

Third Edition

# Cybercrime and Digital Forensics

An Introduction

Thomas J. Holt, Adam M. Bossler, and Kathryn C. Seigfried-Spellman



## Cybercrime and Digital Forensics

This book offers a comprehensive and integrative introduction to cybercrime. It provides an authoritative synthesis of the disparate literature on the various types of cybercrime, the global investigation and detection of cybercrime and the role of digital information, and the wider role of technology as a facilitator for social relationships between deviants and criminals. It includes coverage of:

- key theoretical and methodological perspectives;
- computer hacking and malicious software;
- digital piracy and intellectual theft;
- economic crime and online fraud;
- pornography and online sex crime;
- cyberbullying and cyberstalking;
- cyberterrorism and extremism;
- the rise of the Dark Web;
- digital forensic investigation and its legal context around the world;
- the law enforcement response to cybercrime transnationally;
- cybercrime policy and legislation across the globe.

The new edition has been revised and updated, featuring two new chapters; the first offering an expanded discussion of cyberwarfare and information operations online, and the second discussing illicit market operations for all sorts of products on both the Open and Dark Web.

This book includes lively and engaging features, such as discussion questions, boxed examples of unique events and key figures in offending, quotes from interviews with active offenders, and a full glossary of terms. It is supplemented by a companion website that includes further exercises for students and instructor resources. This text is essential reading for courses on cybercrime, cyber-deviancy, digital forensics, cybercrime investigation, and the sociology of technology.

**Thomas J. Holt** is Professor in the School of Criminal Justice at Michigan State University. His research focuses on all forms of cybercrime and the police response to these offenses. Dr. Holt's work has appeared in outlets such as *British Journal of Criminology*, *Crime & Delinquency*, and *Terrorism & Political Violence*. His research has been funded by the Australian Research Council, the Department of Homeland Security, the National Institute of Justice, and the National Science Foundation.

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“The third edition of *Cybercrime and Digital Forensics* presents an updated and vital introduction to key topics in the study of cybercrime. The authors deliver an accessible textbook for students and a foundational resource for those new to the field, with expanded content on cyberwarfare and illicit markets, among other case studies. *Cybercrime and Digital Forensics* remains a comprehensive and must-read sourcebook in the field of cybercrime.”

**Anastasia Powell**, Associate Professor of Criminology and Justice Studies,  
RMIT University, Australia

“The new edition of *Cybercrime and Digital Forensics* continues to provide a foundation for the study of cybercrime and the government’s response to it. Moreover, the new material demonstrates that the authors have kept up with research and trends on cybercrime as they discuss the emergence of cyber-warfare and the role of the Dark Web in supporting illicit markets. As the demand for cybersecurity specialists grows, this book is a needed primer that covers theoretical, empirical, and practical knowledge for the next generation of professionals.”

**George W. Burruss**, PhD, Department of Criminology and Cyber Florida,  
University of South Florida, USA

“With its broad scope and the captivating style, this new edition of *Cybercrime and Digital Forensics* is a timely update of this seminal book, which remains a key reference point for anyone – scholars and professionals alike – looking for an introduction to cybercrimes.”

**Anita Lavorgna**, PhD, SFHEA, Associate Professor in Criminology,  
University of Southampton, UK

“Cybercrime is a complex phenomenon that blends technical, social and policy dimensions interacting in novel ways. This book presents this complexity in an approachable format and highlights its most salient features to learners from different backgrounds. The authors distill decades of cybercrime expertise in a volume that enables the reader to link practical material with theoretical insights. The abundance of international examples also ensures this book provides students with a truly global perspective on cybercrime.”

**Benoît Dupont**, Professor of Criminology and Canada Research Chair in Cybersecurity,  
Université de Montréal, Canada



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# Cybercrime and Digital Forensics

An Introduction

Third Edition

**Thomas J. Holt, Adam M. Bossler,  
and Kathryn C. Seigfried-Spellar**

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*Tom would like to dedicate this work to all those students, scholars,  
and professionals around the world who seek to understand  
and combat the problem of cybercrime.*

*Adam would like to dedicate the third edition to his family, colleagues, social  
justice advocates, the creators of the Atari 2600,  
and Mr. Whiskers (aka Ricky Bobby).*

*Kate would like to dedicate this work to her students who  
stand on the shoulders of giants.*



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Chapter

1

# TECHNOLOGY AND CYBERCRIME

## Chapter Goals

- Explain how technology has affected human behavior
- Identify the difference between digital natives and digital immigrants
- Discuss the three ways that technology can be abused by individuals
- Recognize a subculture and their role in offending behaviors
- Identify the differences between cyberdeviance, cybercrime, and cyberterror
- Understand how computers and technology produce digital evidence and its value in criminal investigation
- Explain the factors that make cybercrimes attractive to certain people
- Explore the various forms of cybercrime that occur across the world

## Introduction

The Internet, computers, and mobile technologies have dramatically reshaped modern society. Three decades ago, most individuals did not own a cell phone, individuals were not texting, emailing was uncommon, and personal computers were still somewhat expensive pieces of equipment. Internet connectivity generally occurred through slow dial-up modems where individuals paid for Internet access by the hour. Video game systems used 16-bit graphics and did not connect to other devices to allow for gaming to be a communal activity. Individuals read books and newspapers rather than e-readers. If you were using Global Positioning Systems (GPS), you were probably not driving your personal vehicle, but rather operating a military system.

Today, most of the world now depends on computers, the Internet, and cellular technology. Individuals now own laptops that are connected via Wi-Fi, smartphones, and one or more video game systems that may be networked. Cell phones have become a preferred method of communication for most people, especially text messages. In addition, people have multiple email accounts and social networking profiles on multiple platforms for both personal and business use.

It is amazing to consider that the world and human behavior have changed so quickly through the use of technology. In fact, there are now 4.57 billion Internet users worldwide, comprising 58.7 percent of the world's population (Internet World Stats, 2020). Asian nations comprise half of the world's Internet users, though only 53.6 percent of their overall population have sustained online access (Internet World Stats, 2020). By contrast, North American nations

comprise only 7.6 percent of the world's Internet user population, though 94.6 percent of their overall population have access (Internet World Stats, 2020).

## The Importance of Technology in Modern Society

The proliferation of technology has led to distinct changes in how individuals engage with the world around them. People now shop, communicate, and share information in digital formats, which was previously impossible. Additional changes in behavior are likely to continue in the face of technological innovations as they are developed and implemented. In fact, the sociologist Howard Odum referred to this process of behavior change in response to technological innovation as **technicways** (Odum, 1937; Parker, 1943; Vance, 1972). From Odum's perspective, technicways replace existing behavior patterns and force institutional changes in society (Vance, 1972). For instance, if an individual 30 years ago wanted to communicate with other people, he/she might call them, see them in person if possible, or more likely send a letter through postal mail. Now, however, that person would send a text, write an email, or send a direct message, or DM, on social media rather than talking to them over the phone or writing a letter through "snail mail."

The impacts of technicways are evident across all demographic groups in modern society. For instance, 81 percent of Americans own a smartphone as of 2019, with substantial access among younger populations: 96 percent of 18- to 29-year-olds have one (Pew Research Center, 2019). By comparison, evidence suggests 59.9 percent of the population of China and only 25.3 percent of India have smartphones (Newzoo, 2020). As these rates continue to increase, Internet use will change and directly impact the social and economic lives of individuals in each country and across regions of the world.

This is evident in the fact that many people around the world utilize social media as a means to connect and engage with others in different ways. For instance, 69 percent of American adults use Facebook, though there has been substantial increase in the use of Instagram and LinkedIn as a means to communicate (Perrin & Anderson, 2019). By contrast, WhatsApp is much more popular in a global context and is the number one messaging application across much of South America, Western Europe, Africa, and some parts of Asia (Iqbal, 2020). Other services, such as QQ, have a much more region-specific user population (Bucher, 2020).

Despite regional variations in use, technology has had a massive impact on youth populations who have never experienced life without the Internet and

**computer-mediated communications (CMCs)** like email and texting. Today, youth in the United States acquire their first cell phones at approximately age 11, though 20 percent have one by age 8 (Robb, 2019). Similar use patterns are evident across the globe, with children in Germany receiving a phone between the ages of 6 and 13, while children in South Korea obtain them even earlier (Howard, 2017).



**For more information on statistics of social media and technology use, go online to:**

1. [www.pewinternet.org/](http://www.pewinternet.org/)
2. <https://www.cnn.com/2017/12/11/health/cell-phones-for-kids-parenting-without-borders-explainer-intl/index.html>

Technology has not simply shifted the behaviors of youth but has actually shaped and molded their behavior and worldview from the start. Most people born in the mid to late 1980s have never lived without computers, the Internet, or cell phones. As a consequence, they do not know a world without these devices and what life was like without these resources. Thus, Prensky (2001) argued that these youth are **digital natives**, in that they were brought into a world that was already digital, spend large amounts of time in digital environments, and utilize technological resources in their day-to-day lives. For instance, virtually everyone (96 percent) aged 16–34 in the United Kingdom accesses the Internet on a mobile device (Office for National Statistics, 2018). Individuals aged 18–24 in the United States also use unique messaging apps at much higher rates than older groups, as 73 percent use Snapchat and 75 percent use Instagram (Perrin & Anderson, 2019). Similarly, 55 percent of all Indian males between the ages of 18 and 34 use WhatsApp almost every day (Steup, 2018).

By contrast, **digital immigrants** are those who were born before the creation of the Internet and digital technologies (Prensky, 2001). These individuals quite often need to adapt to the digital environment, which changes much more rapidly than they may be prepared for otherwise. This is especially true for many older individuals who were born decades before the creation and advent of these technologies. As a consequence, they may be less willing to immediately adopt these resources or utilize them in diverse ways. For instance, some resources may be more difficult for digital immigrants to understand because of the technologies employed or their perceived utility. For example, only 31 percent of US adults aged 50 and older were likely to use an app like Instagram, and 12 percent used

Snapchat (Perrin & Anderson, 2019). Similarly, only 28 percent of people aged 65 years and older in the United Kingdom used the Internet on a mobile device (Office for National Statistics, 2018). Thus, digital immigrants have a much different pattern of adoption and use of technologies relative to digital natives.

The proliferation of technology in modern society has had a massive impact on human behavior. The world is being restructured around the use of CMCs, affecting the way that we interact with governments, businesses, and one another. In addition, technology use is creating a divide between generations based on the way individuals use technology in their day-to-day lives. At the same time that technology is altering how we live our daily lives, individuals are adapting various technologies, such as computers and the Internet, to subvert their original beneficial designs and applications to commit modified and new forms of crime.

## **Technology as a Landscape for Crime**

The continuing evolution of human behavior as a result of technological innovations has created unparalleled opportunities for crime and misuse. Over the last three decades, there has been a substantive increase in the use of technology by street criminals and novel applications of technology to create new forms of crime that did not previously exist. The World Wide Web and the Internet also provide a venue for individuals who engage in crime and deviance to communicate and share information, which is not otherwise possible in the real world. As a result, it is vital that we begin to understand how these changes are occurring, and what this means for offending in the twenty-first century. There are three key ways that computer and cellular technologies may be abused or subverted by offenders:

- 1 as a medium for communication and the development of subcultures online;
- 2 as a mechanism to target sensitive resources and engage in crime and deviance; and
- 3 as an incidental device to facilitate the offense and provide evidence of criminal activity both online and offline.

## **Technology as a Communications Medium**

Various forms of technology, such as telephony (often viewed as technologies allowing long-distance voice communication), the Internet, and digital media, can be used as a means for individuals to communicate in a rapid and

decentralized fashion across the globe. Computers, cell phones, and technological equipment can be obtained at minimal cost and used with a high degree of anonymity. In turn, criminals can use these devices to connect with others and share information that may be of interest.

For example, the customers of prostitutes use web forums and chat rooms to discuss where sex workers are located, services provided, pricing, and the police presence in a given area (Holt & Blevins, 2007; Holt et al., 2008; Sharp & Earle, 2003). This exchange of firsthand information is difficult to conduct in the real world, as there are no outward signs to otherwise suggest that someone is interested in or has visited a prostitute. In addition, there is a high degree of social stigma and shame surrounding paying for sex, so it is unlikely that someone would admit this behavior to another person in public (McKeganey & Barnard, 1996; O'Connell Davidson, 1998). The faceless, anonymous nature of the Internet, however, allows people to talk about such actions with little risk of harm or reprisal.

The sale of illicit narcotics like cocaine, marijuana, and methamphetamines has also moved online through the development of markets, such as the famous Silk Road (see [Chapter 12](#) for more information), where individuals buy and sell narcotics through various methods. The primary resource used by sellers and buyers are forums operating on the so-called **Dark Web**, which is a portion of the Internet that can only be accessed via the use of specialized encryption software and browser protocols. Individuals can only access these forums through the use of **The Onion Router**, or **TOR service**, which is a free proxy and encryption protocol that hides the IP address and location details of the user (Barratt et al., 2014; Dolliver, 2015). Additionally, the content of these sites cannot be indexed by Google or other search engines. This technology limits the ability of law enforcement agencies to eliminate illicit content because the hosting source cannot be identified through traditional means (see [Chapter 12](#); Dolliver, 2015).



**For more information on TOR, including how it operates, go online to:** <https://www.torproject.org/about/overview.html.en>

The distributed nature of the Internet and CMCs enables individuals to connect to other people and groups that share similar likes, dislikes, behaviors, opinions, and values. As a result, technology facilitates the creation of subcultures between individuals based on common behaviors and ideals regardless of geographic or social isolation. From a sociological and criminological perspective, **subcultures** are groups that have their own values, norms, traditions, and

rituals which set them apart from the dominant culture (Brake, 1980; Kornblum, 1997).

Participants in subcultures generate their own codes of conduct to structure the ways they interact with other members of the subculture and different groups in society (Foster, 1990). In addition, membership in a subculture influences individual behavior by providing beliefs, goals, and values that approve of and justify activity (Herbert, 1998). For instance, a subculture may emphasize the development of skills and abilities that may find less value in the general culture, like an ability to use multiple programming languages and manipulate hardware and software among computer hackers (Holt, 2007; Jordan & Taylor, 1998; Steinmetz, 2015; Taylor, 1999). Members of a subculture also have their own argot or slang to communicate with others and protect their discussions from outsiders (Bilgrei, 2017; Holt et al., 2010a). The use of this language can serve as a practical demonstration of membership in any subculture. Thus, subcultures provide members with a way to gauge their reputation, status, and adherence to the values and beliefs of the group.

There are myriad subcultures in modern society, many involving both online and offline experiences. However, not all subcultures are deviant. Individuals can also be a member of several subcultures at once. For instance, you may belong to a subculture of sports team fans (whether football, basketball, or any athletics) if you (1) enjoy watching their games, (2) know the statistics for your favorite players, (3) know the historic events in your team's previous seasons, and (4) you debate others over who may be the best players in certain positions. Similar subcultures exist for gardening, fashion, cars, movies, and other behaviors. Finding others who share your interests can be beneficial as it allows for social connectivity and a way to channel your interests in positive ways.

**For more examples of various online and offline subcultures and their swift evolutions, go online to:**

1. <https://www.indusnet.co.in/10-internet-subcultures-need-know/>
2. <https://www.afr.com/life-and-luxury/arts-and-culture/punk-s-not-dead-just-invisible-the-fashion-of-today-s-digital-tribes-20191206-p53hgr>



In much the same way, subcultures can emerge online and offline for those with an interest in certain forms of crime and deviance (Quinn & Forsyth, 2005). Technology allows individuals to connect to others without fear of reprisal or social rejection and even enables individuals who are curious about

behavior or activity to learn more in an online environment without fear of detection (Blevins & Holt, 2009; Deshotels & Forsyth, 2020). New technologies also enable the formation of and participation in multiple subcultures with greater ease than is otherwise possible offline. In fact, individuals can readily communicate subcultural knowledge through email and other CMCs, such as techniques of offending that may reduce their risk of detection from victims and law enforcement (Aldridge & Askew, 2017; Souleymanov et al., 2021). Because of the prominence of technology as a means to communicate with others, this book will focus extensively on the role of online subcultures to facilitate crime and deviance in virtual and real-world environments.

### ***Technology as a Target of or Means to Engage in Crime***

The second way that technology can be misused is much more insidious – as a resource for individuals to attack and to cause harm to individuals, businesses, and governments both online and offline. Many devices in our daily lives have the capability to connect to the Internet, from televisions to desktop computers, video game systems, thermostats, and security systems. These technologies contain sensitive bits of information, ranging from our shopping habits to usernames and passwords for bank and email accounts. Since these devices can communicate with one another, individuals can potentially gain access to this information through various methods of computer hacking (see [Chapter 3](#) for more detail).

While hacking is often thought to involve highly skilled individuals with a significant understanding of technology, the simple act of guessing someone's email or computer password could be defined as a hack (Bossler & Burruss, 2011; Skinner & Fream, 1997). In fact, research on college students suggests that between 10 and 25 percent of undergraduates have tried to guess someone else's password (Holt et al., 2010c; Rogers et al., 2006; see also Donner, 2016). Gaining unauthorized access to personal information online is often key to definitions of hacking, as an individual is attempting to gain entry into protected systems or data (see Schell & Dodge, 2002; Steinmetz, 2015; Wall, 2001). In turn, they can use information acquired to engage in different forms of fraud or theft in online and offline spaces.



**For more information on creating passwords, go online to: <http://passwordsgenerator.net/>**

Similarly, some hackers target websites and resources in order to cause harm or express a political or ideological message. Often, the hacker and activist community use **web defacement** in order to spread a message and cause harm at the same time (Holt et al., 2017; Howell et al., 2019). Web defacements are an act of online vandalism wherein an individual replaces the existing HTML code for a web page with an image and message that they create. For example, a person might try to deface the website for the White House ([www.whitehouse.gov](http://www.whitehouse.gov)) and replace the content with a message that they want others to see. Although this is an inconvenience and embarrassment to the site owner, it may be more malicious if the defacer chooses to delete the original content entirely.

Defacements have become a regular tool for politically motivated hackers and actors to express their opinions and have been used around many hot-button social events. For instance, the Turkish hacker community began a widespread campaign of web defacements after the publication of a cartoon featuring an image of the prophet Mohammed with a bomb in his turban (Holt, 2009; Ward, 2006). Many Muslims were deeply offended by this image, and Turkish hackers began to deface websites owned by the Danish newspaper that published the cartoon, along with any other site that reposted the image. The defacements were conducted in support of the Islamic religion and to express outrage over the way their faith was being portrayed in the popular media (Holt, 2009; Ward, 2006). Thus, motivated actors who want to cause harm or express an opinion may view various resources online as a target.

**For more on web defacements and images of such content, go online to: [www.zone-h.org](http://www.zone-h.org)**



### *Defining Computer Misuse and Abuse*

Since technology can be used both as a communications medium and target for attacks against digital targets and infrastructure, it is essential to delineate what constitutes the abuse and misuse of technology. For instance, the term **deviance** is used to refer to a behavior that may not be illegal, though it is outside of the formal and informal norms or beliefs of the prevailing culture. There are many forms of deviance, depending on societal norms and societal contexts. For instance, texting and using Facebook while in class, movie theaters, or other settings may not be illegal, but it is disruptive and generally frowned upon by faculty and administrators. Therefore, texting and using Facebook could be

viewed as deviant in the context of certain situations and locations. Since the activity is engendered by technology, it is to be referred to as **cyberdeviance**.

A more pertinent example of cyberdeviance is evident in the creation and use of pornography (see [Chapters 7 and 8](#)). The Internet has made it exceedingly easy for individuals to view pornographic images and videos as well as make these materials through the use of webcams, cell phone cameras, and digital photography. It is legal for anyone over the age of 18 to either access pornographic images or perform in these films and media. If the larger community shares the view that pornography is morally wrong, then viewing these materials may be considered deviant in that area. Therefore, it is not illegal to engage in this activity; rather it simply violates local norms and belief systems, making it a deviant behavior.

Activities that violate codified legal statutes change from being deviant to criminal acts. In the context of pornography, if an individual is under the age of 18 in the United States, they are not legally allowed to either create or view pornographic images. Therefore, such an act is considered a crime because it carries legal sanctions. The criminal statutes in the United States at both the state and federal levels recognize a variety of offenses in the real world.

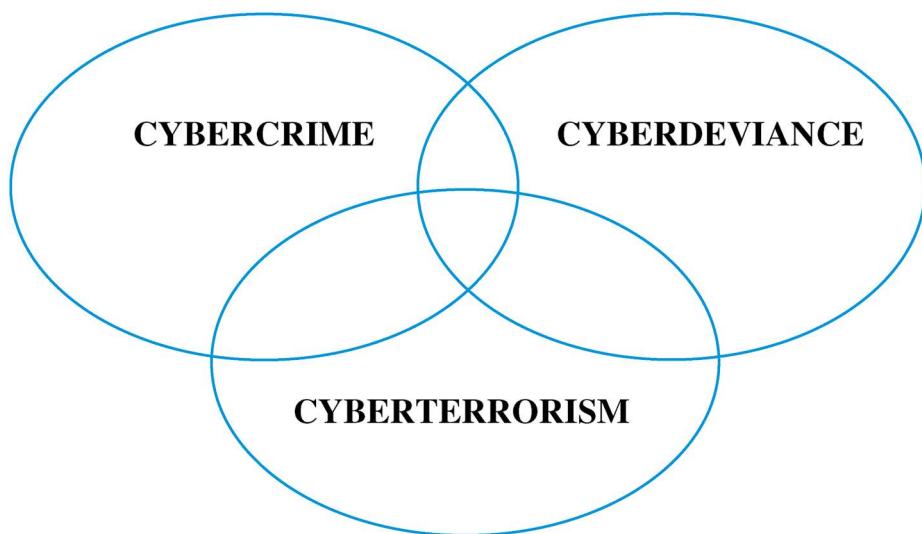
The rapid adoption and use of technology in order to facilitate criminal activity, however, have led to the creation of several terms in order to properly classify these behaviors. Specifically, cybercrime and computer crime emerged a few decades ago to refer to the unique way that technology is used to facilitate criminal activity. **Cybercrime** refers to crimes “in which the perpetrator uses special knowledge of cyberspace,” while **computer crimes** occur because “the perpetrator uses special knowledge about computer technology” (Furnell, 2002, p. 21; Wall, 2001).

In the early days of computing, the difference between these terms was useful to clarify how technology was incorporated into the offense. The fact that almost every computer is now connected to the Internet in some way has diminished the need to segment these two acts (Wall, 2007). In addition, they have become nearly synonymous in both academic circles and popular media. As a result, this book will use the term “cybercrime” due to the range of crimes that can occur through the use of online environments and the massive number of computers and mobile devices that are connected to the Internet.

The borderless nature of the Internet complicates the criminal justice response to crime and deviance since the ways that nations define an act do not generally hinder individuals from accessing content. Using the example of pornography, it is legal to produce and access this content in the United States

and most other parts of the globe. Islamic majority nations like Iran and Saudi Arabia, however, have banned and made it illegal to access pornography due to their religious beliefs (Shishkina & Issaev, 2018). Other countries like Sweden, however, place minimal restrictions on the production of pornographic content, including images of animals or “bestiality.” Although it is illegal to create or view this content in the United States and most other nations, individuals can access bestiality, violent, or unusual pornographic material from across the globe regardless of their nation’s laws, due to the connectivity afforded by the Internet (Brenner, 2008; Wall, 2007). Thus, it is difficult to restrict or enforce local laws on individual conduct because of the ability to access content globally.

The intersection of cybercrime and cyberdeviance is also related to the emerging problem of **cyberterrorism** (see [Figure 1.1](#) for detail; see also [Chapter 10](#)). This term emerged in the mid-1990s as technology began to play an increasingly significant role in all aspects of society (Britz, 2010; Denning, 2001). There is no single accepted definition for cyberterrorism, though many recognize this behavior as the use of digital technology or CMCs to cause harm and force social change based on ideological or political beliefs (Brenner, 2008; Britz, 2010). Cyberattacks driven by an ideological or political agenda have been observed through the last two decades, with individuals targeting sensitive information, computer systems, and networks around the world (Holt et al., 2021). Criminals may also attack these targets using similar tactics, making it difficult to separate acts of cyberterror from cybercrime (Brenner, 2008; Holt et al., 2021).



**Fig. 1.1** Venn diagram of cybercrime, cyberterrorism, and cyberdeviance



**For more information on the technologies supporting power grids, go online to:**

1. [www.tofinosecurity.com/blog/scada-cyber-security-international-issue](http://www.tofinosecurity.com/blog/scada-cyber-security-international-issue)
2. <https://www.allaboutcircuits.com/technical-articles/an-introduction-to-scada-systems/>

In order to more accurately classify these online phenomena, it is necessary to consider both the motive of the attacker and the scope of harm caused. For instance, criminal acts often target single individuals and may be motivated by economic or other objectives, whereas terrorist attacks are often driven by a political motive and are designed to not only hurt or kill innocents but also to strike fear into the larger population (Britz, 2010; Jarvis & Macdonald, 2015). It is not always possible to clearly identify the nature of certain acts as being deviant, criminal, or terroristic based solely on the nature of the event (Holt et al., 2021). Additional context is needed to assess the potential motivation for the action, including the target of the attack and the way in which the attackers express their reasons for the incident. For instance, a data breach targeting a company could be performed for an economic motivation, such as to use customer credit card data to engage in fraud. It may, however, be ideological in nature if the target fits into the ideological beliefs of a specific extremist or radical group, and they post public comments to suggest they performed the attack in order to harm or embarrass the company (Britz, 2010; Jordan & Taylor, 2004). Such hacks have been reported by far-left groups like the Animal Liberation Front since the mid-2000s and are examples of cybercrime performed in support of an ideological belief system that may be considered acts of cyberterrorism (see Holt et al., 2021).

In addition, the communications capability afforded by the Internet creates an interesting intersection between cyberdeviance and cyberterror. For example, members of extremist and hate groups utilize social media and encrypted applications to connect with others across the globe. In fact, various far-right extremist groups now depend upon tools like Telegram as a means to communicate in more covert ways, as well as promote their agenda (see Chapters 10 and 11 for more detail). The laws of a given country may not allow such language, as in Germany where it is illegal to post Nazi-related content (Shishkina & Issaev, 2018). In the United States, though, such speech is protected under the First Amendment of the Constitution; therefore, the act of using online

forums to express an opinion largely unsupported by society is deviant, rather than illegal, behavior.

## *What Makes Cybercrime and Deviance Attractive?*

The rise of cyberdeviance, cybercrime, and cyberterror has led many to question why some people choose to engage in wrongdoing in virtual environments. There are several unique factors that may account for offending online, including, but not limited to, the availability of technology in the modern world, the ease of committing certain forms of cybercrime, technology acting as a force multiplier, the ability to decrease detection by law enforcement via online anonymity, and challenges in international extraditions. Each of these issues is discussed below and throughout the textbook as recurring themes.

First and foremost, the ubiquity of technology makes it easy for individuals to gain access to the tools necessary to offend with relative ease. The prices of computers have dropped substantially over the last decade, making it very easy to acquire such equipment. Smaller portable computers, like the iPad and smartphones, which can connect to the Internet through cellular technology, have also become quite common. As a result, offenders can readily acquire and access information from anywhere through these resources. If a person cannot afford to buy these devices on their own, they can always use computers in Internet cafes and public libraries for free or a small cost. Thus, there are minimal barriers to computer technology globally.

In addition, there is a wide range of cybercrimes that can be performed dependent upon the individual's technical skill. Some forms of cybercrime require a good deal of skill and proficiency, such as the creation and dissemination of malicious software. Other forms of cybercrime may be performed with minimal investment on the part of the offender. For instance, anyone can download pirated music or movies from online environments or send threatening emails.

Technology also acts as a force multiplier in that computers and CMCs allow a single person to engage in crimes that otherwise would involve multiple people and complex schemes in order to target such a significant number of victims (Button & Cross, 2017; Kigerl, 2020). For instance, if a criminal attempted to rob a person in the real world, they must often target single individuals due to the difficulty in intimidating and managing groups of people. The offender must also try to determine in advance if the individual he is attempting to rob has money, jewelry, or other goods that are of value.

In online environments, offenders can target thousands of victims at a time, worldwide, within seconds. Online fraudsters regularly send out unsolicited emails, called **spam**, to thousands of victims using addresses harvested from information posted on public websites (Holt & Graves, 2007; Kigerl, 2020). Public universities often post the addresses of professors, faculty, and staff on their websites. In turn, individuals can copy and collate these addresses into lists and use them to send a variety of different spam messages. Thus, fraudsters increase the likelihood of success by targeting thousands of victims at once with information that is often publicly available (see [Chapter 6](#)).



**For more information on the rate of spam distribution, go online to:** <https://securelist.com/all/?category=442>

The risk of detection from law enforcement is much lower in online environments than in the real world. Offenders in the real world must take several steps to reduce the likelihood that their actual identity can be determined. For example, robbers may wear a mask or baggy clothing to conceal their face and build (e.g., Wright & Decker, 1997). They may also try to disguise their voice by speaking in a higher or lower tone. Victims may be able to recall information about the offender and video cameras may capture the incident on film, making it harder to hide the offense from police.

These issues are largely absent in online environments, as it is easier for offenders to conceal their real identity (Barratt, 2012; Holt et al., 2017). The faceless nature of the Internet makes it easy for individuals to hide their gender, age, or race in various ways. A profile in a social networking site like Facebook or email account can be created using false information through Google, Yahoo, or Hotmail. This false account can be used to send threatening or harassing messages to others to help conceal their true identity (Bocij, 2004; Reyns & Fissel, 2020).

Similarly, various technological resources are designed to hide a person's location from others. For example, Tor, the service used by individuals to access the Silk Road is a form of a **proxy server** that can be used to hide a computer's location by acting as an intermediary between a computer and the servers and systems it connects to through the Internet. If we try to access Google from a PC using a proxy, the command will be routed through a service that will make the request on our behalf and send the information back to us. In turn, the servers at Google will not register our computer as the one making the request, but rather associate it with the proxy server. Some offenders are even able to

route their web and email traffic through other people's computers in order to minimize the likelihood that they are caught (see [Chapter 4](#) for more detail).

**For more on proxy servers, go online to:**

1. <https://www.varonis.com/blog/what-is-a-proxy-server/>
2. <https://www.fossmint.com/free-proxy-for-anonymous-web-browsing/>



Cybercrimes are also attractive for some actors based on the laws of their nation. Since individuals can target victims across the world, local laws make a significant difference regarding who and what an offender targets. Many industrialized nations have laws against cybercrimes, increasing the risk of prosecution and investigation for offenders if caught (Brenner, 2008; de Arimatéia da Cruz, 2020). Therefore, attacking people within that country may increase the likelihood of being prosecuted. If, however, a country does not allow their citizens to be extradited to another country to face prosecution for crimes, then the actor cannot be successfully investigated (Brenner, 2008). For instance, there is no treaty allowing Russian citizens who engage in attacks against US citizens to be brought to the United States for prosecution. Russian criminals cannot be extradited for these offenses and may generally receive no punishment for their actions (see [Box 1.1](#) for an example). In turn, it is extremely difficult to deter or

**Box 1.1 Getting Around Russian Extradition Laws****FBI Agent Charged with Hacking**

[http://www.nbcnews.com/id/3078784#.WNbZom\\_ytQI](http://www.nbcnews.com/id/3078784#.WNbZom_ytQI)



In a first in the rapidly evolving field of cyberspace law, Russia's counterintelligence service on Thursday filed criminal charges against an FBI agent it says lured two Russian hackers to the United States, then illegally seized evidence against them by downloading data from their computers in Chelyabinsk, Russia.

This article provides interesting insights into the challenges posed by cybercrime investigations that cross national boundaries.

sanction cybercriminals in foreign countries and may encourage attacks against certain countries with no consequences.

By contrast, some developing nations may not have laws against computer misuse. If there are no laws, then the nation serves as a sort of “safe haven” for actors where they can operate with minimal risk of legal sanctions (Brenner, 2008; Holt, 2003). This was exemplified in the creation of the ILOVEYOU virus that spread around the world in 2000. This form of malware attacked millions of computers and spread through infected email attachments, effectively crippling the Internet at the time (Poulsen, 2010). The program started in the Philippines on May 4, 2000 and spread across the world in a single day. It is thought to have been created by a Filipino college student named Onel de Guzman, based on the start of the program from Manila and his interest in hacking (Poulsen, 2010). At the time, there were no laws against writing malware in the Philippines, making prosecutors unable to pursue de Guzman. Thus, the absence of laws can make it extremely difficult to combat cybercrimes internationally.

Taken as a whole, the global reach of the Internet has created substantial difficulties for law enforcement agencies at home and abroad to enforce cybercrime laws globally. The structure of policing, especially in the United States, establishes guidelines for the investigation of crimes at the local, state, and federal levels. Offenses that occur within a single jurisdictional boundary are often the responsibility of local municipal police departments or sheriffs’ departments, while those that cross state or national boundaries are handled by state or federal agencies. Many cybercriminals may not live within the same region as their victim (Hadzhidimova & Payne, 2019), though even if they were in the same region, a victim may have no idea where the offender actually resides. This creates significant confusion as to the appropriate agency to contact and diminishes the amount of cybercrime reported to law enforcement (Holt et al., 2015; 2020b). In fact, this undercounting is referred to as “the dark figure” of cybercrime, in that the true number of offenses is unknown.

One reason for the lack of reporting is the inherent difficulty in recognizing when illegal activities have taken place. Individuals may be completely unaware that they have been the victim of cybercrime until it is too late. For example, failures in computer hardware and software may be either the result of an error in the equipment or a direct result of criminal activities designed to hide their occurrence. Many in the general public do not have the skills necessary to discern the root cause, making it hard to know when some sort

of compromise has taken place. Since cybercriminals attempt to target as many victims as possible, it has also been challenging to identify clear risk patterns for certain cyber offenses, such as being the victim of malicious software (Holt & Bossler, 2015; Maimon & Louderback, 2019). Finally, protective software programs designed to reduce individual risk of victimization do not always work. This is due in part to user error, such as misconfiguring the software or not updating it properly which increases the risk of infections. As a result, antivirus software are not a total solution to reduce the risk of compromise (Holt & Bossler, 2015).

The embarrassment, shame, or harm that may come from reporting cybercrime victimization also reduces the likelihood of contacting law enforcement. For instance, individuals are often targeted for what are called romance scams, wherein a fraudster develops a romantic, emotional relationship with a person and gets the individual to send them money over time (Button & Cross, 2017). Victims of these scams often feel substantial shame and embarrassment over their experience, not only because of the money lost but over the emotional trauma experienced by the betrayal of someone they thought loved them (Button & Cross, 2017). Additionally, when they report their experiences to police, they often report feeling blamed by police because of their complicity in transferring funds to the fraudster (Button & Cross, 2017).

Taken as a whole, technology affords multiple unique advantages for offenders that are not necessarily present in the real world. Technology is readily available across the globe, providing offenders widespread access to resources. The number of people online provides a wealth of prospective victims that can be affected with greater ease than is possible in the real world. Technology also offers people the ability to hide their actual identity behind a variety of false names and locations, making it difficult to determine who is responsible for a criminal incident. Finally, the different legal structures and cooperative agreements in place across the globe make it difficult to successfully prosecute cybercrimes. As a result, individuals who engage in cybercrime and deviance face a much lower risk of detection and arrest and may experience greater monetary or emotional rewards from cybercrime.

**For more information on the challenges of prosecuting cybercrimes, go online to:** <https://www.justice.gov/archives/opa/blog/ensuring-tech-savvy-criminals-do-not-have-immunity-investigation>



## **Technology as Evidence**

The third and final way that technology may be used in the course of an offense is through its **incidental** role or involvement in a crime. In this case, the computer may either be involved in the commission of a crime or is being used merely as a storage device (Sachowski, 2018). For instance, the presence of child pornography on a laptop or cell phone suggests that it is incidental to the offense. This information, wherever it is stored, constitutes **digital evidence**, defined as information that is either transferred or stored in a binary form (Sachowski, 2018). Digital evidence can be anything from the browser history of an individual to the emails, chat logs, photos present on mobile phones, GPS devices, IoT devices, and cell phone cameras of both victim and offenders (see [Chapter 15](#)). Computers, in the traditional sense, are no longer the only devices capable of sending emails, chatting, and browsing the Internet. Tablets, music players, and various other devices can be connected to the Internet and provide some evidence of an individual's behaviors.

There are several valuable examples that help clarify what is digital evidence and when it may be pertinent for various forms of crime both online and offline (Maras, 2012; Sachowski, 2018). For example, BTK (Bind, Torture, Kill) was a serial killer in Kansas (United States) from 1974 until 2005 when he was arrested and convicted of ten homicides (Williams & Landwehr, 2006). The killer murdered ten people in Kansas between 1974 and 1991 and then went dormant, though he constantly wrote letters to the media and police describing his exploits. The investigation went cold, though the BTK Killer indicated that he had committed another murder that had not been attributed to him.

Police then began communicating directly with BTK, when the killer asked if it was possible to trace his identity on the basis of data on floppy disks. The agency erroneously said that they could not, and BTK sent them a disk with a document discussing his behaviors. Using specialized computer forensic software to help process the data and evidence located on the disk, investigators determined the location of the computer where the disk had been opened, as well as the person who created the document. In turn, they were able to develop detailed information about the killer and gather enough circumstantial evidence to suggest a prospective identity, which turned out to be a man named Dennis Rader. He was subsequently arrested and pled guilty to the murders, receiving ten consecutive life sentences, one for each murder (Williams & Landwehr, 2006).

Digital evidence can also be derived from online sources that may be present on websites and social media. In fact, digital evidence collected from social media sites, such as Facebook and Twitter, has been influential in law enforcement over the last few years. Following the Vancouver Canucks' loss to the Boston Bruins in the Stanley Cup finals in 2011, a massive riot broke out in Vancouver with fans setting vehicles on fire, breaking windows, looting stores, and dancing atop overturned cars (CBC News, 2011). Within hours of the riot, police received over 3,500 emails that included videos, photos, and web links to various social media sites. In addition, a "Vancouver Riot Pics," Facebook page was created to identify those individuals involved in the riots by allowing the public to "tag" the pictures and videos (Leger, 2011). More than 100 people were arrested through the assistance of social media.

With virtually every crime incorporating some form of digital evidence, it is up to law enforcement to be able to identify the possible sources of information and the locations where such information may be found. Various peripheral devices like flash drives, CDs, DVDs, and even gaming systems may contain digital evidence that can be collected. Some companies even produce removable storage media that are easily disguised, such as a pair of sunglasses or a wristband that contains a flash drive. With digital devices increasingly being used to target, act as a tool, or provide support for criminal activities, law enforcement and investigators must understand the nature of the digital crime scene.

**For more on hidden media devices, go online to: [www.trendhunter.com/slideshow/disguised-usb-drives](http://www.trendhunter.com/slideshow/disguised-usb-drives)**



## A Typology of Cybercrime

In light of the various ways that technology engenders crime and deviance as well as fosters unique tactics for offending, it is necessary to understand the wide range of behaviors that constitute cybercrime. David Wall (2001) created one of the most recognized typologies of cybercrime, which encapsulates behavior into one of four categories: (1) cyber-trespass; (2) cyber-deception and theft, (3) cyber-porn and obscenity, and (4) cyber-violence. These categories reference the wide range of deviant, criminal, and terrorist behaviors that have emerged utilizing technology, as well as the subcultures supporting offenders throughout the world.

## **Cyber-Trespass**

The first category is **cyber-trespass**, referring to the act of crossing boundaries of ownership in online environments. This may seem confusing at first. If you go to a coffee shop or restaurant, you may notice they offer free Wi-Fi. Their network probably has a name that they chose which identifies their network and indicates who manages and is responsible for that space. In order to use the service, you must join their network and accept the terms of service that may come up when you open your web browser. In this instance, the coffee shop owns and manages this wireless network but allows others to use the connectivity. By contrast, if the shop did not offer connectivity to customers, but you attempt to join and use their Wi-Fi anyway, you are trespassing because you are trying to break into the network that they own without the company's permission.

The issue of ownership is critical in instances of trespass; especially for computer hackers who often attempt to access computer systems, email accounts, or protected systems that they do not own (Steinmetz, 2015). Many in the general public recognize hackers for their involvement in criminal acts of trespassing sensitive boundaries of ownership, contributing to the belief that hackers cause significant harm to citizens, industry, and government alike. Though not all hackers engage in crime (Steinmetz, 2015), those who do cost individuals and corporations a great deal of money each year. Individuals who are interested in computer hacking operate within a large online subculture with participants from across the globe (Leukfeldt et al., 2017). They often come together online to discuss various techniques of hacking and their attitudes toward hacking with or without permission from system owners (Holt, 2007; Leukfeldt et al., 2017). Because not all hackers engage in crime, there is a rift within the subculture based on an individual's willingness to engage in acts of cyber-trespass in support of hacking (see [Chapter 3](#) for more detail).

## **Cyber-Deception/Theft**

The second category within Wall's (2001) typology is **cyber-deception** and theft, which can extend from hacking and other forms of cyber-trespass. This category includes all the ways that individuals may illegally acquire information or resources online and often goes hand in hand with trespass. For instance, criminals can use email messages to acquire bank account

information from victims through the use of **phishing** messages (Leukfeldt et al., 2017). In this case, a criminal sends a message claiming to be from a bank or financial institution which needs the prospective consumer to validate their account information by clicking on a web link provided in the message. The individuals are then sent to a fraudulent website that resembles the actual financial institution and are asked to enter in their bank account username, login, and other sensitive information (Leukfeldt et al., 2017). This data is then stored and used by the criminal to engage in fraud or resold to others through an online black market for stolen data. These crimes are particularly costly for consumers and businesses, as a data breach resulting from phishing or other means can cost an average of \$8.19 million in the United States alone (IBM, 2019).

The problem of digital piracy is also included in cyber-theft, encompassing the illegal copying, using, or distributing of digital media, such as computer software, digital sound recordings, and digital video recordings, without the explicit permission of the copyright holder (Lee et al., 2018). Almost 40 percent of consumers in 18 of the world's leading markets obtained their music through digital piracy (IFPI, 2018). The Recording Industry Association of America's website reports a 2007 study that estimated that music piracy costs the music industry \$12.5 billion and 71,000 jobs (Siwek, 2007). The Business Software Alliance (2018) estimated that software piracy costs \$52 billion in 2017. These estimates should be interpreted with caution as they come from businesses or advocacy groups who have financial incentives for bringing attention to the issue of digital piracy and may incorrectly formulate that a pirate would have otherwise purchased the movie, show, song, video game, or piece of software (Yar & Steinmetz, 2019).

**For more information on the problem of software piracy, go online to:** <https://gss.bsa.org/>



The problem of piracy appears to be facilitated in large part by the subculture of pirates operating online (see [Chapter 5](#) for further discussion). The participants in this subculture help break copyright protections on DVDs, Blu-ray disks, and software and distribute these materials online. In fact, individuals can access pirated media and software through various outlets, including file-sharing services, torrents, and websites (Cox & Collins, 2014; Holt & Copes, 2010). Participants in this subculture also encourage piracy by sharing

their attitudes toward copyright law and minimizing the harm caused by pirating media (Steinmetz & Tunnell, 2013). Many young people believe piracy is an acceptable victimless behavior that has little impact on artists or private industry (Brown, 2016; Hashim et al., 2018; Steinmetz & Tunnell, 2013). Thus, cyber-deception and theft involves multiple activities that cause significant financial harm.

### **Cyber-Porn/Obscenity**

The third category in Wall's typology of cybercrime is **cyber-porn** and obscenity, representing the range of sexually expressive content online. As noted earlier, sexually explicit content is defined differently based on location. Thus, porn and obscenity may be deviant or criminal based on local laws. The relatively legal nature of adult pornography has enabled the development of an extremely lucrative industry, thanks in part to the availability of streaming web content and high-speed connectivity (Deshotels & Forsyth, 2020; Lane, 2000). In addition, amateurs are increasingly active in the porn industry due to the ease with which individuals can produce professional quality images and media through HD digital cameras, web-enabled cameras, and other equipment (Deshotels & Forsyth, 2020; Lane, 2000). While viewing pornographic content is not illegal for individuals over the age of 18, accessing certain content, such as violent or animal-related material, may be criminal depending on local laws.

The ability to access pornographic content has also enabled the development of online subcultures focused on various deviant sexual activities. Individuals with niche sexual fetishes can identify multiple outlets to discuss their interests with others in web forums, email lists, and online groups that engender the exchange of information in near real time (Deshotels & Forsyth, 2020). In turn, these spaces help to make people feel they are part of a larger group that validates their beliefs and attitudes.

Sexual subcultures can also move into criminal activity when the actors victimize children and adults either online or offline. For instance, prostitutes increasingly utilize the Internet to advertise their services and keep in touch with clients (Cunningham & Kendall, 2010; DeAngelo et al., 2019). The customers of sex workers also utilize this technology in order to discuss their experiences, provide detailed accounts of their interactions, and warn others about police activities in a given area (Holt & Blevins, 2007; Sharp & Earle, 2003). Similarly, pedophiles who seek out sexual relationships with children frequently use

CMCs in order to identify and share pornographic and sexual images (Deshotels & Forsyth, 2020; Jenkins, 2001; Quayle & Taylor, 2002). They may also use forums and instant messaging to connect with children in an attempt to move into offline relationships (Wolak et al., 2003, 2004).

## Cyber-Violence

The final form within Wall's typology is **cyber-violence**, referring to the ability to send or access injurious, hurtful, or dangerous materials online. This may encompass emotional harm such as embarrassment or shame, and in limited circumstances physical harm through suicidal ideation (Hinduja & Patchin, 2015). For example, the volume of information available through social networking sites, coupled with frequent use of CMCs, has increased the likelihood that individuals will be bullied, harassed, or stalked online (Hinduja & Patchin, 2015; Reyns & Fissel, 2020). Individuals from various age-groups are increasingly receiving threatening or sexual messages via email, instant message, or texts (Reyns & Fissel, 2020; Smith et al., 2017). People can also use CMCs to post embarrassing video, images, and text about another person for the public to see. In fact, technology has greatly increased the likelihood of emotional or psychological harm resulting from these messages (see [Chapter 9](#); Duggan, 2017; Lenhart et al., 2016).

Various extremist groups with their own subcultural norms and values utilize the Internet in order to promote their beliefs and connect interested parties together (see [Chapter 10](#) for details). Social media sites like Facebook, video sharing sites like YouTube, and various web forums are used by extremist groups to promote their ideological beliefs (Hamm & Spaaij, 2017; Scrivens et al., 2020; Weimann, 2011). For instance, Dylann Roof shot and killed nine African Americans in a church in Charleston, South Carolina, on June 17, 2015 (Hankes, 2015). His attack was racially motivated, and it was discovered shortly after his arrest that he operated a website where he posted pictures of himself with guns, Confederate flags, and neo-Nazi and white supremacist paraphernalia, along with a manifesto explaining his views. He also posted on a white supremacist web forum called *The Daily Stormer* and used it as a vehicle to express his racist beliefs (Hankes, 2015).

In addition, extremist groups have utilized the Internet in order to engage in attacks against governmental targets worldwide. Hackers associated with various jihadist groups around the world have attempted to engage in **Distributed Denial of Service (DDoS) attacks** against governments and private

businesses (Ashok, 2016; Hamill, 2014). In a DDoS attack, individuals send multiple requests to servers that house online content to the point where these servers become overloaded and are unable to be used by others. As a consequence, these attacks can completely knock a service offline, causing companies to lose money and, potentially, customer confidence. For instance, the Izz ad-Din al Qassam Cyber Fighters engaged in a series of cyberattacks against various US financial institutions in 2012 and 2013 (Hamill, 2014). Similarly, the hacker group Anonymous used DDoS attacks in order to stage protests against government, industry, and civilian targets (Correll, 2010; Poulsen, 2011). Thus, the use of technology has expanded the capability of extremist groups to affect populations and targets well beyond their overall capacity in the real world.

## Overview of the Textbook

Given the range of criminal and deviant acts that are enabled by the Internet and CMCs, it is critical that we understand as much about these phenomena as possible. Thus, this book will explore the spectrum of cybercrimes in detail, considering how real-world crimes have incorporated technology, as well as the unique forms of offending that have emerged as a direct result of technology. In addition, each chapter will consider the unique subcultures that have emerged in online environments around a form of deviance, crime, or a specific ideology. The subcultural norms of each group will be explored in order to understand how involvement in this subculture affects behavior both online and offline, as well as its influence on attitudes toward crime and deviance. Finally, statutes in the United States and abroad that have been created to address these issues will be covered, along with the local, state, national, and international law enforcement agencies that have responsibilities to investigate and enforce those laws.

*Chapter 2: Law Enforcement, Privacy, and Security in Dealing with Cybercrime* provides an overview of the various entities involved in policing cybercrimes. These entities include traditional local, state, and federal law enforcement agencies as well as organizations and industry bodies that actively attempt to mitigate cybercrimes without a legal mandate from the state.

*Chapter 3: Computer Hackers and Hacking* explores computer hacking in depth, including its role in attacks against individuals and corporations alike.

*Chapter 4: Malware and Automated Computer Attacks* explores the problem of malicious software and its evolution over time. *Chapter 5: Digital Piracy and*

*Intellectual Property Theft* considers the issue of digital piracy, as well as the use of the Internet to steal intellectual property, such as algorithms and design plans, from citizens, companies, and governments. Online fraud and theft, including the use of email scams to acquire financial information from unsuspecting victims, are further explored in [Chapter 6: Online Fraud](#).

[Chapter 7: Pornography, Image-Based Sexual Abuse, and Prostitution](#) covers a wide variety of online sexual behavior, including pornography, how the Internet has affected traditional prostitution, and how the criminal justice system has attempted to evolve to address these issues. [Chapter 8: Child Sexual Exploitation Material Offenses](#) considers sexual crimes against children, including child molestation and the creation, distribution, and viewing of child sexual exploitation materials, or CSAM.

[Chapter 9: Cyberbullying, Online Harassment, and Cyberstalking](#) investigates the significant interpersonal forms of violence of online harassment, cyberbullying, and cyberstalking. [Chapter 10: Online Extremism and Cyberterror](#) explores the use of technology to spread hate speech and extremism across the globe. [Chapter 11: Cyberwarfare and Information Operations Online](#) examines the concept of cyberwarfare in practice and details how nation-states and individuals intersect to cause harm across the globe.

[Chapter 12: Illicit Market Operations Online](#) discusses the ways that all manner of illicit goods now move through online channels on the open and Dark Web, from drugs and identity documents to cybercrime tools.

[Chapter 13: Cybercrime and Criminological Theories](#) provides the reader with an in-depth examination of whether traditional criminological theories can help us understand why individuals commit the wide range of behaviors that is encompassed in cybercrime. It will also explore the idea of whether new cybercrime theories are needed or whether our current stock of criminological theories is adequate in explaining these “new” forms of crime.

[Chapter 14: Evolution of Digital Forensics](#) elaborates the concept of digital forensics and the process of seizing evidence from various devices. [Chapter 15: Acquisition and Examination of Forensic Evidence](#) details the various tools used in the process of evidence analysis, as well as the techniques involved in data recovery and investigation generally. [Chapter 16: Legal Challenges in Digital Forensic Investigations](#) focuses on the process of evidence presentation in court, and the laws that affect what is admissible and when by an analyst.

Finally, [Chapter 17: The Future of Cybercrime, Terror, and Policy](#) considers the future of cybercrime with a discussion of the ways that the global nature of technology hinders our ability to effectively regulate these offenses.

## Key Terms

Computer crime  
Computer-mediated communications (CMCs)  
Cybercrime  
Cyber-deception  
Cyberdeviance  
Cyber-porn  
Cyberterrorism  
Cyber-trespass  
Cyber-violence  
Deviance  
Dark Web  
Digital evidence  
Digital immigrant  
Digital native  
Distributed denial of service attack  
Incidental  
Phishing  
Proxy server  
Spam  
Subculture  
Technicways  
The Onion Router, or TOR service  
Web defacement

## Discussion Questions

1. Think carefully about your current access to technology. How many laptops, desktops, tablets, and mobile devices do you own? How much time do you spend online? How would you compare your use of technology to your peers'?
2. Take a few moments to think critically about the way in which you share information with the world through online environments. How many social media accounts do you have and on how many different platforms? Do you cautiously share personal information? How much

- detail do you place about yourself in posts on any social media platform? Do you use the same credit card for all online purchases? How often do you pirate media? Keeping this in mind, detail the various ways in which you could become a victim of as many forms of cybercrime as is possible.
3. Do you belong to any online or offline subcultures? What are they, and how do you think they affect your activities and attitudes toward the world around you?
  4. How much overlap do you see between real-world crimes and cybercrimes? Should we have distinct terms to recognize crime or deviance in online environments, or should all offenses just be classified as crimes regardless of where and how they occur?

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# LAW ENFORCEMENT, PRIVACY, AND SECURITY IN DEALING WITH CYBERCRIME

## Chapter Goals

- Recognize the responsibilities of local, state, and federal law enforcement agencies in responding to domestic and international cybercrimes
- Understand the different agencies that respond to cyberattacks against military or government systems compared to that of citizens
- Differentiate between civil and criminal law as it applies to digital investigations, including the role of private investigators in digital evidence handling and investigation for civil matters
- Appreciate the challenges that emerge in dealing with cybercrime investigations that cross national borders
- Deliberate upon why governments must balance the privacy rights of citizens against intelligence collection strategies employed to investigate national threats
- Discuss how companies and governments diminish their perceived legitimacy based on their use of certain strategies

## Introduction

Most nations socialize citizens to contact their local emergency service provider in the event of a crime, as with 911 in the United States or 999 in the United Kingdom. The average person may assume that their local police agency is the appropriate point of contact in the event they experience cybercrime victimization. This is unlikely to result in a successful interaction for either the person or the agency.

Policing and law enforcement agencies are complex bureaucracies with roles and responses that are bound by jurisdiction. If a person is the victim of identity fraud or theft in which an offender living in another state or country uses their information to make online purchases, the limited jurisdiction of a local agency would mean that they could not respond to the call for service (Walker & Katz, 2022). Instead, it would likely have to be reported to a federal or national law enforcement agency, and even then, it may not be resolved in a satisfactory way for the victim due to the difficulties in transnational investigations.

Alternatively, the type of victimization an individual experiences may not be viewed as an incident that law enforcement can actually investigate. For instance, if an average home computer user's machine is infected by a

piece of malicious software, a local law enforcement agency may say that this is not a crime they can investigate. If there is no evidence that their personal information was compromised or misused by the attacker, then the incident may not technically constitute a violation of local laws (see [Chapter 4](#) for more details on state malware laws). Similarly, receiving a single mean or harassing message on Facebook or Twitter may not be sufficient to justify a criminal complaint to a police agency (see [Chapter 9](#) for more information).

These conditions have significant consequences for the criminal justice system. Citizens are less willing to contact police agencies about their cybercrime victimization than physical victimization, even if the victimization is serious (e.g., Cross, 2015). Graham et al. (2020) found in a sample of United States respondents that individuals were more likely to report serious victimization to the police and slightly more likely to report physical crimes than cybercrimes. Respondents also believed that the police were less likely to identify and arrest an offender who committed a cybercrime than a traditional offense. Van de Weijer et al. (2020) found in a Dutch sample that individuals were more likely to report serious cybercrime than minor ones and less likely to report their victimization if they knew the offender.

If underreporting becomes a normalized behavior, which it may have already become, then we will not truly understand the frequency and seriousness of cybercrime victimization, which individuals are experiencing. Such a concern is real and has been an acknowledged problem by law enforcement, policy-makers, and researchers since the mid-1990s (e.g. Goodman, 1997; Stambaugh et al., 2001). Despite this recognition, police agencies, especially those at the local level, have been relatively slow to respond or adapt to the issue of cybercrime. In fact, empirical research on the police response to cybercrime is still limited, despite the severity of these offenses, in comparison to the amount of police-oriented research on other topics, such as gangs and domestic violence (see Holt et al., 2015).

This chapter will examine why police agencies at all levels have challenges in responding to cybercrime. We first provide an overview of the local, state, and federal or national agencies that investigate cybercrimes as well as attacks by nation-states and terror threats. Next, the increasingly common role of civil law in digital forensic examination and responses to technology misuse by corporations is also considered. We conclude the chapter by considering the growth of corporations and intelligence agencies' use of data mining online behavior and the challenge this poses to personal privacy.

## Role of Municipal Police Departments and Sheriff Offices in Investigating Cybercrime

Local law enforcement departments, including local municipal police departments and Sheriff's agencies, are responsible for responding to a wide variety of calls, helping citizens, investigating crimes, arresting offenders, preventing crime, increasing public feelings of safety, and generally responding to a wide range of citizen requests within their limited jurisdiction (Walker & Katz, 2022). Just as with traditional forms of crime, most individuals may think that the first agency to contact for assistance with a cybercrime is their local law enforcement agency. There is, however, a substantial degree of variation in the size and response capabilities of local law enforcement. For example, Nowacki and Willits (2020), using the 2013 Law Enforcement Management and Statistics Survey, found that larger and more complex agencies with more hierarchical levels and more specialization were more likely to specifically dedicate resources to cybercrime.

In the United States, the majority of law enforcement agencies involve **local police** forces serving cities, often referred to as municipal police departments. **Sheriffs'** departments, on the other hand, have different responsibilities depending on their location throughout the United States. Some have policing responsibilities (e.g., patrolling and responding to calls) of unincorporated areas throughout a county. They often have to patrol and handle calls for services in remote and rural areas depending on the region of the country. Other Sheriff departments may not have policing responsibilities and instead only maintain the county jail, provide court security, and enforce civil laws, such as evictions (Walker & Katz, 2022). Most local law enforcement agencies serve small populations in rural or suburban communities with populations under 50,000 (Walker & Katz, 2022). As of 2016, 48 percent of all local agencies had less than ten sworn officers (Hyland & David, 2019).

In the United Kingdom, **territorial police forces** are responsible for policing a specific jurisdictional region and generally comprise the majority of police agencies (Yar, 2013). In Canada, major urban centers, such as Toronto or Montreal, also have their own police forces that serve the local population. Local law enforcement agencies in most countries, including the United States, do not currently have a large role in the prevention and investigation of most forms of cybercrime. They are responsible, however, for investigating crimes in which a victim and offender reside within their jurisdiction. For example, local law enforcement is primarily responsible for investigating most cases of online harassment or stalking (see [Chapter 9](#)). Person-based cybercrime cases such as the creation and consumption of child sexual exploitation materials (see [Chapter 8](#); Jenkins, 2001), as well as

sexual solicitation and prostitution cases in the United States, may also be investigated by local police agencies (see [Chapter 7](#); Cunningham & Kendall, 2010).

Over the last three decades, both scholars and police administrators have created lists of reasons why cybercrime poses significant challenges for local law enforcement and why they are not more heavily involved (Burns et al., 2004; Goodman, 1997; Holt et al., 2010; Senjo, 2004; Stambaugh et al., 2001). Some of the challenges can be addressed by placing a higher priority on cybercrimes and providing more funding to police these offenses. Others are not so easily addressed. The list of challenges includes but is not limited to:

- jurisdictional issues caused by the victim and offender not living in the same municipality or county;
- lack of a standard definition for cybercrime;
- little public outcry in comparison to traditional crime, particularly violent crime;
- difficulty in investigating an invisible crime;
- difficulty in acquiring and maintaining the technologies required to investigate these resources (see [Chapters 14–16](#));
- challenges in training, retraining, and retaining trained officers; and
- lack of managerial and police support for the investigation of cybercrimes.

Although the above list of challenges appears to be insurmountable to some, scholars and police administrators have still argued that local law enforcement must play a larger role in investigating cybercrimes (e.g. Bossler & Holt, 2012; Popham et al., 2020; Stambaugh et al., 2001). Some have argued for the development of more local cybercrime investigation units that could directly respond to crimes involving digital evidence in order to decrease assistance from state and national/federal levels (Hinduja, 2007; Horgan et al., 2021; Marcum et al., 2010). A recent longitudinal analysis of law enforcement data within the United States demonstrates that there has been an increase in the number of specialized cybercrime units at the local level (Willits & Nowacki, 2016). They are, however, more likely to appear in police agencies that serve a very large population, such as major cities and urban centers, have greater patrol duties, and possess greater general access to technology (Willits & Nowacki, 2016).

**For more information on the challenges cybercrimes pose to local law enforcement, go online to: <https://www.ncjrs.gov/pdffiles1/nij/186276.pdf>**



Other scholars and commentators have focused on the need for patrol officers to improve their ability to act as first responders to crime scenes with computers or digital evidence (Holt et al., 2010; National Institute of Justice, 2008; Stambaugh et al., 2001). Almost no data exist in the United States on how often patrol officers actually respond to cybercrime calls, although it seems quite rare (Bossler & Holt, 2012; Holt et al., 2010). Other nations provide this information in national policing statistics, such as Canada and South Korea (Popham et al., 2020). Scholars and police administrators similarly argue for more computer and technology training for patrol officers since patrol officers in the United States are overall ill prepared to respond to digital evidence scenes (Hinduja, 2007; Holt et al., 2010; Horgan et al., 2021; Popham et al., 2020; Stambaugh et al., 2001). Government documents and training manuals indicated awhile back that government officials expected this not to be the case in the near future. For example, in the United States, the National Institute of Justice (NIJ) published the *Electronic Crime Scene Investigations: A Guide for First Responders, Second Edition* in 2008. As of the time of this edition, there is still not the third edition.

This guide, which was created primarily for patrol officers, provided both basic and more advanced information on how to properly respond to a digital crime scene, including how to recognize, seize, document, handle, package, and even transport digital evidence. Instead, other online sources are now available for first responders to review and easily access. For example, the US Secret Service (n.d.) published the third version of *Best Practices for Seizing Electronic Evidence: A Pocket Guide for First Responders* to help first responders with common issues surrounding scenes with digital evidence. This document provides a similar direction for law enforcement as to how to triage and process computers and mobile devices at crime scenes.



**For more information on the US Secret Service's Best Practices for Seizing Electronic Evidence, go online to: <https://www.crime-scene-investigator.net/SeizingElectronicEvidence.pdf>**

As the world of digital and smart devices continues to grow, it is essential that police expand their capability to properly seize digital evidence. The rise of smart vehicles, televisions, and IoT devices like Alexa could all store evidence to support a criminal investigation (see [Chapters 14–17](#)). Thus, it would seem to be a necessity that patrol officers have minimal computer literacy in order to know what to secure and understand the lexicon of witnesses.

**For more information on ways that local agencies may move forward to better respond to cybercrime, go online to: [http://www.policeforum.org/assets/docs/Critical\\_Issues\\_Series\\_2/the%20role%20of%20local%20law%20enforcement%20agencies%20in%20preventing%20and%20investigating%20cybercrime%202014.pdf](http://www.policeforum.org/assets/docs/Critical_Issues_Series_2/the%20role%20of%20local%20law%20enforcement%20agencies%20in%20preventing%20and%20investigating%20cybercrime%202014.pdf)**

Interestingly, it appears that police officers do not share the same views as administrators and academics regarding their role in handling cybercrimes or crimes with digital evidence (Holt et al. 2019). Patrol officers know that local law enforcement agencies generally place a low priority on most forms of cybercrime unless it involves child sexual abuse content (Hinduja, 2004; Holt & Bossler, 2012; Holt et al., 2019; Senjo, 2004; Stambaugh et al., 2001). Local agencies may also be increasing their capabilities to investigate various forms of online economic crimes (Bossler, Holt, Cross, & Burruss, 2019), but they do not really focus on computer intrusion offenses (see [Box 2.1](#); Holt et al., 2010).

### **Box 2.1 Increasing Local Police Capacity to Investigate Cybercrime**

#### **Coaxing Cops to Tackle Cybercrime? There's an App for That**

<https://www.npr.org/2020/01/15/796252827/coaxing-cops-to-tackle-cybercrime-theres-an-app-for-that>



“If somebody walked into the precinct holding a bloody handkerchief to their head and said, ‘Somebody hit me over the head and took a thousand dollars out of my wallet,’ you’d have five cops running out to find the guy,” says Nick Selby, a former police detective with extensive cyber security experience. “[But] if they come in and say, ‘Some scammer took a thousand dollars from me,’ [police say] ‘Ooooh, you’ve got to call the FBI!’ That’s crazy. That’s the old way of thinking.”

This article details the development of a training application within the NYPD that provides officers with details on how to interview victims of cybercrime cases. The story provides a good example of innovative strategies that could be implemented widely to improve the response to cybercrime calls for service.

In addition, they feel that police management, and prosecutors for that matter, have little knowledge of cybercrime and do not have the appropriate resources to adequately investigate and prosecute most forms of cybercrime (Burns et al., 2004; Holt et al., 2010; Stambaugh et al., 2001). They therefore do not believe that local law enforcement should be primarily responsible for dealing with cybercrime (Bossler & Holt, 2012; Burns et al., 2004; Holt et al., 2019). They place less emphasis than police administrators on the importance of creating local cybercrime investigative units and implementing additional computer training (Bossler & Holt, 2012). Instead, they believe that the best strategies for dealing with cybercrime would be for citizens to be more careful online and changes to the legal system. Officers also believe that they cannot get involved in offenses that are not criminal in nature, such as cyberbullying, and also believe parents and schools need to handle these issues (Patchin et al., 2020). It would seem that they would not want any substantial changes to their roles of primarily dealing with traditional forms of crime and order maintenance.

## State Agencies' Roles in Investigating Cybercrime

The next level of law enforcement that currently has any substantial responsibility in addressing cybercrime is **state** (e.g., United States, Australia) and **provincial** (e.g. Canada) **police agencies** (Walker & Katz, 2022). In the United States, state agencies can focus on highway traffic control, state law enforcement, or provide laboratory services to smaller agencies depending on the state's Constitution and the mission of the state agency. In general, many states have a state law enforcement agency that can investigate crimes where a jurisdictional conflict exists or limited resources prevent a smaller agency from investigating the crime adequately (Walker & Katz, 2022).

Some state law enforcement agencies may also provide forensic laboratory services, including digital, for other state and local agencies. In many cases, the procedures and resources discussed in [Chapters 14–16](#) of this text are not available to local law enforcement agencies and instead are conducted by state and federal labs. As noted earlier, evidence suggests the number of specialized cybercrime units has grown over the last two decades, particularly at the state level (Willits & Nowacki, 2016). This may be due to the enhanced budgets available to state agencies, and their role in supporting municipal and rural area law enforcement (Holt et al., 2015; Willits & Nowacki, 2016). Thus, state agencies and resources are crucial resource to investigate cybercrimes that do not cross state boundaries.

In addition to specialized cybercrime units, state agencies in the United States have developed their own intelligence sources called **fusion centers** to communicate and investigate threat information to both local and federal agencies (Chermak et al., 2013; Coburn, 2015). The concept of fusion centers was developed in 2003 as a collaborative effort between the Department of Homeland Security and the Office of Justice Programs to improve communication of intelligence information in the wake of the 9/11 terror attacks (Coburn, 2015). Fusion centers develop information and process leads that may be used to produce information threats that may be of value for law enforcement at the local, state, or federal level. Initially, centers focused on intelligence gathering on terror threats, but many now develop information on various crimes, including cyberthreats. Their utility in developing credible intelligence, however, has been substantially criticized regarding threats to both on- and offline environments (Coburn, 2015; Lewandowski & Carter, 2017; see **Box 2.2** for details).

## **Box 2.2 Assessing the Credibility of a Fusion Center's Analysis of a Cyberattack**

### **DHS Issued False “Water Pump Hack” Report; Called It a “Success”**

<https://www.wired.com/2012/10/dhs-false-water-pump-hack/>



But while DHS was busy pointing a finger at the fusion center, its own Office of Intelligence and Analysis had been irresponsibly spreading the same false information privately in a report to Congress and the intelligence community...

This excellent story by Kim Zetter details the story of an Illinois fusion center that wrote up a detailed report suggesting a failed water pump in a local water district’s SCADA system in 2011 was the result of Russian hackers. The initial report was invalidated by subsequent investigation of data by both DHS and the FBI, revealing that an Illinois contract employee logged into the system while on vacation in Russia. The impact of poor reporting, however, was viewed as a success by DHS because it focused attention on the work of fusion centers generally. Thus, this story reveals the potential challenges that may result from the work of state fusion centers.

## Federal Law Enforcement and Cybercrime

The highest levels of law enforcement in the United States and Australia operate at the federal level. They are often the entities most frequently engaged in the investigation of cybercrimes due to the transnational nature of these offenses. In many cases, the victim and offender may live in different states or even different countries. In addition, many types of cybercrime are quite complex and require highly technical investigations. Nations have generally provided more resources for federal or national law enforcement agencies to investigate these offenses rather than state or local agencies (Walker & Katz, 2022). Federal agencies may also play a large role in addressing crimes or managing catastrophic incidents that require cooperation among many agencies across several jurisdictions affecting large populations.

The first **federal law enforcement** agency in the United States was the Coast Guard, which began in 1790 in order to prevent smuggling and properly collect import taxes and duties from incoming ships (Bowling & Sheptycki, 2012). Over time, additional agencies were added as a result of the expansion of the nation and changes in the responsibilities of the government. Students will read in the upcoming chapters about the prominent roles that federal or national law enforcement agencies have in dealing with a wide variety of cybercrime. Many of these agencies serve multiple roles ranging from the prevention, investigation, and apprehension of cyber offenders to intelligence gathering and sharing. Readers of this volume will discover the Federal Bureau of Investigation's (FBI) role in investigating computer intrusion ([Chapter 3](#)), piracy and intellectual theft ([Chapter 5](#)), economic crimes ([Chapter 6](#)), creation, downloading, and disseminating child sexual exploitation materials ([Chapter 8](#)), serious forms of stalking that cross state boundaries ([Chapter 9](#)), and cyberterror ([Chapter 10](#)).

Readers will also see that there exists considerable jurisdictional overlap at the federal level with several agencies being responsible for investigating the same categories of cybercrime. For example, the United States Secret Service also investigates computer intrusions affecting financial institutions ([Chapter 3](#)) and economic crimes ([Chapter 6](#)). The Bureau of Customs and Border Patrol (CBP) may play a role in investigations of intellectual theft ([Chapter 5](#)) and economic crimes ([Chapter 6](#)), while Immigration and Customs Enforcement (ICE) may also be involved in identity theft ([Chapter 5](#)), economic crime ([Chapter 6](#)), and child sexual exploitation materials ([Chapter 8](#)) cases.

The highest levels of law enforcement in nations such as Canada, South Korea, and the United Kingdom are **national police forces**. These agencies

primarily serve the same functions as federal law enforcement in the United States. The United Kingdom operates “special police forces” that operate across multiple jurisdictions. For example, the **National Domestic Extremism and Disorder Intelligence Unit** responds to incidents of extremist activity within the United Kingdom. The **National Crime Agency**, which contains multiple commands, including Border Policing and the National Cyber Crime Unit (National Crime Agency, 2017), responds to serious economic forms of cyber-crime, as well as organized crime and other offenses that affect the nation and extend beyond local jurisdictional boundaries. In Canada, the **Royal Canadian Mounted Police (RCMP)** serves as the national police force and also patrols for seven of the ten provinces and three territories within the nation. The RCMP operates in a similar fashion to the US FBI or **Australian Federal Police** and is responsible for the investigation of both traditional and cyber-crimes (Bowling & Sheptycki, 2012).

When problems escalate to the level of national safety, non-law enforcement agencies may become involved in addition to the abovementioned agencies (Andress & Winterfeld, 2013). For example, the Department of Defense’s US Cyber Command and the **National Security Agency (NSA)** are involved in any investigation that compromises a military computer network or system, as well as cases of cyber terror and warfare. The Ministry of Defense and **Government Communications Headquarters (GCHQ)** play a similar role in the United Kingdom, as does the **Cyber Security Agency (CSA)** in Singapore and the **Communications Security Establishment (CSE)** in Canada. Thus, there is some separation of investigative responsibilities depending on the target of an attack.

## Civil Investigation and Application of Digital Evidence

Everything discussed thus far in the chapter involves violations of criminal law and statute. This is not the only mechanism available to deal with cybercrimes. In most nations, there is both **criminal law** and **civil law**. Criminal cases pursue charges against an individual on behalf of the state and the victim and recognize that a person has violated rules governing our behavior expressive of moral guidelines for action that protect others in society from harm (Kerley et al., 2019). Civil law involves disputes between parties, including individuals, groups, organizations, and government entities, that involve a violation of laws involving private rights and protections rather than morality.

In a civil case, a party can file a suit against another on the basis of a contractual violation or injury. The entity who files the suit is referred to as the

**plaintiff**, while the person being sued is the **defendant** (Kerley et al., 2019). Civil cases primarily focus on monetary compensation to the plaintiff, which may be to replace losses suffered, which are called compensatory damages. A plaintiff may also seek punitive damages, or money as a means to punish the defendant for wrongful actions due to negligence, deceptive practices, or malicious activity (Kerley et al., 2019).

Civil suits are largely handled via out-of-court settlements negotiated between attorneys representing each party in order to settle the dispute. Such processes are thought to be more efficient and less public than a court appearance as the proceedings are private. Final settlements may not be disclosed to the general public in many cases. If the parties cannot reach an agreement, then the plaintiff and defendant must go to court for the case to be heard by a judge and/or a jury depending on the jurisdiction. The outcome of the court proceeding is meant to determine if the defendant is or is not liable for the claims made by the plaintiff. If they are found **liable**, then the court can move to award the plaintiff with whatever damages were deemed appropriate (Kerley et al., 2019).

It is important to note that, unlike criminal cases, the burden of proof in civil law is on a **preponderance of evidence**. Specifically, the plaintiff must present evidence that supports more than half of their claims regarding the defendant (Kerley et al., 2019). In criminal cases, the state must prove its claims with evidence that demonstrates the guilt of the accused **beyond a reasonable doubt**. The lower burden in civil cases means that it may be more efficient to pursue such cases in court. However, the expense involved may limit the ability of individuals or small businesses to pursue civil cases compared to large organizations or wealthy individuals. In addition, being found liable for claims in a civil suit does not infer guilt on the part of the defendant, nor does it require admission of criminal conduct. As such, these cases frequently wind up being pursued for restitution rather than achieving justice for a victim or injured party (Kerley et al., 2019).

There are various circumstances where civil cases may be pursued, such as individuals getting a divorce, individuals suing a company due to injury, a business suing a person over issues associated with either a breach of contract or criminal activity, or corporations suing one another over contractual violations (Karie & Venter, 2015). Evidence generated from digital forensic investigations can play a pivotal role in support of a plaintiff's claims. For instance, a spouse may be able to use digital evidence to demonstrate that their significant other engaged in an extramarital affair, including emails, text messages, and images (see **Box 2.3** for more details). An employer may also use evidence culled from

## Box 2.3 The Role of Digital Evidence in Divorce Cases

### Family Law: Social Media Evidence in Divorce Cases

<https://www.natlawreview.com/article/family-law-social-media-evidence-divorce-cases>



All that being said, posts or photos that are made public are able to be seen or inspected by anyone in the world with an account on that platform (and sometimes by those even without an account; such is the case with Twitter). That material is (perhaps obviously) fair game to be admitted as evidence for or against someone.

This article provides guidelines for how social media posts may be acquired by attorneys in the course of a divorce case, as well as the challenges that arise depending on the ways that posted content was acquired by counsel.

an employee's computer to demonstrate they violated the company's fair use policies for online behavior on the job. This may include web browser histories, email, various system files, executable programs, and other data.

The process of digital forensic investigations in support of a civil suit is the same as those used by law enforcement for criminal cases (see [Chapters 14–16](#)). Law enforcement agencies, however, do not conduct investigations in civil cases; they are performed by forensic examiners who work in private practice, either for business or independently as **private investigators** or **detectives**. An individual who is a private investigator may operate on their own, through a company, or attorneys' offices, to support either criminal or civil cases (Lonardo et al., 2015).

Private investigators can be found in many countries. Rules governing their conduct and relationship to law enforcement and the government vary from place to place. Within the United States, many states require an individual to be registered with, or licensed by, the state in order to operate (Lonardo et al., 2015). Since each state can dictate the conditions needed in order to serve as an investigator, there is substantial variation in the experience and skills an individual must have in order to be licensed.

Interestingly, 30 states in the United States have laws requiring that an individual who is not in law enforcement, but engages in digital forensic

investigations for civil or criminal case support, must be a licensed private investigator (Lonardo et al., 2015). Only four of these states, however, specify that there is a distinction between being a forensic examiner and a private investigator. Of the remaining states, 15 have no PI licensing requirements by either statute or interpretation of existing law, while 5 states have no licensing statutes related to private investigation whatsoever (Lonardo et al., 2015).

There is some debate over the need for licensing of digital forensic examiners within the field. Some argue that licensing is needed to ensure a standard of professionalism and can be implemented across the field and oversight provided by each state (Lonardo et al., 2015). For instance, Florida's statutes recognize that licensing provides a necessary check because “untrained persons, unlicensed persons or businesses, or persons who are not of good moral character.... are a threat to the welfare of the public if placed in positions of trust.”

The PI license, however, does nothing to necessarily ensure the competency of a forensic investigator. Instead, the certifications an individual receives from various accrediting bodies ensure an individual is fully trained in the proper handling, processing, and reporting of evidence (Barbara, 2009; Zahadat, 2019). The process of certification is also relatively unstructured, as individuals can obtain credentials from a variety of private companies, which creates gaps in the knowledge across examiners (Zahadat, 2019). In fact, a recent survey of 100 forensic examiners found that a proportion of respondents were private investigators with no actual certifications in digital forensics or active duty law enforcement officers utilizing their organization's equipment to perform investigations (Kessler International, 2017). As a result, care must be taken when discussing the issue of private investigators and their credentials to actually conduct digital forensic investigations.

Private investigators are not the only noncriminal justice system actors who now play a role in civil actions against cybercrime, but also various corporations and organizations are increasingly taking steps to sanction cybercriminals or the infrastructure supporting their activities via civil suits. For instance, the Recording Industry Association of America (RIAA) and the United Kingdom's Federation Against Copyright Theft (FACT) work in conjunction with Internet service providers (ISPs) to send cease and desist letters to individuals who are thought to have illegally downloaded media without payment through various online sources (see [Chapter 5](#) for more details; Nhan, 2013). This is a relatively simple strategy that is legally justified on the basis of the copyright holders' financial interests that are harmed by people attempting to pirate their products. Sending out letters indicating that the person should not engage in

further attempts to pirate media are thought to serve as a deterrent by demonstrating that an individual's online activities are not anonymous and may lead to further sanctions.

Similarly, Facebook has sued multiple malware operators on the basis of abusing their platform. For instance, the company sued a Hong Kong-based company called ILikeAd Media International Company Ltd. and its two operators (Cimpanu, 2019a). Facebook claimed that the company used targeted ads to get Facebook users to click through to a website that would download malware on their computer and compromise their accounts. Facebook also sued LionMobi and JediMobi, both operating out of Asia, for producing apps that installed backdoor malicious software on users' systems (Cimpanu, 2019b). The apps only functioned on Android devices and would produce fake clicks on advertisements from these two companies to increase the money they were paid through Facebook (Cimpanu, 2019b).

For now, it is unclear how these cases will be resolved, though it is in keeping with a larger tradition of corporations suing cybercriminals for wrongdoing (Athow, 2014; Munson, 2014). In these instances, Facebook claims that victim accounts were secured if they were compromised, but no information has been given as to if or how they assisted victims in removing the malware on their devices. Additionally, it is unclear how Facebook is changing the security flaws in their advertising platforms so as to minimize the risk of future incidents. Thus, further research is needed to understand the ethical implications of corporate civil strategies to combat cybercrime.

**For more details on the potential legal and social risks posed by civil actions against cybercriminals by companies like Microsoft, go online to:** <http://digitalcommons.law.scu.edu/cgi/viewcontent.cgi?article=1592&context=chtlj>



## Extralegal Agencies and Nongovernmental Organizations

As a result of the vast scope and impact of cybercrime, law enforcement agencies have significant limitations that make it difficult for them to respond effectively to these offenses. In order to partially address these limitations, a range of public and private entities operate outside of law enforcement and government agencies to respond to and investigate cybercrimes. Such a group is typically

referred to as a **Nongovernmental Organization (NGO)** because they have no legal responsibility to enforce the law or respond to criminal activity. They may work, however, in conjunction with law enforcement agencies to provide assistance or information (Holt et al., 2015; Wall, 2007). NGOs that respond to cybercrimes are largely gatekeepers for victims or consumers and facilitate linkages to the criminal justice system generally. In the sections below, we discuss three NGOs. Readers should note there are NGOs mentioned throughout other chapters of the book.

### ***Spamhaus***

A prominent global organization that helps to combat cybercrime is the non-profit entity called **Spamhaus**. The organization began in 1998 in the United Kingdom as a resource to help minimize the distribution of spam, or unsolicited emails (Spamhaus, 2021). Steve Linford, a computer security researcher, began the project as a means to track spammers and spam email being delivered. Over time, it grew into a multinational organization providing information on spam, phishing, malware, and related forms of cybercrime to companies, universities, Internet service providers, and law enforcement agencies (Spamhaus, 2021).

One of their key products is its list of untrustworthy IP addresses that are being used to send spam and malware. Individuals who subscribe to their services are able to use information to actively block content being sent from those addresses at all times to reduce their risk of harm. In fact, Spamhaus estimates that their resources are used to protect over 3.1 billion email addresses around the world (Spamhaus, 2021). They also provide real-time intelligence on spammers, malware operators, and other cybercriminal entities to facilitate law enforcement investigations and industry responses to these threats (Spamhaus, 2021).

### ***Computer Emergency Readiness Teams (CERTs)***

One of the largest groups of NGOs is **computer emergency readiness teams (CERTs)**. Computer emergency readiness teams are groups of information security experts, which may be publicly funded or run by private industries, that operate to protect, detect, and respond to cybersecurity incidents (see [Chapter 4](#) for more details). As of 2019, there are 503 total CERTs operating around the globe, located in universities, government agencies, and private industry (FIRST, 2022). The total number of CERTS around the globe in 2019 is a

10.5-percent increase (450) from 2018 and a 59-percent increase (316) from 2015. The largest increase in the number of CERTS over the last several years has been in Europe.

Though CERTs play somewhat different roles depending on where they are housed, their primary functions are to provide information on emerging hardware and software vulnerabilities, malware threats, and security tools to insulate systems from compromise. Some CERTs are also able to engage in incident response for government agencies, organizations, and businesses to determine how an attack took place (US-CERT, 2022).

### **Cyber Civil Rights Initiative (CCRI)**

An additional form of NGOs is those in which private citizens come together for a specific cause. A notable example of such an NGO is the **Cyber Civil Rights Initiative (CCRI)**, which is a volunteer-driven organization that was established in August 2013 as a resource to aid victims of nonconsensual pornography, or revenge porn distribution where an individual's photos or video are shared widely by others without their consent (see [Chapter 10](#) for more details; CCRI, 2020). CCRI takes reports on nonconsensual pornography victimization directly from individuals who experienced this crime through their website. They provide advocacy for victims and assist in having content removed from online spaces (CCRI, 2020). Since CCRI is not a law enforcement agency, they cannot bring charges against a prospective offender. Rather, they use existing laws and protections for media to assist victims by having their content removed from online spaces and connecting with police and Internet service providers. Additionally, they advocate for changes to existing state and federal laws related to revenge porn and related offenses in order to better protect victims (CCRI, 2020).

### **International Enforcement Challenges**

The scope of cybercrimes presents a substantial challenge to law enforcement agencies, particularly those operating at the federal or national level. Agencies such as the Federal Bureau of Investigation and Secret Service in the United States have a remit to investigate both domestic and international cybercrime (Andress & Winterfeld, 2013; Brenner, 2008; Holt & Bossler, 2016). They are limited, however, by existing legislation and cooperative agreements with other countries. Though virtually all industrialized nations have criminalized various

forms of trespass and fraud, there is limited parity in the language of statutes (Brenner, 2011).

The problem is exacerbated by a lack of extradition agreements between the United States, China, Russia, and Ukraine. These conditions make the United States an attractive target for offenders living in these nations. This makes it difficult to deter actors on the basis of legal sanctions alone (Brenner, 2008). In addition, federal prosecutors may choose not to take a case if the suspects reside in these nations, as there will be no real likelihood of arrest (Brenner, 2008; Holt & Bossler, 2016). As a result, United States law enforcement agencies have become reliant on existing extradition relationships with friendly nations in the hopes of detaining cybercriminals in the event that they travel abroad (Holt & Bossler, 2016).

Law enforcement agencies' capacity to handle cybercrime investigations could possibly be improved by the expansion of the existing criminal code to include various acts not currently criminalized or increasing punishments for existing offenses (Brenner, 2008; Holt & Bossler, 2016). There are currently federal statutes covering the compromise of computers, the use of malware to facilitate attacks, the acquisition or theft of personal information, and the use of such information to engage in identity fraud (Bossler, 2020; Brenner, 2011). There are limits, however, as to how these cases can be built against offenders and minimal ways to prosecute individuals based on differing roles in the offense.

To that end, the Obama administration made a push to modernize the existing Racketeering Influenced and Corrupt Organizations (RICO) Act to include hackers and cybercrime groups (Risen, 2015). The RICO laws are typically used to investigate organized crime groups, like the Italian mafia and other structured criminal networks, and enable expanded sentencing rules to be applied. Expanding this statute would increase opportunities to prosecute hacking cases and increase avenues for investigation, especially those involving multiple offenders or networks of actors (see [Chapters 3, 4, and 6](#) for examples). Though these revisions have yet to be acted upon, they may reduce some of the gaps in the current capacity of federal agencies to respond to cybercrimes.

Though there are limitations to the international response to cybercrime, it is important to recognize the excellent global resources that exist to help agencies respond to these offenses. One of the most critical resources is inter-governmental organizations like the International Criminal Police Organization, commonly known as [Interpol](#) (Interpol, 2021). The role of Interpol is to

connect law enforcement in its 194 member nations to collect and disseminate information about three specific crime types: organized crime, terrorism, and cybercrime threats. Interpol operates 18 major databases containing information that can be accessed across all member nations to gain actionable intelligence and credible leads related to ongoing threats. Not only do they maintain physical evidence, such as fingerprints, stolen identity document records, but they also house digital evidence. Their International Child Sexual Exploitation (ICSE) unit maintains images and videos for analyses related to victims, offenders, and locations involved in child sexual abuse material production and distribution (see [Chapter 8](#); Interpol, 2021). Interpol also operates a cyber fusion center, which publishes information on various threats related to malicious software, phishing campaigns, and other activities.

Interpol also offers assistance through cybercrime training programs for law enforcement and support for digital forensic investigations. They also support the investigation of Dark Web offenses through the development of a Dark Web Monitor that collects information and analyzes data from various websites, forums, shops, and resources hosted from the Dark Web (Interpol, 2021). In addition, Interpol also operates task forces to coordinate international counter-terrorism investigations and digital forensic investigations generally. While Interpol agents and investigators cannot arrest individuals, the information and services they offer are essential to help facilitate criminal justice responses in member nations (Interpol, 2021). Thus, they are a vital tool in the international response to cybercrime.

**For more information on Interpol and its work with the Darknet and cryptocurrencies, go online to: <https://www.interpol.int/en/How-we-work/Innovation/Darknet-and-Cryptocurrencies>**



## The Tension Between Security and Privacy

On September 11, 2001, almost 3,000 individuals were killed in a coordinated terrorist attack by Al-Qaeda in which 4 passenger airlines were hijacked and crashed into the Twin Towers in Manhattan, the US Department's Pentagon in Washington, DC, and a field in Pennsylvania. In a post-9/11 world, the need to identify actionable intelligence on threats has become paramount for virtually all nations. Terrorist groups have the capacity to spread their ideologies via social media and various websites, making susceptible individuals willing to engage

in acts of extreme violence against individuals either in their home city or in another nation (see [Chapters 10](#) and [11](#) for more details; Hamm & Spaaij, 2017). In addition, governments must also address the increasingly common threats posed by serious cyberattacks by terrorists, nation-states, and criminals (Andress & Winterfeld, 2013; Kremling & Sharp Parker, 2017; Rid, 2013).

All of these threats have raised substantial concerns across the globe as how to best protect people and infrastructure from harm. Physical barriers, police, and intelligence agency staff play an important role in the protection of a nation, but there is also a need for tools and infrastructure to proactively develop intelligence on threats and the individuals and groups planning to do harm. Prior to the Internet, law enforcement agencies could reasonably monitor a group of interest to national security via [wiretapping](#), or covertly listening in to phone conversation and other methods to surreptitiously observe and capture information on threats (Andress & Winterfeld, 2013). The growth of social media and online communications through various applications such as Signal, Telegram, and TikTok have exponentially increased the ways that offenders can connect and share information in clear text and encrypted methods.

As a result, many nations have increased their information collection mechanisms to gain access to both online information and real-world communications to identify threats in advance and foil potential attacks. For example, anecdotal evidence suggests that police in the United States have dramatically increased the number of arrests for threats made by individuals on social media sites (Bayne et al., 2019). The substantial number of mass shootings within the United States and in other nations is often preceded by escalating threats made by the shooter on sites like Facebook, Twitter, and other platforms. To reduce the potential loss of life, police agencies tend to take such threats seriously and arrest individuals on the basis of their comments regardless of the actor's intentions (Bayne et al., 2019).

The nature of the methods used by police to monitor online communications are largely kept secret from the general public on the basis that knowledge of the processes could lead them to be defeated by savvy actors (Rid, 2013). This creates a challenge for free societies, as the public has a reasonable right to their personal [privacy](#), or the ability to keep aspects of their lives secret from others (Kremling & Sharp Parker, 2017; Rid, 2013). Any attempt by the government to violate individual privacy should be made known to the public as it could be against the law. This creates a tension between individuals' rights to privacy and the government's need to protect the safety of the general public.

This was evident in the United States following a massive domestic terror incident, when Syed Rizwan Farook and Tashfeen Malik shot and killed 14 people and wounded another 22 during a holiday party at the San Bernardino, California Department of Health on December 2, 2015 (Keneally & Shapiro, 2015). Both Farook and Malik fled from the scene of the shooting in an SUV, which was eventually located by police. After a high-speed pursuit, the pair were killed in a shoot-out with police. Subsequent searches of their home led police to discover a cache of weapons and homemade explosives, suggesting they had planned to engage in further attacks.

The FBI took charge of the investigation in the wake of the incident, which eventually became known as the [San Bernardino shooting case](#). Agents came to realize that both Farook and Malik were motivated by radical Islamic beliefs and had accessed a range of online content produced by terrorist organizations overseas. Farook's iPhone 5c, which was owned by the county, was also recovered by agents. The FBI stated that it was unable to unlock the phone and decrypt its contents for investigators because of the security features in the iOS software. The United States does not have any encryption [key disclosure laws](#) to mandate individuals give passwords or access information to law enforcement, making it difficult to compel suspects to provide access to their devices (see [Chapter 14](#) for more details).

As a result, the federal magistrate hearing the case ordered Apple to provide resources to enable the FBI to access the phone's contents. Apple refused on the basis that it would violate the Fifth Amendment rights of the general public as whatever protocols were developed for this case could be used against any of their customers (Benner et al., 2016). Eventually, the FBI revealed they no longer needed Apple to intervene as they were able to pay a third party for a solution to decrypt the phone (Barrett, 2016). This led to public outrage as the FBI gave very little information as to how this solution was developed or what it meant for individual privacy rights and the safety of their electronic information (see [Chapter 14](#) for more discussion). Eventually, it was reported that the FBI paid over \$1 million dollars to obtain the work-around and found nothing on Farook's phone to support the investigation (Tanfani, 2018). The solution also became completely unusable after Apple updated their operating system software (Tanfani, 2018).

The difficulty in maintaining the balance between safety and privacy was also evident in the revelations made by Facebook in the wake of the 2016 presidential election in the United States. It was revealed that a company called [Cambridge Analytica](#) was able to access the account data from 87 million user

profiles as part of their political consulting work for the Trump presidential campaign (Chang, 2018). An individual working at Cambridge University who was tied to the company developed a Facebook quiz called “thisisyoudigital-life” (Chang, 2018). The app secretly collected data from the user, as well as their friends on the site. The information collected was then sold to Cambridge Analytica so that they could create users’ personality profiles in order to craft targeted political ads that would potentially influence their views of political candidates (Chang, 2018).

**For more information on the fallout from the Cambridge Analytica scandal, please visit:**

<https://www.wired.com/story/cambridge-analytica-facebook-privacy-awareness/>

<https://www.nytimes.com/2018/04/08/us/facebook-users-data-harvested-cambridge-analytica.html>



Since Cambridge Analytica worked for the Trump campaign, their expressed goal was to use targeted advertisements that preyed upon the psyche of users in an attempt to swing voters toward Trump or suppress voter behaviors generally (Granville, 2018). The practice of selling data violated Facebook’s policies related to data collection and third-party use and came to light in part thanks to a UK news network reporting on their practices (Granville, 2018). The secretive nature of data collection, coupled with the perceived violations of personal privacy, led to global outrage over Facebook’s practices. The social networking platform’s somewhat delayed and lax response further aggravated the situation and led some users to start deleting their accounts outright (Granville, 2018). Over the long term, however, many users still populate Facebook and regularly post there, suggesting the perceived violation of privacy was not enough to sink this global technology powerhouse.

Massive data collection for surveillance and profiling purposes are not relegated to industry bodies, as evident in reporting on the collection processes of both the NSA and the GCHQ in the United Kingdom. Details of the degree to which governments collect information on their citizens were revealed when **Edward Snowden**, a then-NSA contractor who publicly disclosed thousands of classified documents to journalists detailing the existence of various active intelligence programs designed to mine electronic communications data maintained by technology companies and service providers, including Apple,

Facebook, Google, Microsoft, Skype, and Verison (Gidda, 2013; Rid, 2013). One of the largest of these programs was called **PRISM**, which began in 2007 and combined machine learning techniques with massive data streams of email, text, and other electronic communications data from at least nine major service providers to develop intelligence on terror threats (Gidda, 2013). The data collected were indiscriminately targeted, meaning anyone's information may have been included, but ideally could only be queried by PRISM analysts as a means to identify networks of terrorists or threats. Evidence suggested, however, that the data could have been used by NSA employees with minimal legal justification to search private information (Gidda, 2013). The data and analyses could also be shared with the United States' **Five Eyes** partners: Australia, Canada, New Zealand, and the United Kingdom (Andress & Winterfeld, 2013). This news outraged many other nations as their citizens may have been unfairly affected by this program.

Snowden also revealed a similar program called **KARMA POLICE** was implemented by the United Kingdom's GCHQ. The program was designed to create profiles of the Internet use of every public person online using various pieces of data that could be surreptitiously collected (Gallagher, 2015). It began in earnest in 2009 through the use of hardware taps installed on the fiber-optic cables used to provide transnational Internet connectivity. Approximately 25 percent of the world's Internet traffic is routed through these cables in the United Kingdom, enabling GCHQ to capture sensitive data from global users as it passed through the wires without notifying the user (Gallagher, 2015). Their taps capture specific details about individual Internet users through their web browser metadata, including the individual IP address of the computer, the last web pages visited through that browser, the timestamp for pages visited compared to the IP address, and the search queries used. Additional data were also eventually captured on individuals' use of email, instant messaging systems, search engines, social media, as well as the use of proxies or other anonymity tools (Gallagher, 2015).

The massive amount of information collected by GCHQ analysts could enable substantial profiling of not only individual computer users but also potentially entire countries. The process of data collection enabled GCHQ to collect 50 billion metadata records per day, capturing user behaviors worldwide. At the individual level, the metadata captured from browsers could be used to track a person's entire online footprint at any time of day and collate this information to patterns of email and other online communications platforms. In the aggregate, GCHQ argued it had the potential to detect shifts in an entire country's

user behaviors and identify suspicious patterns in web traffic that could indicate on- or offline threats. They used this data to examine both foreign threats, as well as those within the United Kingdom, which was supported through a legal loophole that allowed investigators to profile UK citizens without notification (Gallagher, 2015).

The emergence of information on KARMA POLICE through the Snowden leak led to an investigation of the processes of GCHQ by the UK Parliament. The study found that the program operated with minimal government oversight or court rulings to justify data collection. This led to a substantial overhaul of the laws concerning spy techniques and the need for mass data collection (Gallagher, 2015).

This program, however, has not drawn the same global attention as PRISM, even though it had much broader consequences for many more nations. This begs the question as to why such programs have not produced greater outrage from citizens over governmental attempts to ensure public safety (see [Box 2.4](#) for details). A portion of the general population may feel that such concerns are trivial as we must ensure public safety at any cost. Others recognize that when a

#### **Box 2.4 An Examination of Why We Should Be Concerned By Government Spying Campaigns**

##### **Nine Reasons You Should Care About NSA's PRISM Surveillance**



<http://theconversation.com/nine-reasons-you-should-care-about-nsas-prism-surveillance-15075>

Mass surveillance and data retention overturn the foundation of the modern legal system: the presumption of innocence. Not only is the presumption lost for gathering evidence, it also weakens the effect of that presumption throughout the rest of the legal process.

This article provides a clear and succinct explanation of the reasons why the average person should be concerned about government spying programs like PRISM. Though it may seem like a problem only for those who are engaged in illicit behavior, these programs effectively erode our civil rights and require greater consideration.

nation's security forces actively exceed the rule of law, or intrude on their citizens' rights, then their efforts are unlawful (Godwin, 2003; Yar, 2013).

Engaging in illegal activity or facilitating behaviors that the general public views as illegitimate can erode public confidence in the companies, agencies, and officials who allowed them to be performed. Should that occur, we can expect the general public to lose trust, support, or a willingness to cooperate with requests or comply with laws (Sunshine & Tyler, 2003; Tyler, 2004). Many western nations are now in the midst of struggles over the perceived legitimacy of their governments and their use of authority. The same is true with some social media platforms like Twitter and Facebook over long-term abuses observed in their platforms. The public has a right to question how the state and huge multinational companies use their power, the extent to which that power can be checked by legislators or the judiciary, and how abuses of power can be identified and resolved. This is a delicate balance that can be easily upset through authoritarian tendencies or overzealous demands that could benefit a nation's enemies (Yar, 2013). As a consequence, we must keep these tensions in mind when considering efforts to secure cyberspace.

## Summary

The problem of cybercrime is complex, requiring a clear and coordinated response from police agencies and law enforcement. At present, the local, state, and federal levels each have their own role, but they differ in terms of their capacity to fully investigate civilian calls for service. These issues are exacerbated at the international level due to the limitations of extradition relationships and investigative resources. Corporations and nongovernmental agencies have emerged as an important resource to combat or investigate cybercrimes in the absence of a more robust law enforcement strategy. The strengths and weaknesses of all of these entities (police, NGOs, and industry) are discussed in the subsequent chapters of this work to demonstrate the ways that cybercrimes are dealt with around the world.

## Key Terms

- Australian Federal Police
- Beyond a reasonable doubt
- Cambridge Analytica

Civil law  
Communications Security Establishment (CSE)  
Computer Emergency Readiness Teams (CERTs)  
Criminal law  
Cyber Civil Rights Initiative (CCRI)  
Cyber Security Agency (CSA)  
Defendant  
Edward Snowden  
Federal law enforcement  
Five Eyes  
Fusion center  
Government Communications Headquarters (GCHQ)  
Interpol  
KARMA POLICE  
Key Disclosure Laws  
Liable  
Local police  
National Crime Agency  
National Domestic Extremism and Disorder Intelligence Unit  
National Police Forces  
Nongovernmental Organization (NGO)  
Plaintiff  
Preponderance of evidence  
PRISM Program  
Privacy  
Private detective  
Private investigator  
Provincial police agency  
Royal Canadian Mounted Police (RCMP)  
San Bernardino Shooter case  
Sheriffs  
Spamhaus  
State police agency  
Territorial police forces  
Wiretapping

## Discussion Questions

1. How can police agencies improve their response to cybercrime, especially in light of the continuous evolution of technology and communications applications?
2. If federal agencies have the greatest responsibility to investigate cybercrime but have difficulties arresting offenders due to limited extradition relationships, how can we improve their ability to deal with these offenses?
3. What issues can you see in having corporations play a more prominent role in combatting cybercrime through the use of civil lawsuits?
4. How do we balance security and privacy? Should Edward Snowden be viewed as a traitor that diminished national security or a hero protecting individual rights of privacy?

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Chapter

3

# COMPUTER HACKERS AND HACKING

## Chapter Goals

- Define what is a “hack” and “hacker”
- Identify the ways that both people and technology can be compromised by hackers
- Differentiate between nation-state and non-nation-state hackers
- Explain the key norms and values of the hacker subculture
- Identify the various terms used to define and differentiate hackers
- Consider the evolution of hacking in tandem with technology over the last 60 years
- Assess the legal frameworks used to prosecute hackers and the ability of law enforcement agencies to address computer hacking

## Introduction

Many in the general public conceive of hackers as skilled technological wizards who break into the Department of Defense, financial institutions, and other protected networks with the intent to do harm. The notion of a hacker may also conjure up images of various characters from television and movies, such as Neo from the Matrix Trilogy, who had the ability to “see” in programming language code and bend “virtual” reality. These stories and representations have become the dominant model for hackers in popular media and news organizations. Although there are a number of hackers who engage in malicious activities, and some who are amazingly sophisticated technology users, they do not accurately represent the entire population of hackers. Instead, hackers also operate to defend computer networks and expand the utility of technology. In addition, an increasing proportion of the hacker community has a relatively low level of technological sophistication; only a small group has expert-level knowledge of computer hardware and software. The global hacker community is also driven by a wide range of motivations which leads them to engage in both legal and illegal hacks.

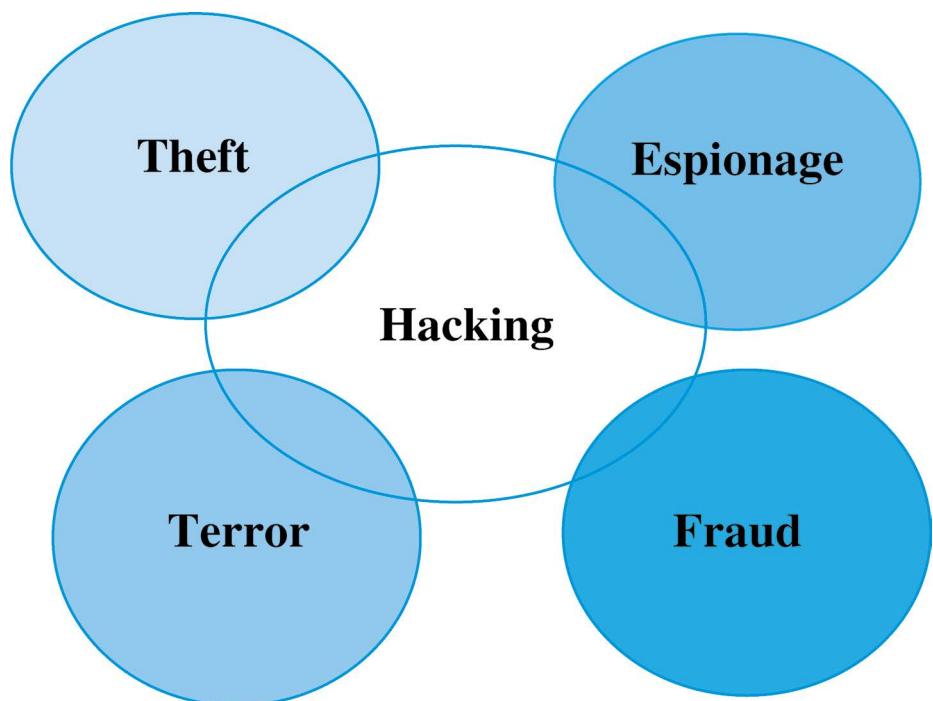
This chapter is designed to present the subculture of hackers in a realistic light devoid of the glitz and flash of what may be portrayed in films. By the end of this chapter, you will be able to understand the variations in the legal and ethical perspectives of hackers, as well as the norms and values of the hacker subculture. The history of hacking over the last 70 years will also be explored to ground your understanding of the actions of hackers over time, including the ways that individual motives for hacking have changed with the explosion

in computer technology. In turn, you will be able to consider the activities of hackers from their point of view rather than from stereotypes and media hype. Finally, we will explore the various legal frameworks that have been created to address illegal computer hacking and the capabilities of law enforcement agencies to actually make an impact.

## Defining Computer Hacking

While many in the general public equate computer hacking with criminal activity, hacking is actually a skill that can be applied in a variety of ways depending on the ethical perspective of the actor. A **hack** involves the modification of technology, such as the alteration of computer hardware or software, in order to allow it to be used in innovative ways, whether for legitimate or illegitimate purposes (Holt, 2007; Levy, 2001; Schell & Dodge, 2002; Steinmetz, 2015; Turkle, 1984). There are myriad applications of hacking for beneficial uses that are not in fact illegal. For instance, iPhones and iPods are designed to only run Apple approved software and applications. Any “app,” ringtone, or wallpaper design that the company has deemed unacceptable due to risqué or inappropriate content will not work on their devices (Whittaker, 2021). If a user wanted to use these resources, or even change the appearance of the icons and applications on their Apple device, they would have to find a way to work around these limitations. Thus, programmers have created “jailbreaking” programs that enable users to install third party designers’ programs to be used on an iPhone or other Apple product. The use of jailbreaking programs constitutes a hack, as they enable actors to use their devices in ways that were not initially allowed by the designer. The use of these programs is not illegal, though they can void the product warranty, making the user accountable for their use of hacking programs (Whittaker, 2021).

Hacks that modify programs and subvert security protocols, however, are illegal and can be used to obtain information or gain access to computer systems and protected resources in furtherance of illegal acts ranging from stealing credit cards to acts of terror (Dupont et al., 2017; Holt et al., 2021; see [Figure 3.1](#) for details). In many cases, hackers utilize very basic nontechnical strategies rather than sophisticated attacks to obtain information. For instance, individuals can steal someone’s passwords for email accounts or access to a system by looking over the victim’s shoulder and watching their keystrokes. This act, called **shoulder surfing**, is simple and can be performed by anyone in order to obtain sensitive information (Mitnick & Simon, 2002).



**Fig. 3.1** Venn diagram of computer hacking

Similarly, hackers can employ **social engineering** tactics to try to fool or convince people to provide them with information that can be used to access different resources (Mitnick & Simon, 2002; Salahdine & Kaabouch, 2019). These attacks often involve making simple requests and acting clueless in order to prey upon people's willingness to help others (Mitnick & Simon, 2002; Salahdine & Kaabouch, 2019). These sorts of nontechnical attacks are invaluable to attackers because it is extremely difficult to protect individuals from being compromised, unlike computer systems and physical buildings (Mitnick & Simon, 2002; Salahdine & Kaabouch, 2019). Often the most easily exploited vulnerability for a person, organization, or a business is not a flaw in hardware or software, but rather the individual themselves. In fact, 44 percent of all breaches in 2019 involved errors and social media-related schemes that involved little technical skill on the part of the attackers (Verison, 2020).



**For more on social engineering, go online to:** <https://www.sans.org/reading-room/whitepapers/critical/methods-understanding-reducing-social-engineering-attacks-36972>

The information victims provide in nontechnical attacks frequently includes usernames and passwords for different resources like email. In turn, the attacker can gain access to personal or corporate information sources that they may not own or have permission to access. The issue of ownership and access is why David Wall (2001) conceived of computer hacking as an act of cyber-trespass in keeping with burglary in the real world. A hacker must cross network boundaries without approval from the owner or operator in much the same way as a burglar enters a dwelling without permission. In order to compromise a computer system or network, the hacker must utilize **vulnerabilities**, or flaws, in computer software or hardware, or people in the case of social engineering (Furnell, 2002; Taylor, 1999). There are hundreds of vulnerabilities that have been identified in all manner of software, from the Microsoft operating system Windows, to the web browsers that we use every day (O'Driscoll, 2021). In much the same way that burglars in the real world attempt to identify weaknesses in the design of homes, entrances, exits, and residents' behaviors and activities in order to find ways to get inside a location (e.g. Wright & Decker, 1994), hackers' first steps in developing a hack using technical means is identifying these vulnerabilities.

**For more information on vulnerabilities, go online to:** <https://nvd.nist.gov>



Once a vulnerability has been identified in a piece of technology, a hacker can then develop or utilize an **exploit**, a program that can take advantage of vulnerabilities to give the attacker deeper access to a system or network (Furnell, 2002; O'Driscoll, 2021; Taylor, 1999). There are many tools available online for hackers to use in order to exploit existing vulnerabilities in computer software (Chu et al., 2010; O'Driscoll, 2021) and various forms of malicious software which can be acquired for free from web forums or purchased from vendors in online black markets (see [Chapter 4](#) for details; Chu et al., 2010). Similarly, burglars can use tools, such as crowbars and keys, to gain access into a residence through vulnerable points of entry (Wright & Decker, 1994).

In the context of hacking, vulnerabilities and their attendant exploits can be used by anyone regardless of their ethical beliefs. For instance, there are vulnerability scanning tools available online, such as Nessus, which allow individuals to easily determine all the vulnerabilities present on a computer system (Jetty, 2018). This tool can be used by hackers working on “red teams” or “tiger

teams” hired by corporations to identify and penetrate their networks in order to better secure their resources. Red teams are authorized by system owners to engage in these acts; thus they are not violating the law. The same scanner could be used as a first step in an attack to identify vulnerabilities on a system to determine what exploits should be used to compromise the system (Jetty, 2018). Running such a scan without permission from the system owners would be viewed as an illegal form of hacking (Jetty, 2018).

### Non-Nation-State Actors vs. Nation-State Actors

Despite misconceptions over who and what is a hacker, it is clear that the use of hacking for malicious purposes can have severe economic and social consequences for computer users. The most common targets for attack by malicious hackers are individual computer users, private industry, and governments. In fact, the general public present an excellent target for the majority of hackers since they may have sensitive information stored on their computer and can serve as a launch point for subsequent attacks against different targets (discussed in [Chapter 4](#)). A malicious hack can often affect multiple groups at the same time, and may be performed by individuals acting alone, in small groups, or in conjunction with a foreign military or government (Dupont et al., 2017; Holt et al., 2019; Leukfeldt et al., 2017). When individuals act without any sort of state backing, they are referred to as **non-nation-state actors** because they have no immediate affiliation to an organization (Maurer, 2018; Rid, 2013).



**For more information on cyberthreats at the nation-state level, go online to:** <http://www.baesystems.com/en/cybersecurity/feature/the-nation-state-actor>

Non-nation-state actors who engage in hacking frequently target individuals and institutions in order to steal sensitive information that can be resold or used in some fashion for a profit (Holt & Lampke, 2010; Leukfeldt et al., 2017). For instance, credit and debit card numbers are a regular target for hackers, as this information can be used by the hacker to obtain funds or sold to others to facilitate fraud (Holt et al., 2016; Leukfeldt et al., 2017). These attacks negatively affect both the cardholders and the financial institutions who manage customer accounts (Peretti, 2009). Alternatively, they may steal usernames, passwords and

related data so that user accounts can be compromised and used for phishing and other purposes (Dupont et al., 2017; Leukfeldt et al., 2017).

There are myriad breaches occurring across the globe every year, leading to the loss of personal data and sensitive data. For instance, 29 million Facebook user accounts were compromised by hackers from July 2017 through September 2018 (Leskin, 2018). The attackers were able to use vulnerabilities in Facebook software to gain access to users' personal information, including their location data, search histories, and what devices were used to access the account. Similarly, over 500 million individuals who stayed at Marriott hotels from 2014 to 2018 were affected by a data breach when hackers compromised their reservation database and regularly copied and stole guest data (Leskin, 2018).

Perhaps one of the worst breaches in recent memory affected the country of India, as over 1.1 billion people were affected by a breach leading to the loss of their government-managed identity information, including ID details and connected bank accounts. This breach occurred because a utility company with access to the government identity database did not secure their access portal. As a result, anyone was able to gain access to the system, resulting in catastrophic loss of information (Leskin, 2018).

By contrast, hackers who engage in attacks at the behest of or in cooperation with a government or military entity can be referred to as **nation-state actors** (Maurer, 2018; Rid, 2013). Though it is unclear how many nation-state hackers there are internationally, they are most likely a small number relative to the larger population of non-nation-state actors. The targets of nation-state actors' attacks differ substantially. They frequently target government agencies, corporations, and universities using hacks to engage in both espionage and theft of intellectual property (Maurer, 2018).

An excellent example of nation-state sponsored hacking involves the creation and dissemination of a piece of malicious software called Flame (see [Chapter 4](#) for more detail on malware). It is thought that hackers working for the US National Security Agency and/or the Israeli government were responsible for the development of this malware, which was identified in May 2012 by security researchers (Symantec, 2012; Zetter, 2012). The program was found to have infected computers in government agencies, universities, and home computers, primarily in the Middle East including Iran. There were, however, infections identified in Europe and North America.

The malware was designed to target specific computers and serve as an espionage tool, enabling backdoor access to any system files, the ability to remotely record audio, capture keystrokes and network traffic, and even record Skype

conversations (Cohen, 2012; Zetter, 2012). One of the most unusual features of this code was that it could remotely turn on the infected computer's Bluetooth functions in order to log the contact data from any nearby Bluetooth-enabled device, such as a mobile phone or tablet (Symantec, 2012). The malware was also remotely wiped from all of these systems after it was made public, eliminating any evidence of the infections.

The complexity and utility of the tool suggested to researchers that it could have only been produced through the resources of a nation state. Additionally, the malware shared some common attack points with another well-known piece of malware called Stuxnet that has been heavily associated with the United States and Israel (see [Chapter 10](#) for detail on this program; Cohen, 2012; Zetter, 2012). The computers targeted are also indicative of the interests of a nation-state due to the fact that it was originally identified on Iranian Oil Ministry computers and other systems across Iran, Syria, Saudi Arabia, and various Middle Eastern nations. Finally, evidence from security analysts at Kaspersky demonstrated that the majority of infections were targeted within Iran to specifically acquire schematics, PDFs, text files, and technical diagrams (Lee, 2012). The purpose of these attacks was to acquire information about the Iranian nuclear program and surreptitiously spy on any actors associated with its development.



**For more on a ransomware attack against critical oil infrastructure in the United States by a Russian criminal group, go online to:**  
<https://www.cnn.com/2021/05/10/politics/colonial-pipeline-white-house-reaction/index.html>

Over the last two decades, there have been an increasing number of attacks performed by non-nation-state actors against government and industry targets due to social conflicts both online and offline (Brenner, 2008; Denning, 2010; Kilger, 2010). For instance, individuals associated with the hacker collective Anonymous attacked various police and government agencies across Saint Louis County, Missouri in August 2014. They targeted these systems as a form of protest in the wake of the shooting death of Michael Brown, a teenager who was killed by police in Ferguson, Missouri (Hunn, 2014a). The hackers not only engaged in denial of service attacks against websites and government services, but also released the personal information of police and others associated with the Ferguson Police Department (Hunn, 2014b). Anonymous members also encouraged physical protests which lasted for days after the shooting occurred.

In much the same way, there have been a range of serious cyberattacks targeting the country of Ukraine over the last six years, most all of which appear to originate from Russian state actors or civilians. Ukraine was originally part of the Soviet Union up until its dissolution in the early 1990s. At that time, Ukraine became its own sovereign nation, with relatively friendly relations to its neighbors, particularly Russia. However, a number of events occurred throughout the late 2000s and early 2010s in Ukraine that led Russia and Russian sympathizers within the nation to engage in escalating social and physical conflicts. In fact, Russia invaded a part of Ukraine called Crimea, and seized power, and began to back separatists who tried to seize power of other parts of the state.

The severity of these physical conflicts has been dwarfed by the outcomes of cyberattacks, which have targeted the entire infrastructure of the nation, from its power grid to financial and government systems. Russian hackers have used various malware, ranging from ransomware (see NotPetya in [Chapter 1](#)) to a piece of software that caused a power outage in the capital city of Ukraine. This attack caused an hour long blackout in Kyiv two days before Christmas, and researchers have found evidence to suggest that it did not fully function as designed (Greenberg, 2019). The malware appears to have been structured to not only cause a blackout, but actually damage the equipment used to operate the power grid when identified and disabled. Thankfully this did not occur, otherwise the city may have been subject to a long-term blackout and costly repairs to fix the damages (Greenberg, 2019).

**For more information on the activities of Anonymous in Ferguson, Missouri, go online to:** [https://www.stltoday.com/news/local/crime-and-courts/not-so-anonymous-how-hackers-wreaked-havoc-in-st-louis/article\\_809a5d53-7d67-57ff-96f9-ee5772b395d0.html](https://www.stltoday.com/news/local/crime-and-courts/not-so-anonymous-how-hackers-wreaked-havoc-in-st-louis/article_809a5d53-7d67-57ff-96f9-ee5772b395d0.html)



## The Human Aspects of the Hacker Subculture

In light of the various targets affected by hacks, it is necessary to understand the individuals responsible for these attacks (see [Box 3.1](#) for details). Individuals who utilize hacks may be referred to as **hackers**, though this term has different meanings to different groups (Jordan & Taylor, 1998; Schell & Dodge, 2002; Taylor, 1999; Turkle, 1984). Individuals within the hacker community may argue that a person can only be a hacker dependent on their level of skill or interest in technology (Holt, 2007; Jordan & Taylor, 1998). Individuals in the



### Box 3.1 The Jargon File Definition of Hacking

#### Hacker: n

<http://catb.org/jargon/html/H/hacker.html>

1. A person who enjoys exploring the details of programmable systems and how to stretch their capabilities, as opposed to most users, who prefer to learn only the minimum necessary.

The Jargon File provides a very distinct and well-accepted set of definitions for what constitutes a hacker. The definition also recognizes the differences between a hacker who is motivated by curiosity and intellect relative to malicious intent.

general public might often define a hacker, however, as a young, antisocial nerd who can only relate to others via their computer (Furnell, 2002; Schell & Dodge, 2002). They may also be viewed as misfits who are involved in criminal or illicit activities, or perhaps computer technicians within the public and private sector (Furnell, 2002; Schell & Dodge, 2002).

Empirical studies conducted on the hacker community suggest that hackers are predominantly under the age of 30, although there are older hackers as well working in the security community (Bachmann, 2010; Holt et al., 2009; Jordan & Taylor, 1998; Weulen Kranenbarg et al., 2021; Schell & Dodge, 2002). Younger people may be attracted to hacking because they have greater access and exposure to technology, as well as the time to explore technology at deep levels. Older hackers appear to be gainfully employed, working primarily in the computer security industry (Bachmann, 2010; Weulen Kranenbarg et al., 2021; Schell & Dodge, 2002). Younger hackers may or may not be employed; some may be students in high school or universities. In fact, hackers tend to have a mix of both formal education and knowledge acquired on their own through reading and experiential learning (Bachmann, 2010; Holt, 2007; Holt et al., 2009). Limited evidence suggests that a proportion of skilled actors may have at least a community college education, while a small number have degrees from four-year institutions (Bachmann, 2010; Holt et al., 2008; Schell & Dodge, 2002).

Hackers also appear to be predominantly male, though it is unknown what constitutes the true gender composition of the subculture (Gilboa, 1996; Jordan & Taylor, 1998; Steinmetz et al., 2020; Taylor, 1999). This is because most

hackers conceal their identities from others online and are especially resistant to being interviewed or participating in research studies (Gilboa, 1996; Holt, 2007; Steinmetz et al., 2020). Thus, it is difficult to identify the overall composition of the hacker community at any given point in time.

There is also substantive evidence that hackers have a number of social relationships that influence their willingness to engage in different forms of behavior over time (Dupont et al., 2017; Leukfeldt et al., 2017). Peer relationships often emerge online through involvement in forums, Internet Relay Chat (IRC) channels, and other forms of computer-mediated communication (Dupont et al., 2017; Jordan & Taylor, 1998; Steinmetz, 2015), though a portion may involve social relationships cultivated in the real world (Leukfeldt et al., 2017). This is true not only for those interested in legitimate hacking, but also for criminal hacks. In fact, recent research on international networks of individuals involved in phishing and malware schemes suggest that the actors depended on technical expertise cultivated from web forums where technically proficient hackers communicated (Dupont et al., 2017; Leukfeldt et al., 2017).

These associations are invaluable as friends and relatives can provide models to imitate hacks (Morris & Blackburn, 2009; Leukfeldt et al., 2017), positive encouragement and praise for unique hacks, and justifications for behavior, including excuses and beliefs about the utility of malicious hacks (Bossler & Burruss, 2011; Morris, 2011; Skinner & Fream, 1997). In fact, many hackers deny any harm resulted from their actions (Brewer et al., 2020), or blame their victims for having inadequate computer skills or systems to prevent victimization (Brewer et al., 2020; Jordan & Taylor, 1998).

There are many communities operating via CMCs across the globe for hackers at every skill level to identify others who share their interests. There are hacker-related discussions in social groups via IRC, forums, blogs, and other online environments (Holt, 2007, 2009a,b; Leukfeldt et al., 2017). Hackers have operated in **bulletin board systems (BBSs)** since the late 1970s and early 1980s to provide information, tools, and techniques on hacking (Meyer, 1989; Scott, 2005). The content was posted in plain text and occasionally featured images and art made from ASCII text, in keeping with the limitations of the technology at the time (see [www.asciiworld.com](http://www.asciiworld.com) for examples). These sites allowed asynchronous communications between users, meaning that they could post a message and respond to others. In addition, individuals hosted downloadable content including text files and tutorials, though some also hosted pirated software and material, called **warez** (Meyer, 1989; for more on piracy, see Chapter 5). The BBS became an important resource for new hackers, since

experienced technology users and budding hackers could share detailed information about systems they explored and discuss their exploits (Landreth, 1985).

The BBS allowed hackers to form groups with private networks based on password-protected boards intended to keep out the uninitiated and maintain privacy (Landreth, 1985; Meyer, 1989). Closed BBSs were initially local in nature based on telephone area codes, but changed with time as more individuals obtained computers and sought out others online. Local hacker groups grew to prominence as a result of BBSs based on their exploits and intrusions into sensitive computer systems, such as the Masters of Disaster and the Legion of Doom (Slatalla & Quittner, 1995). As a result, it is common for individuals to belong to multiple forums and websites in order to gain access to pivotal resources online.



**For more information on what hacker BBSs looked like in the 1980s, go online to:** <http://hackers.applearchives.com/pirate-BBSs.html>

In addition to online relationships, hackers often report close peer associations with individuals in the real world who are interested in hacking (Holt, 2009a,b; Meyer, 1989; Schell & Dodge, 2002; Steinmetz, 2015). These networks may form in schools or through casual associations in local clubs. There are also local chapters of national hacker conferences, like the DefCon or DC groups (Holt, 2009a). For example, local 2600 groups began to form around the publication of the underground hacker/phreaker magazine of the same name in the early 1980s (2600, 2011). These chapters operate in order to bring interested individuals together to share their knowledge of computers and technology with others.

Similarly, **hacker spaces** have emerged over the last decade as a way for individuals with knowledge of technology to come together in order to share what they know with others (Hackerspaces, 2021). There are now 2,413 hackerspaces listed, with 996 marked as active and 362 as planned. They are often located in warehouses or large buildings rented by nonprofit groups in order to give individuals a chance to play with various technologies in an open and encouraging environment (Hackerspaces, 2021). This stimulates interest in technology and expands individual social networks to relate to a larger number of people who share their interests.



**For more information regarding hacker spaces, go online to:** [www.hackerspaces.org/](http://www.hackerspaces.org/)

There are also a number of regional and national conferences in the United States and Europe focusing on hacking and computer security. They range from regional **cons** organized by local groups, such as PhreakNIC in Nashville, Tennessee, and CarolinaCon in Raleigh, North Carolina, to high profile organized meetings arranged by for-profit industries like DefCon. **DefCon** has been held since 1993 and is now one of the preeminent computer security and hacking conferences in the world (DefCon, 2021). The conference draws in speakers and attendees from law enforcement, the intelligence community, computer security professionals, attorneys, and hackers of all skill levels for discussions on a range of topics covering hardware hacking, phreaking, cryptography, privacy laws, and the latest exploits and vulnerabilities in everything from ATMs to cell phone operating systems (Holt, 2007).

To learn more about DEF CON, go online to: <https://defcon.org/index.html>



Similar cons are held around the world, such as the Chaos Communication Congress (CCC), which is the oldest hacker conference in Europe. The CCC has been held since 1984 in various locations across Germany, with more than 9,000 attendees in 2013 (Kinkade et al., 2013). Thus, cons play an important role in sharing information about technology and connecting hackers in the real world which might not otherwise happen in online environments.

## Hacking History

### 1950s: The Origins

In order to understand the hacker community, it is important to explain its historical evolution in the context of computing technology since its infancy in the late 1950s (see [Table 3.1](#) for details). Some researchers argue that the term “hacking” emerged from engineering students at the Massachusetts Institute of Technology (MIT) in the 1950s (Levy, 2001). This phrase was used by students to refer to playful, but skilled, tinkering with electronics and was largely synonymous with “goofing off” or “fooling around.” In fact, the MIT model railroad club (TMRC) used the term to describe their work on the club’s railroad systems (Levy, 2001). They perceived hacking as a way to solve problems in spite of conventional techniques for engineering and electronics.

The emergence of computing in the 1950s in university settings like MIT, Cornell, and Harvard also facilitated the emergence of hacking. At the time, computing mainframes were massive systems encompassing whole climate-controlled rooms with relatively limited memory and overall processing power (Levy, 2001; see [Box 3.2](#) for details). These devices were not linked together in any networked fashion as is the case with current computers, and individuals working with these systems had to develop their own unique solutions to problems experienced by programmers and users. Computer programmers who managed the systems of the time were often pressed to find ways to speed up the otherwise slow processing of their mainframe computers. The elegant and innovative solutions to these problems were referred to as “hacks,” and the programmers responsible were identified as “hackers” in keeping with the original concept as generated among the student body at MIT (Levy, 2001).

### ***Timeline of Computer Hacking***

**Table 3.1** A timeline of notable events in the history of hacking

1955	<ul style="list-style-type: none"><li>The first computer hackers emerge at MIT. Members try their hand in rigging the new mainframe computing systems being studied and developed on campus.</li></ul>
1968	<ul style="list-style-type: none"><li>The UNIX operating system is developed by Dennis Ritchie and Keith Thompson.</li></ul>
1971	<ul style="list-style-type: none"><li>Phone hackers or phreaks break into regional and international phone networks to make free calls. John Draper discovers that a toy whistle found inside a Cap'n Crunch cereal box generates a 2600 Hz tone. By building a “blue box” using the toy whistle, resulting in free calls, John Draper and other phreaks land feature story in Esquire Magazine entitled “Secrets of the Little Blue Box.”</li><li>The first email program is created by Ray Tomlinson.</li></ul>
1975	<ul style="list-style-type: none"><li>Microsoft is created by Bill Gates and Paul Allen.</li></ul>
1976	<ul style="list-style-type: none"><li>The Apple Computer is created by Steve Jobs, Stephen Wozniak, and Ron Wayne.</li></ul>
1980–1982	<ul style="list-style-type: none"><li>Phone phreaks move into computer hacking.</li><li>Message boards called electronic bulletin board systems (BBSs) are created to exchange information and tactics with other phreaks.</li><li>Emergence of many hacking groups, including Legion of Doom and The Warelords in the United States, and the Chaos Computer Club in Germany.</li></ul>
1981	<ul style="list-style-type: none"><li>Ian Murphy becomes the first hacker to be tried and convicted as a felon for computer hacking.</li></ul>

(Continued)

**Table 3.1** A timeline of notable events in the history of hacking (*Continued*)

1983	<ul style="list-style-type: none"> <li>“War Games” sheds light on the capabilities that hackers could have. Generates fear among the public.</li> <li>“414” gang arrested for allegedly breaking into 60 computer systems from Los Angeles to Manhattan. As a result the story gets mass coverage and the US House of Representatives holds hearings to discuss cyber security.</li> </ul>
1984	<ul style="list-style-type: none"> <li>The Hacker Magazine or Hagazine called “2600” and the online zine Phrack a year later are created to give tips to upcoming hackers and phone phreaks.</li> <li>The Comprehensive Crime Control Act of 1984 is passed, giving the Secret Service jurisdiction over computer fraud.</li> </ul>
1985	<ul style="list-style-type: none"> <li>The first PC virus, called the Brain, is created. The virus used stealth techniques for the first time and originated in Pakistan.</li> </ul>
1986	<ul style="list-style-type: none"> <li>As a result of numerous break-ins on government and corporate computer systems, Congress passes the Computer Fraud and Abuse Act, which makes it a crime to break into computer systems. The law did not apply to juveniles.</li> </ul>
1988	<ul style="list-style-type: none"> <li>The Morris Worm incident is caused by Robert T. Morris, the son of a Chief Scientist of a division of the National Security Agency, and a graduate student at Cornell University. Morris plants a self-replicating worm on the government’s Arpanet in order to test what effect it would have on the UNIX system. The worm spread and clogged 6,000 networked computers belonging to the government and the university. As a result, Morris was expelled from Cornell, given probation, and fined \$10,000.</li> <li>The Computer Emergency Response Team (CERT) is created by DARPA (Defense Advanced Research Projects Agency), an agency of the United States Department of Defense responsible for the development of new technologies for use by the military. DARPA would address network security.</li> </ul>
1989	<ul style="list-style-type: none"> <li>The Hacker’s Manifesto is published by “The Mentor” and the Cuckoo’s Egg is published by Clifford Stoll.</li> <li>Herbert Zinn becomes the first juvenile to be convicted under the Computer Fraud Act.</li> </ul>
1990	<ul style="list-style-type: none"> <li>The Electronic Frontier Foundation is founded in order to protect and defend the rights of those investigated for computer hacking.</li> <li>Operation Sundevil commences, a prolonged sting operation where Secret Service agents arrested prominent members of the BBSs in 14 US cities during early-morning raids and arrests. The arrests were aimed at cracking down on credit card theft and telephone and wire fraud. This resulted in the breakdown in the hacking community, whereby members were informing on each other in exchange for immunity.</li> </ul>
1993	<ul style="list-style-type: none"> <li>DefCon hacking conference held in Las Vegas to say goodbye to BBSs. Popularity of event resulted in a meeting every year thereafter.</li> </ul>
1994–2000	<ul style="list-style-type: none"> <li>Emergence of the World Wide Web. Hackers adapt and transfer all information to web sites; as a result the face of hacking changes.</li> </ul>

*(Continued)*

**Table 3.1** A timeline of notable events in the history of hacking (*Continued*)

1994	<ul style="list-style-type: none"> <li>Russian crackers siphon \$10 million from Citibank and transfer money to bank accounts around the world, led by Vladimir Levin who transferred funds to accounts in Finland and Israel using his laptop. Levin was sentenced to three years in prison. All but \$400,000 was recovered.</li> </ul>
1995	<ul style="list-style-type: none"> <li>Kevin Mitnik is charged with illegally accessing computers belonging to numerous computer software and computer operating system manufacturers, cellular telephone manufacturers, Internet service providers, and educational institutions. Mitnik was also responsible for the theft, copying, and misappropriation of proprietary computer software from Motorola, Fujitsu, Nokia, Sun, Novell, and NEC. Mitnick was also in possession of 20,000 credit card numbers once captured. Chris Pile becomes the first person to be jailed for writing and distributing a computer virus.</li> </ul>
1995	<ul style="list-style-type: none"> <li>AOHell, a freeware application that allows unskilled script kiddies to wreak havoc on America Online or AOL is released, resulting in hundreds of thousands of mailboxes being flooded with email bombs and spam.</li> </ul>
1996	<ul style="list-style-type: none"> <li>Hackers alter the websites of the United States Department of Justice, the CIA, and the US Air Force. Reports by the General Accounting Office state that hackers attempted to break into Defense Department computer files approximately 250,000 times, 65 percent of which were successful.</li> </ul>
1998	<ul style="list-style-type: none"> <li>NASA, the US Navy, and universities across the country are targeted by denial of service attacks on computers running Microsoft Windows NT and Windows 95.</li> <li>Carl Fredrik Neikter, the leader of the Cult of the Dead Cow, releases the Trojan Horse program “Black Orifice,” which allows hackers remote access to computers once installed.</li> </ul>
1999	<ul style="list-style-type: none"> <li>Napster is created by Shawn Fanning and Sean Parker, attracting millions of users before being shut down in July of 2001.</li> <li>The first series of mainstream security software is released for use on personal computers.</li> <li>Bill Clinton announces a billion-dollar initiative to improve computer security and the establishment of a network of intrusion detection monitors for certain federal agencies.</li> <li>The Melissa virus is released causing the most costly malware outbreak to date.</li> <li>The Cult of the Dead Cow releases an updated version of Black Orifice.</li> </ul>
2000	<ul style="list-style-type: none"> <li>Hackers launch Denial-of-Service (DoS) attacks, shutting down Yahoo, Buy.com, Amazon, eBay, and CNN.</li> </ul>
2001	<ul style="list-style-type: none"> <li>The Department of Energy’s computer system at Sandia National Laboratories in Albuquerque is compromised.</li> <li>Microsoft’s main server is hacked by DDoS attacks.</li> </ul>

(Continued)

**Table 3.1** A timeline of notable events in the history of hacking *(Continued)*

2002	<ul style="list-style-type: none"> <li>Internal training and quality control campaign started by Bill Gates in order to insure the security of Microsoft.</li> <li>George W. Bush's administration submits a bill that would create the Department of Homeland Security, which would have, as one of its many roles, the responsibility of protecting the nation's critical information technology (IT) infrastructure.</li> <li>The CIA warns of an impending launch of cyberattacks on US computer networks by Chinese hackers funded by the Chinese government.</li> <li>"Shatter Attacks" is published by Chris Paget, showing how the Windows messaging system could be used to take control of a machine and questioning the security of the Windows system itself.</li> </ul>
2003	<ul style="list-style-type: none"> <li>Anonymous is formed.</li> <li>The United States Department of Commerce allows hacker groups to export encrypted software.</li> </ul>
2004	<ul style="list-style-type: none"> <li>Myron Tereshchuk is taken into police custody for an attempt to extort millions from Micropatent.</li> <li>North Korea claims to attempt to break into South Korea's computer systems.</li> </ul>
2005	<ul style="list-style-type: none"> <li>Rafael Nunez, member of "World of Hell," is taken into custody for cracking into the Defense Information Systems Agency.</li> <li>Cameron Lacroix is convicted for hacking into T-Mobile's USA network.</li> <li>Jeanson James Ancheta, member of "Botmaster Underground," is arrested by FBI.</li> </ul>
2006	<ul style="list-style-type: none"> <li>Kama Sutra, a worm specializing in destruction of data, is discovered and found to replicate itself through email contacts, disrupting documents and folders. The threat turned out to be minimal.</li> <li>Jeanson James Ancheta convicted for his role in hacking systems of the Naval Air Warfare Center and the Defense Information Systems Agency, sentenced to prison, and ordered to pay damages in addition to handing over his property.</li> <li>Iskorpitx hacks more than 20,000 websites.</li> <li>Robert Moore and Edwin Pena, hackers featured on <i>America's Most Wanted</i>, are convicted and ordered to pay restitution.</li> <li>FairUse4WM is released by Viodentia, removing DRM from music service websites.</li> </ul>
2007	<ul style="list-style-type: none"> <li>Estonia recovers from DDoS attacks.</li> <li>During Operation "Bot Roast," the FBI locates over a million botnet victims; the second botnet operation uncovers a million infected computers, results in a loss of millions of dollars, and several indictments.</li> <li>Office of Secretary of Defense undergoes a spear-phishing scheme, resulting in the loss of US Defense information as well as causing communication and identification systems to be altered.</li> <li>The United Nations website is hacked.</li> </ul>

*(Continued)*

**Table 3.1** A timeline of notable events in the history of hacking (*Continued*)

2008	<ul style="list-style-type: none"> <li>Project Chanology occurs on a Scientology website by Anonymous resulting in the loss and release of confidential information.</li> </ul>
2009	<ul style="list-style-type: none"> <li>The Conficker worm hacks into the computer networks of personal computers and government.</li> </ul>
2010	<ul style="list-style-type: none"> <li>“Operation Aurora”: Google admits to attacks on its infrastructure from China resulting in the loss of intellectual property.</li> <li>Stuxnet worm discovered by VirusBlockAda, deemed to be a cyberattack on the nuclear facilities of Iran.</li> <li>MALCON conference held in India, founded by Rajshekhar Murthy. Event gives an opportunity to display the techniques of malware coders from around the world.</li> </ul>
2011	<ul style="list-style-type: none"> <li>The website of Bank of America is hacked by Jeopardy, who is accused of stealing credit card information by the FBI.</li> <li>The PlayStation Network is compromised revealing personal information of its consumers, recognized as one of the largest data breaches to date.</li> <li>YouTube channel of Sesame Street hacked.</li> <li>Palestinian Territories’ internet networks and phone lines hacked from multiple locations around the world.</li> </ul>
2012	<ul style="list-style-type: none"> <li>Hundreds of thousands of credit card numbers from Israel released by Saudi hacker named 0xOmar. As a result Israel releases hundreds of credit card numbers from Saudi Arabia.</li> <li>Team Appunity, a Norwegian hacker group, is taken into custody for releasing the user database for the largest prostitution ring in Norway.</li> <li>Foxconn is hacked by Swagg Security, compromising information.</li> <li>WHMCS and MyBB are hacked by UGNazi due to the use of its software.</li> <li>Government sites including Farmers Insurance, MasterCard, and others are hacked by Swagg Security resulting in the release of personal information.</li> </ul>
2013	<ul style="list-style-type: none"> <li>Burger King Twitter account is hacked by McDonald’s.</li> <li>The Syrian Electronic Army attacked various media outlets because of articles they viewed as being sympathetic to Syrian rebel forces.</li> <li>Chinese hackers attack the New York Times over a story published regarding China’s prime minister.</li> <li>The Montana Emergency Alert System was hacked and broadcast messages regarding a zombie apocalypse.</li> <li>Target and other retailers are compromised by Point of Sale (PoS) malware that steals tens of millions of customer records leading to the largest data breaches on record.</li> <li>Anonymous hacked the official Twitter and Flickr accounts of North Korea to post mean messages about Kim Jong-un.</li> </ul>

(Continued)

**Table 3.1** A timeline of notable events in the history of hacking (*Continued*)

2014	<ul style="list-style-type: none"> <li>• Sony Pictures is hacked by a hacker group called the Guardians of Peace. They dump substantial quantities of intellectual property and sensitive email exchanges online and threaten violence if the film <i>The Interview</i> is not pulled from theaters.</li> <li>• A vulnerability in the OpenSSL software used to encrypt online communications is identified, called Heartbleed. It allows users to capture sensitive data from web servers with little to no detection.</li> <li>• Multiple retailers and financial service providers are hacked, including J. P. Morgan Chase and Home Depot.</li> <li>• Evidence emerges that the United States and United Kingdom are responsible for the release of malware called Regin that surreptitiously collects data from infected systems, and is viewed as the most sophisticated espionage malware created to date.</li> <li>• Major celebrities were the target of a phishing scheme to acquire their Apple iCloud usernames and passwords in order to gain access to their personal photos and videos. Several high profile female celebrities' nude photos were released online.</li> </ul>
2015	<ul style="list-style-type: none"> <li>• The website Ashley Madison, designed to facilitate extramarital affairs, is hacked by the “Impact Team” who leak their customer database online.</li> <li>• The Ukraine’s power grid is compromised by hackers, coinciding with Russian incursions into the country to seize territory.</li> <li>• The US Office of Personnel Management (OPM) was compromised leading to a breach of over 21 million individuals’ personal data, particularly their security clearance information and fingerprint details. Experts speculate it was performed by Chinese hackers as none of the information acquired was resold to others.</li> <li>• Anthem Health Care, a major insurance provider in the United States, was compromised by hackers leading to the loss of 80 million customers’ sensitive information.</li> </ul>
2016	<ul style="list-style-type: none"> <li>• Yahoo revealed that a series of compromises occurred since 2013 leading to the loss of 500 million users’ data.</li> <li>• The 2016 Democratic National Committee is hacked by someone using the handle Guccifer 2.0. The information acquired from the hack, including sensitive email exchanges, are posted online by WikiLeaks. The US government declares this hack was enabled by the Russian government as part of a larger campaign to affect the US elections.</li> <li>• A hacker group calling itself the Shadow Brokers tried to sell hacking tools and programs they acquired from an NSA hacking team, sometimes referred to as the Equation Group.</li> <li>• Major websites, including Netflix, undergo a DDoS attack using Internet of Things (IoT) devices, such as wireless security cameras, infected by Mirai botnet malware.</li> </ul>

*(Continued)*

**Table 3.1** A timeline of notable events in the history of hacking (*Continued*)

2017	<ul style="list-style-type: none"> <li>• The WannaCry ransomware attack affects individuals and organizations around the world.</li> <li>• NotPetya malware identified in the Ukraine causes damages to corporations across Europe, and various parts of the world, and is thought to have been generated by Russian state actors.</li> <li>• The organization Equifax is compromised by hackers, leading to the loss of credit records for more than 140 million US citizens.</li> </ul>
2018	<ul style="list-style-type: none"> <li>• Ransomware infections targeting Atlanta, Georgia slows their ability to do basic business for days.</li> <li>• Facebook was hacked, leading to the loss of personal information for over 30 million users, including sensitive information.</li> <li>• The United States indict two men for their active use of SamSam ransomware, which is thought to have caused more than \$30 million in damages to victims. This is the first such prosecution in the United States.</li> </ul>
2019	<ul style="list-style-type: none"> <li>• Healthcare companies Quest Diagnostics and LabCorp were affected by a data breach leading to the loss of millions of customers' medical, financial and personal information.</li> <li>• Cities across the United States are targeted by ransomware leading to huge losses for municipalities of all sizes.</li> <li>• Mobile game manufacturer Zynga was hacked which led to the loss of over 218 million user credentials.</li> <li>• Anonymous takes responsibility for hacking four Chinese databases in support of Hong Kong's protests against Chinese political pressures in the country.</li> </ul>
2020	<ul style="list-style-type: none"> <li>• Beauty company Estee Lauder was compromised by hackers, leading to the loss of 440 million pieces of information. It is thought that hackers had backdoor access to the system for some time and released all manner of internal corporate documents as well.</li> <li>• The cellular service provider Pakistani Mobile had 99 million user accounts posted online for sale by hackers, though it is unclear how long ago the actual hack may have occurred.</li> <li>• Russian and Chinese nation-state hackers attempted to breach medical companies in Europe and the US in an attempt to acquire plans for COVID-19 vaccination formulations.</li> <li>• Anonymous is thought to have hacked multiple US police departments to acquire police data in the wake of the death of African American suspects in police custody.</li> <li>• US-based IT services provider SolarWinds was hacked, leading to the compromise of major companies and US government agencies, making it the potentially worst hack of all time.</li> </ul>

The above information was accessed from:

1 <http://steel.lcc.gatech.edu/~mcordell/lcc6316/Hacker%20Group%20Project%20FINAL.pdf>

2 [http://en.wikipedia.org/wiki/List\\_of\\_security\\_hacking\\_incidents](http://en.wikipedia.org/wiki/List_of_security_hacking_incidents)

3 <http://edition.cnn.com/2001/TECH/internet/11/19/hack.history.idg/index.html>

4 [http://www.symantec.com/about/news/resources/press\\_kits/securityintelligence/media/SSR-Timeline.pdf](http://www.symantec.com/about/news/resources/press_kits/securityintelligence/media/SSR-Timeline.pdf)

## Box 3.2 Mainframe Computing Systems

### Hello MAUI, Goodnight Mainframe

<http://now.uiowa.edu/2013/03/hello-maui-goodnight-mainframe>



What's a mainframe? Sometimes called "big iron," a mainframe is a large-scale computer that can support thousands of users simultaneously and run vital operations reliably and securely. The mainframe probably got its name from massive metal frames that once housed it, often occupying thousands of square feet.

This article describes the early phases of mainframe computing and the eventual transition from these room-sized devices to the laptops of today.

**For more information on the history of hacking at MIT, go online to:** <http://tmrc.mit.edu/hackers-ref.html>



## 1960s and 1970s: The Hacker Ethic

The perception of the hacker as a skilled programmer and tinkerer continued through the 1960s. The social upheaval and civil unrest experienced during this decade, however, would affect the ways that hackers viewed their relationship to technology and the larger world. As computer technology moved from universities into military applications, the number of programmers and "hackers" began to expand. As a consequence, a culture of programmers emerged based on a series of ideas called the **hacker ethic** by Steven Levy (2001):

- 1 Access to computers – and anything that might teach you something about the way the world works – should be unlimited and total.
- 2 All information should be free.
- 3 Mistrust authority – promote decentralization.
- 4 Hackers should be judged by their hacking, not bogus criteria such as degrees, age, race, or position.
- 5 You can create art and beauty on a computer.
- 6 Computers can change your life for the better.

Though these six ideas are interrelated, the core belief within the hacker ethic is that information should be open and free to all so that individuals can understand how things work and identify ways that they could be improved (Thomas, 2002).

The importance of transparency through technology became even more salient in the 1970s with the introduction of two activities: **phreaking** and homebrew computing. The emergence of phone phreaking, or tampering with phone technology to understand and control telephone systems, was espoused by elements of the 1960s and 1970s counterculture movement (Landreth, 1985; Wang, 2006). Individuals like Abbie Hoffman, an activist and protestor who wrote *Steal This Book*, advised people to engage in phreaking as a way to strike out against telephone companies for profiteering from a wonderful service. Hoffman and other groups wanted people to phreak because they could make free calls to anyone in the world by controlling telephone system switches through various devices and tones. The novel application and manipulation of telephony through phreaking led this activity to be the first form of hacking to gain a broader audience outside of traditional computing.

The act of phreaking gained national attention in the mainstream media through an article published in *Esquire* magazine on John Draper and various other “phreaks” in 1971 (Wang, 2006). Subsequently, law enforcement and telephone security began collaborative crackdowns to eliminate phreaks from penetrating telephony. The absence of laws pertaining to the exploration and manipulation of computers and telephony made it difficult for police agencies until the late 1970s, when the first legal statutes were developed (Wang, 2006). In fact, one of the first computer crime laws in the United States was passed in Florida in 1978 making all unauthorized access to computer systems a third degree felony (Hollinger & Lanza-Kaduce, 1988).



**For more information on blue boxes and phreaking, go online to:**  
<http://www.lospadres.info/thorg/lbb.html>

The 1970s also saw the emergence of hobbyist groups focused on the development of computer hardware and software. These groups operated through informal meetings run in garages and other settings to facilitate conversations on the design and construction of personal computers (PCs). These hobbyists often used a combination of commercial computer kits sold through magazines, as well as their own innovative designs and “hacks” of existing

resources. Their practices helped to advance the state of personal computing, though they did not typically refer to themselves or their activities as hacking (Ceruzzi, 1998).

## 1980s: PCs, Entertainment, and the Hacker Manifesto

The adoption of PC technology was initially slow, and did not take hold until the early 1980s when middle income families began to purchase computers. The concurrent explosion of video games and home electronic entertainment systems exposed young people to technology as never before. Young people, particularly males, were increasingly attracted to these devices and began to explore and use computers beyond their advertised value as learning tools. Similarly, modem technology, which connects computers to other computers and networks via telephone lines, improved and became accessible to the common home user. Individuals who had never before had access to computer technology could now identify and explore connected computer networks (Furnell, 2002). This led to the rise of the BBSs culture where local groups and hackers across the country could connect and share information with others (Slatalla & Quittner, 1995). At the same time, a growing underground media began to publish homemade magazines on computers, hacking, and phreaking, such as *Phrack* and *2600*. These publications helped to propel individual interests in hacking and connect the burgeoning computer-using community together.

The increasing popularity of technology in the general public led to increased media attention around computers and youth. This was due, in part, to the theatrical release of the movie *WarGames*, which featured a teenage hacker played by Matthew Broderick who unsuspectingly gains access to military computer systems and nearly causes a nuclear holocaust (Schneider, 2008). The film piqued the curiosity of some youth and increased interest in hacking and computer use in general (see [Box 3.3](#) for details).

Media outlets quickly published stories on malicious hacker groups in order to capitalize on the public interest in computer misuse stemming from the film (Marbach, 1983a,b). For instance, the Federal Bureau of Investigation (FBI) began raiding and filing suits against the members of a local group of hackers known as the “414s” based on their Milwaukee area code (Krance et al., 1983). The teen boys compromised protected networks but did not cause harm to systems or data (Hollinger & Lanza-Kaduce, 1988). Their acts drew attention from both federal law enforcement and the media to the growing perceived use of hacking for criminal purposes. Thus, this marked a distinct divergence in the

### Box 3.3 A Hacker Talks about WarGames

When WarGames came out, that was probably the biggest boon to the modern hacker that there ever was. Because right after that war dialers came out ... programs that you could download to your computer that were all over the BBS that you could download that would call up people's computers and just look for modem tones. And then, they'd record the greetings that the computers gave. Everybody was friendly back then so when you dialed into a computer, it gave you the identification of who the computer was and... if it was governmental or something like that. It would either tell you, you know this is so and so's computer or simply would not tell you anything and that would be a flag that hey, this is, you know, is something worth looking at. If it just asked you for your username and password, then maybe I need to go in here. Most of 'em didn't even ask for usernames. They just wanted passwords ... So you start doing things and when I got my first modem, WarGames came out as a movie and I saw all these dialers and I thought you know, this is cool. And so you download one of the dialers and you run it. You check every phone number in your neighborhood and after it had checked for five days and like come up with four numbers or whatever and you would take those numbers and call 'em and you would get the greeting protocols. And from that point in time you'd bring in your second program which was just, it would dial up, connect, and then it would randomly generate a password. Try to get through and it would keep doing it ... so you would take this wardialer and you would tell it, ok I'm going to dial every phone number in there looking for a modem and hang up. And you know if I don't get a modem in so much time, hang up, go to the next one. So the people think they get a hang-up phone call, it's annoying, but that's it. When you finally do get one, it sends across its I-identification which was usually a welcome greeting, "welcome to blah-blah blah-blah-blah" and... it would record that and then you'd go through at the end of, you know, after you'd let it sit for however long it took to go through that exchange and for the ten thousand numbers in the exchange it might take eight hours. You'd

come back at the end of eight hours you'd look at all your greetings and see if any of 'em were what you were looking for. Once you knew they were what you were looking for then it was a matter of brute forcing the passwords.

(Interview conducted with Mac Diesel by Thomas J. Holt)

concept of hacking and hackers from the notion in the 1950s and 1960s of ethical computer tinkerers to a more criminal orientation.

**For more information on 1980s hacker groups and cyber gang warfare caused by racism, go online (caution: racist language, including the N-word, appears in the article) to: [http://archive.wired.com/wired/archive/2.12/hacker\\_pr.html](http://archive.wired.com/wired/archive/2.12/hacker_pr.html)**



The criminalization of hacking and the growing schism in the hacker community was exacerbated by the publication of a brief text called *The Conscience of a Hacker*, or ***The Hacker Manifesto*** (Furnell, 2002). The document was written by "The Mentor" in 1986 and first published in the magazine *Phrack*. The Mentor railed against adults, law enforcement, and schools, arguing that hackers seek knowledge even if that means breaking into or gaining access to protected computer systems. These activities do not make hackers criminals according to the Mentor, but rather misunderstood and unappreciated by adults who have no conception of the value of technology. He also encouraged hackers to engage in phreaking because telephone companies were "run by profiteering gluttons." This document supported some of the criminal aspects of hacking that were in opposition to the 1960s conception of hacking and the broader hacker ethic. As a consequence, a rift began to form between hackers based on their support of either the *Manifesto* or the hacker ethic, as well as their perception of malicious and exploratory hacks.

In fact, there are two terms that are used by some to attempt to differentiate between hackers who seek to harm or destroy systems and those who do not. The term **crack** emerged within the hacker subculture to recognize and separate malicious hacks from those acts supported by the hacker ethic (Furnell, 2002; Holt, 2010). Those who engage in deviant or criminal applications of hacking could be labeled as **crackers** since true hackers consider destructive

hackers to be “a lower form of life” (Furnell, 2002). Thus, the act of cracking is thought to be different from hacking based on the outcome of the attack and not the techniques applied by the actor.



**For the full text of the *Hacker Manifesto*, go online to: [www.phrack.org/issues/7/3.html#article](http://www.phrack.org/issues/7/3.html#article)**

The criminalization of hacking continued through the creation of the federal Counterfeit Access Device and Computer Fraud and Abuse Act (CFAA) of 1984, and its subsequent revision in 1986. The 1984 law initially focused on the use and abuse of credit card information and established that any criminal incident involving \$5,000 of loss or more was a federal offense to be handled by the Secret Service (Hollinger & Lanza-Kaduce, 1988). The 1986 revision of this act, however, expanded legal protections to all computerized information maintained by banks and financial institutions.

Furthermore, the law added three new violations: (1) unauthorized access to computer systems with the intent to defraud; (2) unauthorized access with intent to cause malicious damage; and (3) the trafficking of computer passwords with the intent to defraud (Taylor et al., 2010). These laws not only codified criminal applications of hacking, but also afforded police agencies with better tools to prosecute the activities of hackers across the country (Hollinger & Lanza-Kaduce, 1988; Sterling, 1992;). In turn, multiple high profile law enforcement investigations developed during the late 1980s and early 1990s, such as the pursuit of Kevin Mitnick (Shimomura & Markoff, 1996; see [Box 3.4](#) for details) and Kevin Poulsen (Littman, 1997).

As technology became increasingly user friendly and affordable in the early 1990s, the hacker population continued to expand. The hacker subculture became more segmented based on the use of perceived unethical hacking techniques by the increasing number of young hackers (Taylor, 1999). For instance, modern hackers would typically attempt to gather internal documents after accessing a system, both for bragging rights and to allow for the free exchange of information through the hacker network. This desire to spread information and discuss attack techniques afforded a mechanism for law enforcement to gather evidence of illegal activities (Holt, 2007). As a consequence, the free exchange of information within the hacker community began to evolve into trying to diminish the likelihood of detection and prosecution (Kilger, 2010; Taylor, 1999). Local hacker groups began to support conferences on the topic of hacking in the United States, including DefCon, Hackers On Planet Earth (HOPE),

## Box 3.4 The Criminal Exploits of Kevin Mitnick

### Mitnick Speaks!

[www.forbes.com/1999/04/05/feat.html](http://www.forbes.com/1999/04/05/feat.html)



FORBES.COM [F]: How would you characterize the media coverage of you?

MITNICK [M]: When I read about myself in the media even I don't recognize me. The myth of Kevin Mitnick is much more interesting than the reality of Kevin Mitnick. If they told the reality, no one would care ...

In this article, Kevin Mitnick discusses his hacks and his life during incarceration for violations of the Computer Fraud and Abuse Act. He also discusses his thoughts on the post-release conditions he would have to live with once he completed his prison sentence.

and PumpCon. Similar conferences have been held since the mid-1980s in Germany, such as the **Chaos Communication Congress (CCC)**, which began in 1984 in Hamburg, then moved to Berlin in 1998 (Kinkade et al., 2013). These meetings afforded the opportunity to connect in the real world and gave the hacker population an air of respectability in the face of increasing criminal prosecutions of hacker groups (Holt, 2007).

### **1990s: Affordable Technology, the Computer Security Community, and Financial Gain**

At the same time, the computer security community began to emerge in the 1990s with the incorporation of skilled hackers who understood the process of identifying and securing vulnerable software and hardware. This created a new tension within the hacker community between supposedly ethical hackers who worked for private industry and unethical hackers who used the same techniques to explore and exploit systems (Jordan & Taylor, 1998; Taylor, 1999). Some felt this was an important transition back to the origins of the hacker ethic, while others viewed the change from hacker to security professional as a process of selling out and betraying the very nature of open exchange within the hacker community (Taylor, 1999).

The prosecution and detention of Kevin Mitnick exacerbated this issue in the mid-1990s. Mitnick was viewed as a hero by the hacker community because of his substantial skill and the overly harsh treatment at the hands of law enforcement and prosecutors (Taylor et al., 2010). In fact, federal prosecutors barred Mitnick from using a computer or Internet-connected device for several years after his release from a federal prison due to fears that he might cause substantial harm to telephony or private industry (Painter, 2001). Many hackers donated to Mitnick's legal defense fund and felt that he was a scapegoat of fearmongering by legislators and law enforcement (Taylor et al., 2010). Shortly after his release from prison, Mitnick began a computer security consulting business and angered those in the subculture who viewed this as a betrayal of the basic principles of the hacker community. As a result, he lost a good deal of respect but provided a model for others to transition from hacker with a criminal past to security insider in an increasingly technologically driven society.



**For more information on Mitnick's prison experience, go online to:** [www.youtube.com/watch?v=lJFCbrhLojA](https://www.youtube.com/watch?v=lJFCbrhLojA)

By the late 1990s, the World Wide Web and PC had radically altered the nature of business and communications. The global expansion of connectivity afforded by the Internet led to the digitization of sensitive financial and government information and massive databases accessible online. Financial service providers and business platforms moved to online environments to offer services directly to home computer users, offering convenient modes of communication and shopping. As a consequence, the landscape and dynamics of computer hacking and the computer security industry changed.

The motives for hacking also shifted during this period from acquiring status and acceptance from the social groups that dominated hacking in the 1980s and 1990s toward economic gain (Chu et al., 2010; Kilger, 2010; Holt and Lampke, 2010). The complexity of the tools used by hackers increased, and their functionality changed from infecting and degrading global networks to attacking and stealing sensitive information surreptitiously. In fact, the problem of **phishing**, where consumers are tricked into transmitting financial information into fraudulent websites where the information is housed for later fraud, grew in the late 1990s and early 2000s (James, 2005; Wall, 2007). These crimes are particularly costly for both the individual victim and financial institutions alike. According to the Anti-Phishing Working Group (2021), there were 199,120 unique

phishing websites that were detected in December 2020 alone, which was a decrease from the previous two months (October: 225,304; November: 212,878). In addition, over 500 brands were targeted in December 2020 as part of phishing campaigns.

During this time, individuals began to apply hacking techniques and skills in attacks based on political and social agendas against government and private industry targets. For instance, members of the hacker collective, the “Electronic Disturbance Theater,” created and released an attack tool called FloodNet (Denning, 2010; Jordan & Taylor, 2004). This program was designed as a standalone tool to enable unskilled actors to engage in **denial of service** attacks against various government services as a form of “civil disobedience” (Cere, 2003; Schell & Dodge, 2002). Such an attack keeps individuals from being able to use communications services, thereby rendering them useless. This tool was first employed in an attack against the Mexican government because of their treatment of Zapatista separatists who were fighting against what they perceived to be governmental repression (Denning, 2010). See [Box 3.5](#).

Similarly, hackers in India and Pakistan engaged in a series of defacement attacks over a four-year period from 1998 to 2001 due to the use of nuclear weapons testing and development in India (Denning, 2010). Web defacements

### Box 3.5 The Electronic Disturbance Theater and Cyberattacks

#### Tactical Poetics: FloodNet’s Virtual Sit-ins

<http://rhizome.org/editorial/2016/dec/01/tactical-poetics-floodnets-early-1990s-virtual-sit-ins/>



It was a simple Java applet designed to rapidly reload a given webpage, but in the hands of these artists, it became a powerful “weapon of collective presence” and conceptual artwork – an exercise in “tactical poetics.”

In this essay, the role of FloodNet as a tool of protest and its association to the corporeal and virtual is discussed in detail. Examining the use of FloodNet as a tool for attacks in the 1990s demonstrates the thoughtful nature of hacking depending on the motive of the attacker.

### Box 3.6 The Ongoing Conflict Between Indian and Pakistani Hackers

#### Hackers from India, Pakistan in Full-Blown Online War



<http://www.gadgetsnow.com/tech-news/Hackers-from-India-Pakistan-in-full-blown-online-war/articleshow/44766898.cms>

Even as gunfire continues to be traded across the Indo-Pak border, a full-blown hacking and defacement war has erupted in cyberspace. On Thursday, over a dozen Indian and Pakistani websites were defaced by hackers from either side of the fence.

In this article, the various attacks between hacker crews in both India and Pakistan are detailed. This includes targeted defacements against government, industry, and educational institution websites, due in part to physical conflict between the two nations.

allow an actor to replace the original web page with content of their own design, including text and images. Such an attack is an ideal mechanism for politically motivated attackers to express their attitudes and beliefs to the larger world. Thus, the number of defacements dramatically increased during this period as more countries became connected to the Internet and saw this environment as a means to express their political and religious ideologies (Denning, 2010). To understand how hacking is used as a method for both legitimate and malicious activities that affect individuals and governments around the world, it is necessary to examine the modern hacker subculture and its influence on structuring the hacker identity. See **Box 3.6**.



For more information on web defacements, go online to: [www.zone-h.org/](http://www.zone-h.org/)

### The Contemporary Hacker Subculture

The activities of hackers are driven, in large part, by the values and beliefs of the current hacker subculture. Three primary norms within the hacker community have been identified across multiple studies: (1) technology; (2) knowledge; and

(3) secrecy (Holt, 2007; Jordan & Taylor, 1998; Meyer, 1989; Steinmetz, 2015; Taylor, 1999; Thomas, 2002). These norms structure the activities and interests of hackers *regardless* of their involvement in ethical or malicious hacks; they are highly interconnected and important in understanding the overall hacker subculture.

## Technology

The act of hacking has been directly and intimately tied to technology since the development of the term “hack” in the 1950s (Holt, 2007; Jordan & Taylor, 1998; Meyer, 1989; Steinmetz, 2015; Taylor, 1999; Thomas, 2002). The interests and activities of hackers center on computer software and hardware, as well as associated devices like electronics, video games, and cell phones (Holt, 2007; Jordan & Taylor, 1998; Turkle, 1984). These interests are interrelated, as understanding of hardware can improve an individual’s understanding of software and vice versa. Thus, an individual’s connection to technology and their sense of ownership over the tools of their “craft” (Steinmetz, 2015) increases their ability to hack (Holt, 2007; Jordan & Taylor, 1998; Taylor, 1999; Thomas, 2002).

To generate such a connection, hackers must develop a deep appreciation of computers and be willing to explore and apply their knowledge in new ways (Jordan & Taylor, 1998). Hackers must be curious and explore technology often through creative play with devices, hardware, and software. For instance, one of the most well-known hackers is John Draper, also known as Cap’n Crunch. He was very active in the 1970s and 1980s in the hacker community and is known for having blown a giveaway whistle found in a box of Cap’n Crunch cereal into his phone receiver (Furnell, 2002; Wang, 2006). The whistle created the perfect 2600 Hz tone that was necessary to enable an individual to connect to long distance lines at that time. Such an act of hacking the telephone system is known as **phreaking**, combining the notion of “phone” and “hacking” together (Furnell, 2002; Holt, 2010; Wang, 2006). Draper’s unique application of phreaking knowledge through the use of a simple children’s toy garnered a great deal of respect and attention from the phreaking community and popular media. In turn, this act demonstrates the importance of exploration and creativity in the hacker community.

The importance of technology for hackers often emerges early in youth. Many who become involved in the hacker community report developing an interest in technology at an early age. Many hackers report gaining access to computers in their early teens or even younger (Bachmann, 2010; Holt, 2007). Simply utilizing computers in public cafes and schools can also help pique a

hacker's interest in technology (Holt, 2010). Identifying peers who share their affinity for technology on or offline is also extremely valuable because it helps to maintain their interests. Hackers maintain loose peer associations with individuals in online environments that may be useful in the development of their skill and ability (Dupont et al., 2017; Holt, 2009a,b; Holt & Kilger, 2008; Leukfeldt et al., 2017; Schell & Dodge, 2002; Taylor, 1999).

### Knowledge

The central importance of technology in this subculture drives individuals to have a deep commitment to having knowledge and mastery of a variety of technological tools, including hardware and software (Meyer 1989, Holt, 2007; Steinmetz, 2015; Thomas 2002). Hackers spend a significant amount of time learning about technology in order to understand how devices work at deep levels. The hacker community stresses that individuals need to learn on their own rather than ask others to teach them how to do things (Holt, 2007; Jordan & Taylor, 1998; Taylor, 1999). Though social connections provide access to information and accumulated knowledge, the idea of being a hacker is driven in part by curiosity and experiential knowledge that can only be developed through personal experience.

An individual interested in hacking cannot simply ask others to teach them how to hack (Holt, 2007; Jordan & Taylor, 1998; Taylor, 1999). Such a request would lead to a person being ridiculed or mocked and embarrassed publicly by others. Instead, most hackers learn by spending hours every day reading manuals, tutorials, and forum posts in order to learn new things (Holt, 2007, 2009a; Jordan & Taylor, 1998; Taylor, 1999). Hackers also belong to multiple forums, mailing lists, and groups in order to gain access to resources and information (Dupont et al., 2017; Holt, 2007, 2009a; Holt & Kilger, 2008; Meyer, 1989; Taylor, 1999). The increasing importance of video sharing sites has also enabled people to create tutorials that describe in explicit detail and demonstrate how to hack. For instance, Turkish hackers regularly post videos on YouTube and hacker forums that explain in detail how certain hacks work so that they can help others learn about technology (Holt et al., 2017). Constant changes in technology also require hackers to stay on the cutting edge of innovations in computer hardware and software in order to improve their overall understanding of the field.

Individuals who can apply their knowledge of technology in a practical fashion often garner respect from others within the subculture (Holt et al., 2017).

The hacker subculture is a meritocracy where individuals are judged on the basis of their knowledge of computer hardware and software. Those with the greatest skill have the most status, while those with little to no ability but a desire to hack receive the least respect from others. Hackers who create new tools, identify unknown exploits, and find novel applications of technology often generate media attention and respect from their peers in forums and blogs (Dupont et al., 2017). Demonstrations of technological mastery provide cues that they are a hacker with some skill and ability (Holt et al., 2017). By contrast, individuals who engage in poorly executed hacks or have minimal skills but try to brag about their activities can be ostracized by others (Dupont et al., 2017; Holt, 2007; Jordan & Taylor, 1998; Meyer, 1989; Steinmetz, 2015).

One of the most salient demonstrations of mastery of technology can be seen at cons, where individuals can compete in hacking challenges and competitions. For example, DefCon and some regional cons hold **Capture the Flag** (CTF) competitions where hackers compete against each other individually or in teams to hack one another, while at the same time defending their resources from others. This demonstrates the dual nature of hacking techniques for both attack and defense. Many cons also hold trivia competitions with questions about computer hardware, software, programming, video games, and the exploits of well-known hackers. These games allow individuals to demonstrate their understanding and connection to the social history of hacking, as well as their technical knowledge. The winners of these competitions are usually recognized at the end of the con and are given prizes for their accomplishment. Such recognition from the general public helps to validate an individual's knowledge and skill and demonstrate their mastery over social and technical challenges (Holt, 2009a).

For more information on CTFs, go online to: [www.youtube.com/watch?v=giAe7wU4r2o](https://www.youtube.com/watch?v=giAe7wU4r2o)



The importance of knowledge is also reflected in the way that hackers refer to individuals within the hacker subculture, as well as those who operate outside of it (Furnell, 2002; Holt, 2007, 2010; Jordan & Taylor, 1998; Taylor, 1999). There are a variety of terms that are used to describe hackers. Individuals who are new to hacking and have minimal knowledge of technology may be referred to as a **noob** or **newbie** (Holt, 2010). This may be used derogatorily in order to embarrass that person, although many simply identify themselves as noobs in order to clearly delineate the fact that they may not know much about

technology. Regardless, those who are considered noobs generally have no status within the hacker community (Furnell, 2002; Holt, 2010).

As hackers learn and gain an understanding of computer software and hardware, they may attempt to apply their knowledge with limited success. One of the key ways that a person may hack early on involves the use of tools and kits found on hacker websites and forums (Bachmann, 2010; Furnell, 2002; Holt, 2010). The proliferation of hacker tools over the last two decades has made it relatively easy for individuals to engage in various hacks because these resources automate the use of exploits against known vulnerabilities. The ability to quickly and easily hack a target is enticing for individuals who are new to the subculture because they may feel such an act will garner status or respect from others (Furnell, 2002; Holt, 2007; Holt et al., 2017; Taylor, 1999). They do not, however, understand the way that these tools actually affect computer systems so their attacks often fail or cause greater harm than initially intended. As a consequence, many within the hacker subculture use the term **script kiddies** to refer to such individuals and their acts (Furnell, 2002; Holt, 2007, 2010; Taylor, 1999). This derogatory term is meant to shame individuals by recognizing their use of premade scripts or tools, their lack of skill, and the concurrent harm that they may cause. In addition, older members of the hacker community may also refer to noobs or script kiddies as **lamers** or **wannabees**, referencing their limited capacity and skills (Furnell, 2002).

Those hackers who spend a great deal of time developing a connection to technology and robust understanding of computers may be able to demonstrate that they are more than just a noob or script kiddie (see Holt, 2010). Eventually, they may be able to demonstrate enough capacity to be viewed as a hacker, or even **leet** (1337), by others in the subculture. There is no single way, however, to determine when a person is “officially” considered a hacker or leet (Holt, 2007). For instance, some people may not refer to themselves as hackers because they feel that being a hacker is something that others must apply to you, rather than something you can bestow upon yourself (Holt, 2007). Thus, they may simply allow others to call them a hacker rather than use the term on their own. Others argue becoming a hacker is based on experience, such that you are only a hacker after you can use various programming languages, repair your own computer, and create your own tools and scripts (Holt, 2007; Taylor, 1999).

Within the community of skilled hackers, some use the terms **white hat**, **black hat**, or **gray hat** to refer to an actor based on the way that they apply their knowledge (see Furnell, 2002; Holt, 2007, 2010; Thomas, 2002). White hats are thought to be “ethical” hackers who work to find errors in computer

systems and programs to benefit general computer security (Furnell, 2002; Holt, 2007, 2010). Black-hat hackers use the same techniques and vulnerabilities in order to gain access to information or harm systems (Furnell, 2002; Holt, 2007, 2010). Thus, black hats may sometimes argue that they are no different from white hats; instead it is a perceptual difference among security professionals (Holt, 2007). Gray-hat hackers fall somewhere between these two camps, as their motives shift or change depending on the specific situation (Furnell, 2002; Holt, 2010). The ambiguous nature of hacker ethics, however, makes it difficult to clearly identify when someone is acting purely in a black or white context. The use of a term like gray hat is used to identify the ethical flexibility and lack of consistency in individual hackers' actions (Furnell, 2002; Holt, 2007, 2010; Jordan & Taylor, 1998). A gray-hat hacker may use their knowledge for beneficial purposes one day, while breaking into a computer system to steal information the next day. Thus, there is significant variation in the actions of skilled hackers.

## Secrecy

The importance hackers place on demonstrations of knowledge and deep commitment to technology creates a unique tension within the hacker subculture: the need for secrecy (Jordan & Taylor, 1998; Taylor, 1999; Thomas, 2002). Since some forms of hacking are illegal, an individual who attempts to brag about their activities to others can place themselves at risk of arrest or legal sanctions (Dupont et al., 2017; Kilger, 2010; Taylor, 1999). This does not stop hackers from talking about or engaging in illicit activities in relatively public arenas online. Instead, they use various techniques to reduce the likelihood that their real identity is compromised, such as **handles** or nicknames in online and offline environments in order to establish an identity separate from their real identity (see Furnell, 2002; Jordan & Taylor, 1998). Handles serve as a digital representation of self. They may be humorous or serious, depending on the individual. For example, one hacker adopted the handle TweetyFish under the assumption that no judge would ever take criminal hacks associated with that name seriously (Furnell, 2002). Others take names that are associated with scofflaws and villains, like the group the Legion of Doom in the 1980s, or represent violence and pillaging like Erik Bloodaxe (Furnell, 2002). Regardless of the handle an individual chooses, its use helps to create a persona that can be responsible for successful hacks and activities and diminish the likelihood of reprisals from law enforcement (Furnell, 2002; Jordan & Taylor, 1998; Taylor et al., 2010).

Some hackers also attempt to segment themselves and shield their activities from the general public through the use of closed web forums and private message boards. Requiring individuals to register with a website or forum helps to give some modicum of privacy for posters and diminishes the likelihood that anyone in the general public may stumble upon their conversations (Meyer, 1989). Law enforcement officers and computer security researchers can still gain access to these forums and generate information about serious hacks and attacks, though it is harder to identify these resources when they are closely kept secrets (Dupont et al., 2017). In fact, some hacker groups keep their sites from appearing in search engine results like Google by turning off the feature “robots.txt” in the HTML coding (Chu et al., 2010). This keeps web spiders from logging the site and reduces the likelihood that outsiders may access their resources. Individuals within the hacker subculture can still identify and gain access to these resources. Hackers, therefore, tread a fine line between sharing information and keeping certain knowledge private (Jordan & Taylor, 1998).

The issue of secrecy has also affected the way that individuals engage with one another at conferences and in public settings. The substantive increase in law enforcement investigations of hackers and the concurrent incorporation of hackers into government and private industry to secure resources means that individual attendees may be surrounded by people who are focused on identifying malicious hackers (Holt, 2007, 2010; Schell & Dodge, 2002). Conferences like DefCon have actively attempted to single out when an individual is in such a position through their “Spot the Fed” contest (Holt, 2007). The game involves pulling an attendee out of the crowd who people perceive to be a federal agent and asking them a series of questions about their life and job. If the person is, in fact, a federal agent, both the fed and the spotter receive t-shirts to commemorate the experience (Holt, 2007).



To see “Spot the Fed” in action, go online to: [www.youtube.com/watch?v=oMHZ4qQuYyE](https://www.youtube.com/watch?v=oMHZ4qQuYyE)

The Spot the Fed game was initially designed to draw attention to the presence of law enforcement at the con, and stress the need to carefully manage what is shared with strangers in the open. The game also helps demonstrate the boundaries between hackers and law enforcement and sheds light on the role of law enforcement in the hacker subculture. Over time, however, the game has become much more playful, and has occurred with less frequency as the

conference has become a more established part of the computer security community. The presence of such a game still emphasizes the need for secrecy in managing how hackers interact with others on- and offline.

## Legal Frameworks to Prosecute Hacking

The federal government within the United States is the primary level of government that attempts to curtail computer hacking activities by passing and enforcing legislation through various agencies. At the federal level, the primary statutes used to prosecute hacking cases are referred to as the [Computer Fraud & Abuse Act \(CFAA\)](#) (discussed previously). This act, listed as Section 1030 of Title 18 of the US Criminal Code, was first passed in 1986 and has been revised multiple times over the last three decades. These laws prosecute attacks against a “[protected computer](#),” which are defined as any computer used exclusively or nonexclusively by a financial institution or the federal government, as well as any computer used to engage in interstate or foreign commerce or communication generally (Bossler, 2020; Brenner, 2011). This broad definition was adopted in 1996 in order to provide protection to virtually any computer connected to the Internet and to increase the efficacy of federal statutes to prosecute hacking crimes (Bossler, 2020; Brenner, 2011).

The CFAA (18 USC § 1030) stipulates seven applications of hacking as violations of federal law, though we will focus on four of these statutes here. The other three statutes are discussed in [Chapter 4](#) because they pertain more to malicious software and certain attacks that may extend beyond or can be completed without the use of computer hacking. In addition, 18 USC § 1030 (b) also made it illegal to conspire to commit any of the seven acts of the CFAA. With that in mind, there are four offenses that immediately pertain to unauthorized access as discussed thus far:

- 1 Obtaining national security information: Knowingly accessing a computer without authorization or by exceeding authorized access and obtain information protected against disclosure which could be used to the disadvantage of the United States or the advantage of a foreign nation and willfully deliver that information to another person not entitled to receive it or retain the information and refuse to deliver it to the person entitled to receive it (18 USC § 1030 Sect. (a)(1)).
- 2 Accessing a computer and obtaining information: Knowingly accessing a computer without authorization or by exceeding authorized access to:

- a) Obtain information contained in a financial record of a financial institution or of a card issuer or contained in a file of a consumer reporting agency on a consumer;
  - b) Obtain information from any federal department or agency;
  - c) Information from any protected computer (18 USC § 1030 Sect. (a)(2));
- 3 Trespassing in a government computer: To intentionally and without authorization access any nonpublic computer of a US department or agency that is exclusively for the use of the government and affects the use of that computer (18 USC § 1030 Sect. (a)(3)).
- 4 Accessing a computer to defraud and obtain value: To knowingly and with the intent to defraud access to a protected computer without authorization or by exceeding authorized access and thereby further the intended fraud and obtain anything of value (18 USC § 1030 Sect. (a)(4)).

These acts cover a wide range of offenses and are written broadly enough to prosecute hackers regardless of whether they are **internal** or **external attackers** (Brenner, 2008; Furnell, 2002). Specifically, an internal attacker is an individual who is authorized to use and has legitimate access to computers, networks, and certain data stored on these systems. For example, college students are typically allowed to use online registration systems, access course content hosted on Blackboard or other learning sites, and use computer systems on campus through a username and password sign-in system. They are not, however, allowed to enter in grades or use sensitive systems that are reserved for faculty and administrators. If a student wanted to change their grades electronically, they would have to exceed their authorized use by guessing a password or exploiting a system's vulnerability in order to gain access to grading systems. Thus, their use of existing internal resources makes them an internal attacker. Someone who attempts to change grades or access sensitive systems, but is not a student or an authorized user, would be defined as an external attacker (Brenner, 2008; Furnell, 2002). This is because they have no existing relationship with the network owners and are completely outside of the network.

The US Supreme Court in June 2021 provided clarity on what is meant by “exceeding authorized access” in the case of *Van Buren v. United States* (2021). Georgia police officer, Nathan Van Buren, searched a license plate database in order to be paid by a third party for information. This unauthorized use of the database led to his conviction under the CFAA. The Supreme Court in a 6-3 decision, however, held that the CFAA had been interpreted too broadly, and that it does not cover situations in which an individual, who “plainly flouts”

departmental policies, accesses databases for improper reasons if they had the authorization to access the information in the first place. The Court further found that a broad interpretation of the CFAA could lead to a significant number of commonplace computer activities, such as using your work computer to search the Internet for personal reasons, to be illegal. The dissenting opinion, written by Supreme Court Justice Clarence Thomas, argued that a plain reading of the statute would indicate that the police officer exceeded his authorized access to the database when he used it for personal gain and not for official law enforcement purposes.

**To read the full Supreme Court decision in *Van Buren v. United States*, go online to:** [https://www.supremecourt.gov/opinions/20pdf/19-783\\_k53l.pdf](https://www.supremecourt.gov/opinions/20pdf/19-783_k53l.pdf)



**To learn more about the insider threat problem and how it may be mitigated, go online to:** [https://www.ncsc.gov/issues/docs/Common\\_Sense\\_Guide\\_to\\_Mitigating\\_Insider\\_Threats.pdf](https://www.ncsc.gov/issues/docs/Common_Sense_Guide_to_Mitigating_Insider_Threats.pdf)



The punishments for violating the CFAA vary based largely on the harm caused by the incident and the number of prior convictions. For example, the minimum sentence for these crimes can be a 10–20 year sentence related to acts of trespass designed to obtain national security information (Sect. (a)(1)), while simply accessing a computer and obtaining information of value (Sect. (a)(2)) varies from one year in prison and/or a fine to up to ten years if the offender has either multiple charges brought against them or if they engaged in the offense for commercial or private gain (18 USC § 1030). Individuals who trespass in government controlled computers (Sect. (a)(3)) can receive both a fine and imprisonment for not more than one year, though if it is part of another offense then it can be up to ten years.

The greatest sentencing range involves attempts to access a computer in order to engage in fraud and obtain information (Sect. (a)(4)). If the object of the fraud and the thing obtained consists only of the use of the computer and the value of that use does not exceed \$5,000 in any one-year period, then the maximum penalty is a fine and up to five years in prison. If the incident involves harm that exceeds \$5,000, affects more than ten computers, affects medical data, causes physical injury to a person, poses a threat to public health or safety,

or affects the US government's administration of justice, defense, or national security, then the punishments can start at ten years and/or a fine (18 USC § 1030). If the hack either attempts to cause or results in serious bodily injury, the actor can receive up to 20 years in prison, and he or she can be eligible for a life sentence if the hack either knowingly or recklessly caused death. These changes were a direct result of the Cyber Security Enhancement Act, which was a subsection of the Homeland Security Act of 2002 (Brenner, 2011; 18 USC § 1030; see also [Chapter 10](#)). This Act amended the punishments available to federal judges when dealing with cybercrime cases in order to more accurately reflect the severity of harm that may result from hackers' attacks against computer systems and data.

The CFAA also allows victims of hacking cases to pursue civil suits against the attacker (18 USC § 1030). Specifically, the statute allows any person who suffers either damage or losses due to a violation of the CFAA the opportunity to seek compensatory damages within two years of the date of the complaint or discovery of damages. It does not place limits on the amount of damages that an individual may seek, though the statute stipulates that computer software and hardware manufacturers cannot be held liable for negligent designs or manufacturing (Brenner, 2011). As a result, this essentially releases a vendor from any civil responsibility for the presence of vulnerabilities within their products. Instead, it is the attacker who is held liable for the identification and use of exploits against those vulnerabilities.

An additional federal statute pertaining to hacking is 18 USC § 1030 Sect. 2701(a), referencing unlawful access to stored communications. Given that so much personal information is now stored in email accounts hosted on web servers that are protected through limited security protocols, like passwords that can be easily hacked, there is a need to protect this information at all points. This statute makes it an offense to intentionally either (1) access without authorization a facility through which an electronic communication is provided; or (2) exceed an authorization to access such a facility and then obtain, alter, or prevent authorized access to a wire or electronic communication while it is in electronic storage. This law is designed to help secure personal communications and information, particularly against nation-state attackers who may attempt to use email or communications to better understand a target (Brenner, 2011).

Initially, the punishments for these offenses involved a fine and/or imprisonment for not more than one year for the first offense, and up to five years for a subsequent offense. This statute was amended by the Homeland

Security Act of 2002 to increase the penalties if the offense was completed for “purposes of commercial advantage, malicious destruction or damage, or private commercial gain, or in furtherance of any criminal or tortious act in violation of the Constitution or laws of the United States or any State” (6 U.S.C. 145 Cybersecurity Enhancement Act of 2002). If the attacks occurred for these reasons, an actor may receive a fine and up to five years in prison for the first offense, and then up to ten years imprisonment for multiple offenses (Bossler, 2020).

In addition to federal statutes, all states have laws against computer hacking in some shape or form (Bossler, 2020; Brenner, 2011; National Conference of State Legislatures (NCSL), 2021). In fact, the first state to pass a law related to hacking was Florida in 1978, with the creation of the Computer Crimes Act. Though each state is different, they largely define hacking in one of two ways:

- 1 the unauthorized access to computers or computer systems;
- 2 unauthorized access leading to the acquisition, theft, deletion or corruption of data.

The terminology used to define hacking is varied, ranging from “unauthorized access” to “computer trespass” to “computer tampering.” A majority of US states used a two-tiered system to classify computer hacking as either a misdemeanor if there was unauthorized access with no damage or further criminal behavior or as a felony if the unauthorized access was accompanied with further criminal behavior such as the copying or destroying of files (Brenner, 2011). Some states use a single statute for all unauthorized access behaviors regardless of whether any further criminal behavior occurred. Finally, some states place computer hacking laws under existing criminal statutes pertaining to burglary, theft, and robbery (Brenner, 2011). For instance, Missouri defines computer hacking as “tampering” with either computers or data and has placed these offenses under Chapter 569, that includes “Robbery, Burglary, and Related Offenses.” Others, like North Carolina, place computer hacking and related cybercrimes under their own statutes in order to encapsulate the unique nature of cybercrimes (Brenner, 2011).

**To learn more about the incident that spawned the first state-level computer crime law in the United States, go online to: <http://repository.jmls.edu/cgi/viewcontent.cgi?article=1414&context=jitpl>**



Similar legislation is present in countries around the world, though there are some variations in the way in which these statutes can be applied or the punishments associated with the offense. For instance, the **United Kingdom's Computer Misuse Act** of 1990 defines three behaviors as offenses:

- 1 unauthorized access to computer material (whether data or a program);
- 2 unauthorized access to a computer system with intent to commit or facilitate the commission of a serious crime;
- 3 unauthorized modification of computer material.

The structure of this Act recognizes variations in the way that hackers operate, such as the fact that only some hackers may attempt to gain access to systems, while others may attempt to maliciously use or modify data. Any individual found guilty of a violation of the first statute can face a maximum sentence of six months or a fine of £2,000, or both. Subsequent charges under the second and third statutes are associated with more severe sanctions, including up to five years in prison, a fine, or both.

Several researchers hold this legislation up as a model for other nations because of its applicability to various forms of hacking and compromise (see Brenner, 2011; Furnell, 2002). The law itself, however, emerged because of the absence of existing laws that could be used to prosecute the crimes performed by Robert Schifreen and Steven Gold in 1984 and 1985. Specifically, Schifreen noticed the username and password of a system engineer at the British Telecom firm, Prestel, and he and Gold used this information to access various parts of the network and gain access to sensitive account information (Furnell, 2002). The two were then caught by Prestel administrators and arrested, but there was no legislation against the activities they performed. Thus, prosecutors charged the pair under the Forgery and Counterfeiting Act of 1981, under the auspices that they “forged” the user credentials of others (Furnell, 2002).

Though both Schifreen and Gold were found guilty, they appealed their case claiming that they caused no actual harm and had been charged under inappropriate statutes (Furnell, 2002). The two were acquitted based on the conclusion that forgery laws were misapplied and their actions were not, in fact, a violation of existing criminal law. As a result, the English Law Commission recommended that new legislation be developed to criminalize various forms of hacking (Furnell, 2002). The law was introduced and passed in 1990, though subsequent revisions have been introduced over the last 25 years to increase

sanctions, apply the law to offenses involving smartphones, and cover offenses involving malicious software (Brenner, 2011; Furnell, 2002).

Other nations define hacking more narrowly, as with the Indian Information Technology Act, 2000, which specifically criminalizes and references a hack as a person who “destroys or deletes or alters any information residing in a computer resource or diminishes its value or utility or affects it injuriously by any means” (Department of Electronics and Information Technology, 2008). Engaging in such an act can lead to a fine of up to 500,000 rupees and/or up to three years imprisonment. There are related subsections of the hacking law, related to (1) receiving a stolen computer or communications device, (2) using a fraudulently obtained password, digital signature, or other unique identification, and (3) cheating using a computer resource (Department of Electronics and Information Technology, 2008). While cheating is not specifically defined within the law, this is a unique addition that is largely absent from other nations’ criminal code. These subsections recognize the role of hacking as a facilitator for other criminal acts, extending the utility of the law in a similar fashion to the US CFAA.

At a broader level, the **Convention on Cybercrime (CoC)**, also known as the Budapest Convention on Cybercrime, is the first international treaty designed to address cybercrime and synchronize national laws on these offenses (de Arimatéia da Cruz, 2020; Weismannn, 2011). This Convention was developed in conjunction with the Council of Europe, Canada, and Japan in 2001 and came into force in 2004. The language of the treaty specifically addresses a number of cybercrimes (illegal access, illegal interceptions, data interference, system interference, misuse of devices, computer-related forgery, computer-related fraud, child pornography, and copyright infringements) with the intent to create common criminal policies and encourage international cooperation in the investigation and prosecution of these offenses. The CoC does not, however, encourage extradition, which limits its value in enforcement. Additionally, those states that sign and ratify the CoC are under no obligation to accept all parameters of the Convention. Instead they can select which provisions they choose to enforce, further limiting its utility. Thus, the CoC has some inherent value for the development of consistent legal frameworks and definitions for hacking-related crimes in a global context, but has significant limitations regarding enforcement (Weismannn, 2011).

At present, 64 nations have ratified the treaty and another three have signed but not ratified the convention (de Arimatéia da Cruz, 2020). The majority of the ratifiers are members of the Council of Europe and European Union

generally, including Italy, Germany, Turkey, the Ukraine, and the United Kingdom. Several nations that are not members of the Council have also ratified the CoC, including Australia, Canada, Dominican Republic, Israel, Japan, Mauritius, Panama, Sri Lanka, and the United States. The language of the CoC has served as a model for a number of nations' cybercrime laws, particularly in a number of South American and African nations (Riquert, 2013; Weismann, 2011). Thus, the CoC may be invaluable in structuring consistent laws regarding cybercrime.

### Enforcing and Investigating Hacker Activity

It is important to note that federal agencies are responsible for cases where the victim and offender reside in different states or countries. We will focus our discussion on the primary federal agencies responsible for the investigation of computer hacking since there are few local law enforcement agencies investigating computer hacking. This appears to stem from the fact that these cases are often very technically complex. In addition, these crimes involve local victims compromised by offenders living in completely separate jurisdictions that cannot be affected by a police or sheriff's office (Holt et al., 2015).

One of the most prominent federal law enforcement bodies involved in the investigation of hacking cases is the **United States Secret Service (USSS)**. The Secret Service was initially part of the Department of the Treasury, dating back to its creation in 1865 in order to combat the production and use of counterfeit currency after the Civil War (USSS, 2021). Now, however, the Secret Service is housed under the Department of Homeland Security (DHS). The Secret Service was initially tasked with hacking cases through the CFAA because of their mandate to investigate crimes against financial institutions and counterfeit currency (18 USC § 1030). The growth of technology and Internet connectivity among banks and financial service providers made the Secret Service seem like an experienced agency, capable of investigating hacking and online fraud.

Today, the Secret Service investigates cybercrimes through its Criminal Investigative Division, specifically through its Financial Crimes unit with three primary investigative responsibilities concerning cybercrime (USSS, 2021). The first involves financial institution fraud (FIF) against banks, savings and loan institutions, and credit unions (see [Chapter 6](#) for additional detail). The second includes access device fraud, such as the use of passwords in order to engage in fraud or hacks against various targets. The final responsibility involves acts of

fraud that affect computers of “federal interest,” that directly facilitate interstate or international commerce and government information transfers.

The US Secret Service also has two task forces that investigate cyber intrusions: Electronic Crimes Task Forces (ECTFs) and Financial Crimes Task Forces. The Secret Service operates 40 ECTFs that utilize the resources of academia, the private sector, and law enforcement at all levels to meet Congressional mandate for the Secret Service to create a national network to “prevent, detect, and investigate electronic crimes, including potential terrorist attacks against critical infrastructure and financial payment systems” (USSS, 2021).

The USSS also operates multiple specialized resources and training programs to improve the response to hacking and fraud. First, the Network Intrusion Responders (NITRO) Program tasks special agents to assist in the investigation and forensic analysis of materials related to various financial crimes (USSS, 2021). Second, the USSS operates a specialized unit of experts who are housed within ECTFs who assist in the capture and analysis of forensic evidence. This program helps to ensure critical knowledge is available to those partners working with ECTFs across the country. Third, they operate the Electronic Crimes Special Agent Program in Computer Forensics (ECSAP-CF) tasked with special agents who performs forensic investigations of various devices, inclusive of Internet of Things (IoT), mobile, and vehicle systems (USSS, 2021).

Fourth, the National Computer Forensics Institute (NCFI) in Hoover, Alabama is operated by the Secret Service as a resource to train local law enforcement, prosecutors, and judges to understand the process of digital forensic image capture and analysis. This program has been a massive success, training over 3,800 individuals across the United States (USSS, 2021). In addition, individuals who are trained at the NCFI also collaborate with the USSS in their home state to increase the capacity for investigation and response to cybercrimes.

The other prominent agency involved in the investigation of hacking cases is the **FBI**. Cybercrime is one of the FBI’s top three investigative priorities, in part by legal mandate in the CFAA. The law stipulates that the FBI has the primary authority to investigate hacking cases that involve espionage, foreign nation-states, counterintelligence, and classified sensitive data that affects national defense or foreign relations.

In order to address that mandate, the FBI has established several capabilities and partnerships. The FBI operates a Cyber Division at its headquarters to coordinate their cyber strategy. They also run cyber squads in each field office across the country with the capacity to investigate various forms of cybercrime. They also have specialized Computer Crimes Task Forces that can investigate

cybercrimes and work with other law enforcement agencies at the local, state, and federal levels (FBI, 2021a). These task forces are focused on investigating attacks against critical infrastructure, hacks that target private industry or financial systems, and other cybercrimes. The CTFs in each region are also responsible for developing and maintaining relationships with public and private industry partners in order to improve their response capabilities (FBI, 2021b). The Bureau also operates Cyber Action Teams (CATs), which are highly trained small groups of agents, analysts, and forensic investigators who can respond to incidents around the world. These teams are designed to collect data and serve as rapid first responders to any incident, no matter where it occurs around the world.



**For more information on the FBI, go online to:** <https://www.fbi.gov/investigate/cyber>

In addition, the FBI operates the **InfraGard** project, which is a nonprofit public-private partnership designed to facilitate information sharing between academics, industry, and law enforcement (InfraGard, 2021). The group is designed to aid in collaborations in order to better protect critical infrastructure and reduce attacks against US resources. InfraGard operates in chapters across the United States, which hold regular meetings to discuss threats and issues of interest with members. InfraGard has 79 chapters across the United States, and its membership must undergo a vetting process in order to participate (InfraGard, 2021). In turn, members gain access to a secured web portal where intelligence on threats, vulnerabilities, and general information is shared. This partnership has been very successful, though members of the hacker group LulzSec attacked InfraGard chapter websites in order to embarrass the FBI (see Satter, 2011; [Box 3.7](#) for more detail). This attack, however, appears to be an isolated incident in the otherwise positive partnerships afforded by InfraGard.

While the FBI and Secret Service focus on the investigation of cybercrimes, they must work in close concert with the United States Attorney's Office, which is a part of the **US Department of Justice (DOJ)** focused on the prosecution of federal criminal cases. Though the FBI is part of the DOJ, they operate as an investigative arm, while the Attorney's Office represents the federal government in court to prosecute suspects. In fact, the investigation of cybercrimes is largely handled by the Criminal Division's **Computer Crime and Intellectual Property Section (CCIPS)**.

## Box 3.7 Exploits of LulzSec

### LulzSec Hacks FBI Affiliate, Infragard

<http://www.digitaltrends.com/computing/lulzsec-hacks-fbi-affiliate-infragard/>



Hacker group Lulz Security (aka LulzSec) is on a war path. Following their highlight public hacks of the PBS website and SonyPictures.com, LulzSec has now set its sights on the top law enforcement agency in the United States: The Federal Bureau of Investigation.

This article provides an overview of the hacks performed by the Anonymous offshoot hacking group LulzSec against Infragard. In addition, the article illustrates some of the tension between Anonymous and security specialists.

Initially, violations of the CFAA were prosecuted at the federal level through the Computer Crime Unit, first established in 1991 (United States Department of Justice (US DOJ), 2021)). The expansion of the Internet and the resulting range of cybercrimes that became possible led to a restructuring of the unit to a full Section with the enactment of the National Information and Infrastructure Protection Act of 1996. The unit now deals exclusively with the investigation and prosecution of cybercrime cases and intellectual property crimes, through close collaboration with law enforcement agencies and private industry.

The CCIPS division also provides support for prosecutors handling similar cases at the federal, state, and local levels, and works with legislators to develop new policies and legal statutes to deal with cybercrime generally. Recently, the Criminal Division created the Cybersecurity Unit within the CCIPS “to serve as a central hub for expert advice and legal guidance regarding how the criminal electronic surveillance and computer fraud and abuse statutes impact cybersecurity” (US DOJ, 2021). This unit also focuses on outreach, attempting to inform businesses and industry about the threats they face and improve the state of cybersecurity practice without violating the law.

Specialized law enforcement agencies also operate around the world to investigate cybercrimes that may violate local or federal laws. For example, the **National Crime Agency's** (NCA) **National Cyber Crime Unit** (NCCU) is responsible for leading the United Kingdom's response to serious forms of

cybercrime, provide cyber specialist support, and to coordinate the nation's cyber response with Regional Organized Crime Units, the Metropolitan Police Cyber Crime Unit, industry, and international law enforcement agencies. As part of this coordination, they share intelligence and expertise to increase the knowledge of the cyber threat in order to more effectively disrupt cyber-crime activity. Thus this unit serves a similar role to that of the FBI in the response to serious cybercrimes (National Crime Agency, 2017). Similar structures are present in the Korean National Police and the Royal Canadian Mounted Police through their Integrated Technological Crime Unit (Andress & Winterfeld, 2011).



**For more on the concerns expressed by the FBI director regarding cyberattacks in 2021, go online to:** <https://www.cnn.com/2021/06/04/politics/christopher-wray-cyberattacks-9-11/index.html>

## Summary

The computer hacker subculture is distinctive and provides justifications for individuals to develop a deep understanding of technology and the ability to apply their knowledge in innovative ways. Some hackers use their skills for malicious purposes, while others use them to protect computer systems. Both ethical and malicious hackers may have to utilize the same skill sets to complete an activity. In fact, hackers judge one another on the basis of their skill, connection to technology, and depth of knowledge. Those with demonstrable skills garner more respect from their peers, while those with minimal skill may be derided by others.

The perception of hackers as malicious actors stems directly from the evolution of hacking and technology. The criminalization of hacking in the late 1970s and 1980s, coupled with the development of the PC, enabled a shift in the hacker subculture and the expansion of hacking to new populations. As technology became more user friendly, the hacker culture changed, creating significant variation in the skill and ability of hackers. These factors have produced the current population of skilled and semiskilled hackers with various motives and ethical orientations. Thus, there is no single way to deal with hackers who use their skills for criminal gain. Instead, it is critical to understand that script kiddies and noobs present a different threat than those black-hat hackers who can successfully penetrate systems without detection.

## Key Terms

Black-hat hacker  
Bulletin board system (BBS)  
Capture the Flag  
Chaos Communication Congress (CCC)  
Computer Crime and Intellectual Property Section (CCIPS)  
Computer Fraud and Abuse Act (CFAA)  
Con  
Convention on Cybercrime (CoC)  
Crack  
Cracker  
DefCon  
Denial of service  
Exploit  
External attackers  
Federal Bureau of Investigation (FBI)  
Gray-hat hacker  
Hack  
Hacker  
Hacker ethic  
The Hacker Manifesto  
Hacker space  
Handle  
InfraGard  
Internal attackers  
Lamer  
Leet  
Nation-state actor  
National Crime Agency  
National Cyber Crime Unit  
Non-nation-state actor  
Noob/Newbie  
Phishing  
Phreaking  
Protected computer  
Script kiddie

Shoulder surfing  
Social engineering  
UK Computer Misuse Act  
United States Department of Justice (US DOJ)  
United States Secret Service (USSS)  
Vulnerability  
Wannabe  
Warez  
White-hat hacker

### Discussion Questions

1. Think about the various ways that you have seen hackers portrayed in popular media over the last few years. Are they heroic characters or dangerous criminals? Do the representations conform to any of the realities of the hacker subculture, or do they simply further stereotypes about hackers as a whole?
2. If hacking is a skill or ability, does it share any similarities to other real-world activities that can be applied in malicious or ethical ways?
3. Compare the ideas expressed in the hacker ethic against the comments made by the Mentor in the Hacker Manifesto. Do they make similar points, or are they very different documents? If there are common themes, what do they suggest about hacking and the complexities of the hacker subculture?
4. Given the range of actors evident in the hacker subculture, is it possible that ethical and unethical hackers may share similar motives? If so, what might those motives be, and is it possible to identify an individual's ethical stance based solely on their motives?
5. What were the weaknesses of using "traditional" legislation to prosecute hackers? How did newer legislation address those problems?

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Chapter

4

# MALWARE AND AUTOMATED COMPUTER ATTACKS

## Chapter Goals

- Define malware and the role of vulnerabilities and exploits in their activation
- Identify the differences between viruses, trojans, worms, and blended threats
- Understand why individuals write and distribute malicious software
- Assess the legal frameworks used to pursue cyberattacks facilitated by malicious software
- Recognize the role of law enforcement agencies and the security industry to mitigate malware in the wild

## Introduction

Much like the threat posed by computer hackers explored in [Chapter 3](#), there is a good deal of confusion and misunderstanding around the issue of malware or malicious software. Many in the general public have heard the term “virus” or perhaps “trojan” in computing, though they may neither understand what they actually do nor how they operate. The lack of understanding is compounded by the number of security tools available to protect computer systems from malware. Although most laptops and desktop computers are sold with some form of antivirus software preinstalled, owners may not know how, when, or why to properly use these tools. Additionally, most mobile phones and tablet computers, such as iPads or Kindles, do not have this software even though they can be infected by malware.

Computer users who understand the value and necessity of antivirus software and security tools to minimize the likelihood of infections may not realize that they are still vulnerable to attacks from new code that has just been identified. Though that may seem like a relatively minor dilemma, consider that there were at least 677 million pieces of malware identified by one cybersecurity firm in 2020 alone (Clement, 2020)! That is the equivalent of two pieces of malware for every person in the entire US population. Additionally, the behavior of malware can often be so subtle that an individual may not know that they have been affected.

**For some examples of vulnerabilities and malware, go online to:**

1. <https://www.forbes.com/sites/augustinefou/2020/06/02/what-do-hacking-and-malware-have-to-do-with-ad-fraud/>
2. <https://www.forbes.com/sites/augustinefou/2020/12/17/hackers-dont-even-have-to-hack-users-who-voluntarily-download-apps-and-browser-extensions/?sh=60b38a8f83edextensions/>



This chapter is designed to provide a basic understanding of malware, including the most common forms of malware that are active in the wild. Due to the substantive technical details involved in the classification and operation of malware, this chapter will provide descriptions of each form without going into overly technical explorations of their functionality. Instead, a summary description will be provided using minimal technical jargon in order to give readers a basic appreciation for the range of malware currently operating, its role in attacks, and any historical evolution of these tools in the hacker and computer security community generally. Visual examples of the user interfaces associated with malware will also be provided to demonstrate the ease with which some tools can be used. The legal frameworks used to prosecute malware-related cybercrimes and their relationship to hacking will also be discussed. Finally, we will consider the legal and computer security entities operating to protect users from malware threats.

## The Basics of Malware

**Malicious software**, or **malware**, is largely an umbrella term used to encapsulate the range of destructive programs that can be used to harm computer systems, gain access to sensitive information, or engage in different forms of cybercrime. Malware can serve a countless number of different functions but are generally designed to automate attacks against systems and simplify the process of hacking overall. Various forms of malware have increased in complexity in keeping with the evolution of technology over the last two decades (BitDefender, 2021; Symantec, 2021). Malware, however, exists in a nebulous legal space as there are no specific laws against the creation of malicious software (Brenner, 2011). It is simply computer code, which writers can argue is necessary in order to better understand the limits of computer and network security. The *use* of these tools in or to access computers without permission from the

system owner is, however, illegal. Thus, individuals who write malicious code may have minimal legal culpability for the way that others use their creations so long as they are not the ones utilizing it on networks without authorization (Brenner, 2011).

Malicious software programs operate by exploiting **vulnerabilities**, or flaws, in computer software or hardware (O'Driscoll, 2021; Symantec, 2021). Every program has design flaws. There are literally thousands of vulnerabilities that have been identified in systems that individuals use every day, such as Microsoft Windows and popular web browsers. In fact, there were 12,174 vulnerabilities reported in 2019 alone (CVE, 2020). The presence of a vulnerability allows an attacker to understand and gain initial access to a target system in some way. Many security professionals attempt to identify vulnerabilities in order to help secure computer systems, though this information is typically released to the public through open forums or email lists like BugTraq (see [Box 4.1](#); Taylor, 1999). As a result, attackers can immediately use information on vulnerabilities to their advantage.

Once a vulnerability is identified, malware writers then create an **exploit**, or a piece of code, that can take advantage of vulnerabilities to give the attacker deeper access to a system or network (Symantec, 2021). These exploits are often

### **Box 4.1 The Debate over Public or Private Vulnerability Disclosures**

#### **Vulnerability Disclosure Debate**



<http://web.archive.org/web/20100102144837/http://spirit.com/Network/net0800.html>

Today, there are appeals to put the genie back into the bottle. That is, to stop the publishing of new vulnerabilities. There is even a proposed law that would make some forms of vulnerability testing illegal in the US.

This article provides an interesting debate on the issue of vulnerability disclosures and the relationship between black-hat and white-hat hackers who identify and provide this information to the public for free or companies and security vendors for a profit. This work helps to give context to the difficult need to balance privacy and free information exchange in the security community.

built into malware to compromise and influence the victim machine more efficiently. The changes that a piece of malware causes to a computer system are affected by what is commonly called its **payload**. When a piece of malware is activated and executes the program it contains, the resulting impact on the system can range from benign to highly destructive, depending primarily on the skills of the writer and their interests. In fact, early malware typically caused no actual harm to the system or its contents but annoyed the victim by presenting them with messages or playing music at a high volume. Many variants of malware today often delete or change system files, causing harm to the user's documents and files, or collect information that users input or store on their system, causing a loss of personally identifiable information. Some malware can even disrupt the basic functions of an operating system, thereby rendering a computer unusable.

Malware is generally used to disrupt email and network operations, access private files, steal sensitive information, delete or corrupt files, or generally damage computer software and hardware (BitDefender, 2021; Symantec, 2021). As a result, the dissemination of malware across computer networks can be costly for several reasons, including, but not limited to (1) the loss of data and copyrighted information; (2) identity theft; (3) loss of revenue due to customer apprehension about the safety of a company's website; (4) time spent removing the programs; and (5) losses in personal productivity and system functions. The interconnected nature of modern computer networks and the Internet of Things (IoT) also allows an infected system in one country to spread malicious software across the globe and cause even greater damage. Thus, malware infection poses a significant threat to Internet users around the globe.

## Viruses, Trojans, and Worms

Malicious software is a problem that many individuals in the general public with minimal technical proficiency do not understand. Part of the confusion lies in identifying the diverse range of current malware. The most common forms of malware include computer viruses, worms, and trojan horse programs that alter functions within computer programs and files. These programs have some distinctive features that separate them from one another, though more recent forms of malware combine aspects of these programs together to create what are commonly called **blended threats**. We will explore the most common forms of malware here and differentiate them based on their unique features and utility in an attack.

## **Viruses**

**Viruses** are perhaps the oldest form of malware, operating since the earliest days of computing (Szor, 2005). This form of malware can neither be activated nor execute its payload without some user intervention, such as opening a file or clicking on an attachment. The target must execute the code in some fashion so that the virus will be installed in either existing programs, data files, or the boot sector of a hard drive (Szor, 2005). In addition, many viruses may access sensitive data, corrupt files, steal space on the hard drive, or generally disrupt system processes.

Viruses can install themselves in data files or existing programs and operate based on the parameters of a specific operating system, whether Windows, Linux, or Mac OS. These viruses will attempt to install themselves in any executable file so as to ensure their success. Some viruses can overwrite the contents of their target file with malicious code, which renders the original file unusable. Such a tactic is, however, easy to identify because the error or failure that results may be immediately obvious to the user. Other viruses can insert their code into the file but leave it operational so that it will not be identified by the user. Finally, some viruses can clone an existing file so that it runs instead of the original program (Szor, 2005).

**Boot sector viruses** operate by attempting to install their code into the boot sector of either a form of storage media like a flash drive or into the hard disk of the targeted computer (Szor, 2005). A **boot sector** is a region of any sort of storage media or the hard disk of a computer that can hold code, which is loaded into memory by a computer's firmware. There are a range of boot sectors, but the operating system loader of most devices is stored starting in the first boot sector so that it is the first thing that the system loads. As a result, virus writers create boot sector viruses so that they can load the code of their virus into the random access memory (RAM) of the computer. This ensures that the virus will always be present in the system from the start to the finish of each session. In fact, boot viruses can gain control of the entire system by installing themselves into a specific region and then changing the boot record so that the original code is no longer in control of the system. The malware then becomes extremely difficult to identify and eradicate and can severely impact the functionality of the system (Szor, 2005).

Some of the first viruses observed in the home PC market during the 1980s were boot sector viruses that spread to other machines via floppy disks. These viruses generally had limited functionality and malicious utility. For example,

they might often play music or delete letters in documents. For instance, one of the first viruses observed in home computers was called **Elk Cloner** and was designed to infect Apple II computers via a floppy disk (Manjoo, 2007). The code was written as a prank by Rich Skrenta, a 15-year-old person who liked to play and share computer games. He wrote Elk Cloner in order to play a practical joke on his friends without clueing them into the presence of the code (Manjoo, 2007). The virus was attached to a game which when played 50 times would display the following poem:

Elk Cloner: The program with a personality  
It will get on all your disks  
It will infiltrate your chips  
Yes, it's Cloner!  
It will stick to you like glue  
It will modify RAM too  
Send in the Cloner!

Though the program caused no actual harm, the code was difficult to remove and infected many machines because the virus would install locally on any computer and then infect other floppy disks inserted into the infected system (Manjoo, 2007).

**Macro viruses** are also a popular way to infect systems by using a common weakness in a variety of popular programs like Excel, Word, and PDFs (F-Secure, 2017; Szor, 2005). Virus writers can write a program using the **macro programming languages** associated with specific applications and embed the code into the appropriate file, such as a PowerPoint presentation. Opening the file actually executes the virus, enabling the infection payload to be activated and subsequently embedding the code into other documents of the same type so that any attempt to share a file will lead to other systems being infected. Macro viruses designed to target Microsoft Outlook can infect a user's computer by including infected files, or even by the user previewing an infected email.

In the early 1990s, virus writers began to employ encryption protocols in order to make the code more difficult to detect and remove (Szor, 2005). This novel tactic was further adapted through the development of **MuTation Engine (MtE)** in 1991, a polymorphic generator that not only encrypted the virus but also randomized the routine used so that it varied with each replication. The term polymorphic references the ability to take multiple forms or go through various phases. In the context of malware, this term references the use

of code to hide viruses from detection by changing their structure in order to not match existing signatures. Thus, the emergence of polymorphic engines led to an increase in the number of these viruses in the wild in 1993.



**For a deeper explanation of polymorphic engines in malware, go online to: [www.dailymotion.com/video/xctxj\\_avg-tutorials-what-is-polymorphic-v\\_tech](http://www.dailymotion.com/video/xctxj_avg-tutorials-what-is-polymorphic-v_tech)**

During this period, the Microsoft Windows operating system emerged and became tremendously popular among home computer users for its easy use and various features. As a result, virus writers began to target Windows users and incorporated the use of macros in order to compromise the system. The first macro virus, called **Concept**, was found in 1995 (see **Box 4.2** for more details; Paquette, 2010). This code would only replicate itself and displayed the following message: “That’s enough to prove my point.” This was not necessarily malicious but demonstrated that macros were a weakness that could be exploited. As a result, a number of macro-based viruses were released, affecting both Windows and Mac OS computers since both operating systems could run the Microsoft Office software suite (Paquette, 2010). This common business-based software includes Excel and Word, both

### **Box 4.2 F-Secure Report on Virus W32/Concept Malware**



#### **Virus: W32/Concept**

[www.f-secure.com/v-descs/concept.shtml](http://www.f-secure.com/v-descs/concept.shtml)

The virus gets executed every time an infected document is opened. It tries to infect Word’s global document template, NORMAL.DOT (which is also capable of holding macros). If it finds either the macro “PayLoad” or “FileSaveAs” already on the template, it assumes that the template is already infected ...

This technical brief provides an in-depth analysis of how a macro virus operates in a Windows system, including a breakdown of how it infects programs overall.

of which could be easily affected by macro-based viruses as they support a macro programming language.

Around the same time, viruses began to spread through the Internet as the World Wide Web was becoming popular among home users and more easily accessible through an increase in Internet service providers. In fact, one of the most prominent viruses of this period, the **Melissa virus**, which was first identified in 1999, spread through the web and utilized macros to infect users' computers (F-Secure, 2014). The Melissa virus was distributed through an online discussion group titled *alt.sex* by sending an infected file titled "List. DOC" that contained passwords for pornographic websites. Anyone who opened the file using Microsoft Word 97 or 2000 was infected. The macro code then attempted to email itself out to 50 people using the email client in Microsoft Outlook (F-Secure, 2014). Given that it would send 50 emails per infected system, the infection rate was quite substantial. Additionally, the code altered the Word program to infect any new document created.

The virus payload was not necessarily harmful in that it did not delete files or corrupt systems, but it clogged email servers because of its distribution pattern. In the end, it was estimated that approximately 1.2 million computers were infected in the United States with \$80 million in damages worldwide due to system outages and the costs to remove the malware (Szor, 2005). Based on the success of the Melissa virus and others, malware writers quickly began to adopt the web as a means to spread their code as widely and as easily as possible. They not only targeted common OS products like Microsoft Office but also programming languages commonly used in web browsing software and tools such as Java.

## Trojans

In addition to viruses, **trojans** are a prevalent form of malware. This form of malware is similar to viruses in that it cannot replicate on its own but requires some user interaction in order to execute the code. It got its name from the trojan horse of ancient Greece, which was a giant wooden horse concealing soldiers inside (Dunham, 2008). The horse was brought inside fortified city walls under the belief that it was a gift; this enabled the warriors to sack the city. Computer-based trojans share a similar structure in that they appear to be a downloadable file or attachment that people would be inclined to open, such as photos, video, or documents with misleading titles such as "XXX Porn" or "Receipt of Purchase" (Dunham, 2008). When the file is opened, it executes

some portion of its code and delivers its payload on the system. Thus, trojan writers utilize social engineering principles in order to entice users to open their files (see [Chapter 3](#) for more details).

Trojans do not typically replicate themselves on the infected system or attempt to propagate across systems. Instead, trojans most often serve to establish backdoors that can be used to gain continuous unauthorized access to an infected system (Dunham, 2008). Specifically, the code can open ports and establish remote controls between the infected system and the operator's computer allowing them to invisibly execute commands on that system. This is achieved through the use of a client and server system, where the victim executes the trojan and establishes a server on their computer that can be remotely accessed by a client program on the attacker's computer (Dunham, 2008). The commands sent between the client and server are largely invisible to the infected user, though if the attacker utilizes too much of the available processing power, it may slow down the infected system.

The benefits of trojan programs to an attacker are that they can configure the tool to perform a range of functions, including keystroke logging, access to sensitive files, use of the webcam or other system tools, use of the infected system as a launch point for attacks against other systems, and even send additional forms of malware to the system to engage in secondary infections. Many trojans also allow the attacker to restart a computer remotely and manage its activities without the victim's knowledge. Some even give the attacker the power to uninstall or deactivate security tools and firewalls rendering the system unable to protect itself from harm (Dunham, 2008).

One of the more noteworthy trojans that combined all of these functions into a single tool was called [Sub7](#) or SubSeven, a piece of malware initially written by a hacker called Mobman (Crapanzano, 2003). The program functions on virtually all variations of the Windows operating system and acts as a sort of remote control program in that the attacker can remotely command the system to perform a variety of functions. To achieve this, the program has three components: the server, client, and server editor. The server portion runs on the victim machine enabling the client machine, operated by an attacker, to use the system remotely. The server editor allows the attacker to define the operating functions and utilities of the infection, making it possible for the attacker to have clear control over their victim (Crapanzano, 2003).

Sub7 has a range of functions, including giving the attacker remote access to system files, the ability to control the system camera and microphone, access to cached passwords, and the ability to change desktop colors, open disk drives, and



**Fig. 4.1** The SubSeven attacker graphical user interface (GUI)

capture sensitive data (see Figure 4.1 for an example of the attacker interface; Crapanzano, 2003). In addition, the server editor function allows the attacker to receive email or instant message alerts when their victim system is online for more careful management. It is also very easy to attempt to infect user systems, as Sub7 can be sent via email or other attachments. These factors may account for the popularity of Sub7 among hackers, particularly script kiddies (see Chapter 3 for details on script kiddies).

#### For more information on Sub7 attacks in the wild, go online to:

1. <https://malwiki.org/index.php?title=Sub7>
2. <https://www.pandasecurity.com/en-us/security-info/29113/information/Sub7/>



The utility of trojans has led them to become one of the most popular forms of malware available (BitDefender, 2021; Panda Security, 2015). In fact, one of the most dangerous and common trojans currently active today is commonly



**Fig. 4.2** An example of a Zeus malware variant GUI

called **Zeus**. This malware targets Microsoft Windows systems and is often sent through spam messages and phishing campaigns in which the sender either sends attachments or directs the recipient to a link that can infect the user (see Chapter 6 for more details). Once installed, the trojan creates a backdoor in the system, so it can be remotely controlled. It also affects the web browser in order to capture sensitive data entered by a user (see Figure 4.2 for example of Zeus GUI; Symantec, 2014). In addition, Zeus can collect passwords stored locally on the infected system and act as a traditional keylogging program.



To see Zeus malware distribution patterns, go online to: <https://cyware.com/news/the-tale-of-the-ever-evolving-zeus-trojan-and-its-variants-814d037e>

This trojan is extremely adaptable and has been used as the basis for a range of malware used in attacks against various financial institutions across the globe. In fact, a form of Zeus has been identified that infects the Google Android operating systems common on smartphones and tablets (Leyden, 2012). This malware acts as a banking app that can be downloaded and installed on a phone in order to capture SMS messages sent to bank customers from financial institutions in order to authenticate transactions. The use of SMS messaging is common in European banking in order to authenticate account information and

transactions made by a customer. Obtaining this information allows attackers to engage in fraudulent transfers between accounts and verify that they are correct without the need for victim interaction. As a result, a group of cybercriminals was able to obtain 36 million Euros from over 30,000 customers in Italy, Germany, Spain, and Holland using this malware (Leyden, 2012).

A Zeus variant was also used in a series of attacks against hundreds of victims across the United States leading to losses of over \$70 million during 2009 (FBI, 2010). This campaign was operated by multiple individuals living in Eastern Europe, the United States, and the United Kingdom. The ring of thieves was disrupted by a multinational investigation spearheaded by the Federal Bureau of Investigation in 2010. There were over 100 arrests in this case. The majority of the arrests were in the United States for violations of fraud and money laundering statutes.

## **Worms**

**Worms** are a unique form of malware that can autonomously spread on their own, though they do not necessarily have a payload (Nazario, 2003). Instead, they utilize system memory to spread, self-replicate, and deteriorate system functionality. Worms are written as stand-alone programs in that they do not need to attach to existing system files or modify any code. Once it is activated, it copies itself into the system memory and attempts to spread to other systems through email address books or other mechanisms. Should an unsuspecting recipient click on an attachment sent from a worm-infected system, the code will execute and infect that system, replicating the process.

As a result, worms can spread rapidly, and depending on their functionality, cause massive network outages. For example, the **Code Red worm**, activated online on July 13, 2001, began infecting any web server using Microsoft's IIS web server software. The initial growth of the worm was small, but by July 19, it exploded and infected more than 359,000 computer systems worldwide within a 14-hour period (CAIDA, 2001). The infection rate was so fast that it was infecting 2,000 hosts per minute during its peak spread that day. The sheer number of the worm's attempts at replication caused a virtual denial of service attack across most of the industrialized world as the worm's traffic absorbed almost all available bandwidth.

To see a video of the spread of the **Code Red worm**, go online  
to: [www.caida.org/research/security/code-red/coderedv2\\_analysis.xml](http://www.caida.org/research/security/code-red/coderedv2_analysis.xml)



In addition to network degradation, some worms contain secondary payloads to affect computer systems or servers. For instance, the Code Red worm contained code to display the following message on any web page hosted on a server infected by the worm: “HELLO! Welcome to <http://www.worm.com>! Hacked by Chinese!” In addition, the worm contained a secondary payload to engage in denial of service attacks against various websites, including the White House. The infected systems, however, seemingly terminated all activities within 28 days, suggesting there may have been some code within the worm that triggered it to shut down independently (CAIDA, 2001).

Beyond payloads, it is critical to note that worms can cause tremendous harm on their own by crashing email servers, overloading networks with floods of requests, and severely diminishing the functionality of infected systems by forcing them to constantly scan and attempt to replicate the code to other systems (Nazario, 2003). The first example of a worm in the wild was created by Robert Tappan Morris and became known as the **Morris worm**. The worm went active on November 2, 1988, after being released by Morris through a computer at MIT. Morris, a student at Cornell University, claimed he designed the worm to assess the size of the Internet by copying the worm code on each computer connected online at that time (Eisenberg et al., 1989). The code was improperly written and malfunctioned, establishing multiple copies of itself on each system which caused them to slow down dramatically due to the copies trying to replicate themselves and spread to other systems. Morris’ errors caused an estimated 6,000 UNIX computer systems to be infected multiple times over and become effectively unusable (Eisenberg et al., 1989).



**For more information on the Morris worm, go online to:** <https://www.youtube.com/watch?v=o2dj2gnxjtU>

Morris was prosecuted and convicted in federal court for violating the Computer Fraud and Abuse Act. Interestingly, Morris was the first person to be convicted under this law. He eventually received three years’ probation, 400 hours of community service, and a substantial fine (Markoff, 1990).

The incident also demonstrated the need for a coordinated response to a large-scale online threat. Researchers at MIT, Berkeley, Purdue, and other institutions pooled their resources in order to determine the best solution to mitigate the worm (Eisenberg et al., 1989). It was, however, a substantial investment

of time and resources due to the distributed nature of the teams and the attack itself. Thus, DARPA (Defense Advanced Research Projects Agency of the US Department of Defense), one of the founders of the Internet itself, sponsored the foundation of the first **Computer Emergency Response Team (CERT)** at Carnegie Mellon University in order to serve as a coordinating point for responses to major network emergencies (Eisenberg et al., 1989). This CERT now serves a pivotal role in the dissemination of information related to serious cyberthreats and determining large-scale responses to vulnerabilities and security threats.

## Blended Threats and Ancillary Tools

In addition to these three forms of malware, there are now blended threats operating online that combine the distinct aspects of these codes into a single functional tool.

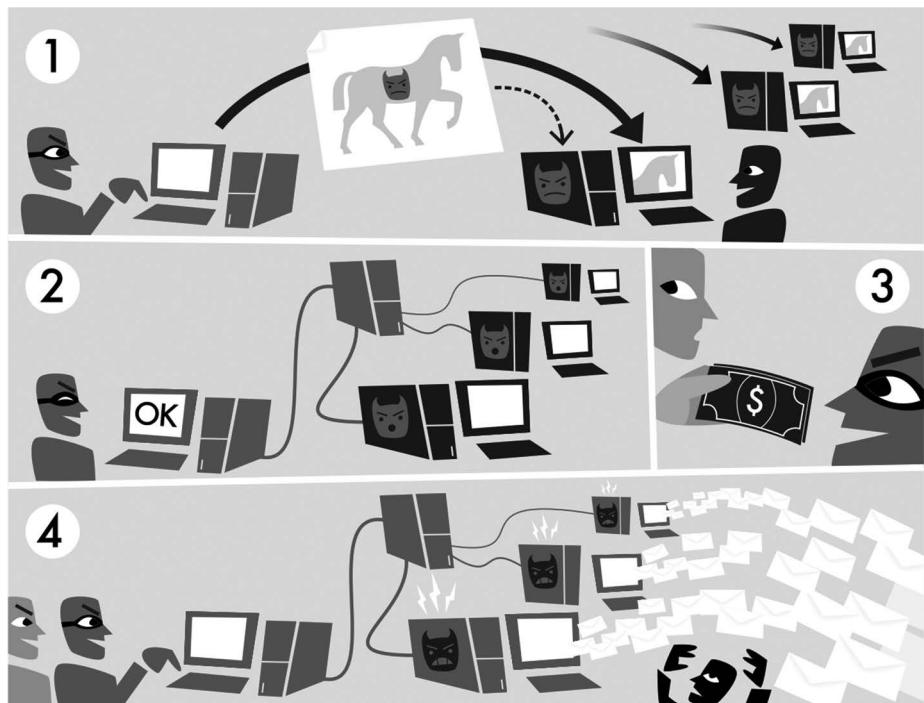
### ***Botnets and DDoS Attacks***

A common blended threat is **botnet** malware, which combines aspects of trojan horse programs and viruses together in a single program. Botnet malware is often sent to a victim through an attachment or other mechanism (Dupont, 2017; Symantec, 2021). Once the program is executed, it then installs a “bot” program, meaning that the computer can now receive commands and be controlled by another user through Internet Relay Chat (IRC) channels or the web via HTTP protocols. The infected machine then surreptitiously contacts a pre-programmed IRC channel to wait for commands from the bot operator. Multiple machines that are infected with this malware will contact the channel, creating a “botnet,” or network of zombie machines (see [Figure 4.3](#)). This form of malware is often very easy to control through the use of sophisticated interfaces that make sending commands to the network quite easy to accomplish.

**For more information on botnets, go online to:** <https://www.youtube.com/watch?v=3BbxUCOFX8g>



The size of botnets enables their operators to engage in a wide range of cybercrimes, including the distribution of spam and other malware. Botnets can also be used to perform **distributed denial of service (DDoS attacks)**. In a



**Fig. 4.3** Botnet command and control distribution

Source: <http://commons.wikimedia.org/wiki/File:Botnet.svg>

DDoS attack, each computer in the network attempts to contact the same computer or server (Bacher et al., 2005; Dupont, 2017). The target system becomes flooded with requests and cannot handle the volume, resulting in a loss of services to users (see [Figure 4.4](#) for an example of a botnet user interface). This is an extremely costly form of cybercrime for companies, as they can lose millions of dollars in revenue if customers cannot access their services. “Bot masters” may therefore attempt DDoS attacks against specific websites to cause financial and reputation problems for the website owner, but they may also blackmail the organization to pay a ransom to stop the DDoS attack. In other cases, it may also serve as a way to distract IT teams so they do not notice stealthier intrusions into the system (Symantec, 2021).

Botnets are now a common form of malware as indicated by active infections and operations around the world. These types of attacks are growing in both number and intensity although most of them last for under 30 minutes (Symantec, 2021). For example, the BBC in the United Kingdom experienced a recent attack in 2015 in which its website and services were down for several hours, leading some experts to believe that it was possibly the largest DDoS attack ever. The US FBI has engaged in two separate investigative crackdowns against botnet operators under the code name “[Operation: Bot Roast](#)” between 2005



**Fig. 4.4** An example of the illusion bot malware GUI

and 2010 (Hedquist, 2008). These operations led to the arrest of individuals in the United States and New Zealand (Goodin, 2007; Hedquist, 2008).

There have been a number of recent high-profile arrests of botnet operators around the globe for their role in various cybercrime schemes. For instance, two Greek men were arrested in 2014 for operating a botnet called Lecpetex that used Facebook and email spam to contact potential victims (Sparkes, 2014). The botnet affected over 250,000 computers in North and South America, as well as Europe and the United Kingdom. Once an individual's system was infected, it would install a tool designed to mine an online currency called Litecoin and send any funds accrued back to the operators (see [Chapter 6](#) for more details on cryptocurrencies). This unique example demonstrates the diverse utility of botnet malware. In addition, the insecurity of the IoT, including thermostats, security systems, refrigerators, and many other household appliances, has led these devices to become infected with malware to enable DDoS attacks. A specialized piece of malware called Mirai was used by attackers in the fall of 2016 to DDoS

Twitter, Spotify, and other services depending on the Dyn protocol (F-Secure, 2017). This malware infected both regular computer systems and IoT devices, enabling them to be used as a stable attack platform for cybercrime. We return to the IoT threat issue in the final chapter of the book.

### Exploit Packs

Similarly, malware writers have recently developed tools that can infect web browsers and thereby enable remote takeovers of computer systems. These programs are called **exploit packs** and must be installed on a web server in order to attack individuals visiting a website. The exploit pack malware contains multiple common vulnerabilities for the most prevalent web browsers and its associated exploits. The program then detects the type and version of browser software that an individual is using to go to that website, and cycles through these vulnerabilities, and exploits until it can infect the user (Symantec, 2021).

This type of attack exponentially increases the ease of infection by operating surreptitiously and without the need for true user interaction to activate the malicious code (see [Box 4.3](#) for an interview with the creator of the exploit pack MPack; Symantec, 2021). An individual must (unknowingly) direct their web browser to a site hosted on a server with the toolkit in order to begin the process of infection, which is much simpler than trying to get someone

#### Box 4.3 Interview with MPack Creator



##### MPack Developer on Automated Infection Kit

[www.theregister.co.uk/2007/07/23/mpack\\_developer\\_interview](http://www.theregister.co.uk/2007/07/23/mpack_developer_interview)

In late June, SecurityFocus answered an online advertisement for the MPack infection kit, sending an ICQ message to the identifier listed in the ad. A few days later, a person contacted SecurityFocus through ICQ ... What follows is the result of two weeks of interviews that took place ...

This article provides an interview with one of the developers of the well-known and highly profitable exploit pack called MPack. This interview provides insights into the nature of malware creation, distribution, and the individuals responsible for their development.

to open an attachment or file. This is why such attacks are commonly known as “drive-by downloads” in that a victim needs only to visit the site without clicking on anything in order to be infected (Symantec, 2009). In addition, web browsers often store sensitive information about a user such as passwords and common sites visited, thereby increasing the risk of identity theft, data loss, and computer misuse. Once the infection payload is executed, the attacker can then send additional malware to the system, including rootkits and trojans to gain further control over the system (Symantec, 2009).

## Ransomware

An additional blended threat that has gained a great deal of popularity over the last decade is called **ransomware**. These threats demand that the operator of the infected system pay in order to have their system’s functionality restored (Panda Security, 2015; Russinovich, 2013). Ransomware is similar to a trojan in that it spreads through downloadable files or through websites. Once the prospective target executes the file, it will then deploy its payload, which either encrypts files on the user’s hard drive or may modify the boot record of the system (similar to a virus) to restrict what the user can access (Russinovich, 2013). The payload may also include messages that are displayed to the victim indicating that their computer has been used for illegal activities like child pornography and has been shut down by law enforcement. These messages require the user to pay so that the functionality or files will be restored. Once payment is received, the victim receives a program to either decrypt the file or unlock the affected portions of the system.

There have been several notable examples of ransomware, including the recent **CryptoLocker** program that was first identified in September 2013 (Ferguson, 2013; F-Secure, 2017; Panda Security, 2015). The program spreads via attachments in either emails or as downloadable malware online and targets Microsoft Windows systems. Once it is executed, the code encrypts data on any hard drives attached to the infected system using a very strong encryption protocol (Ferguson, 2013). The key to decrypt the file is sent to a command-and-control structure (similar to a botnet) and the victim is told that they have to pay a specific fee, typically in some form of cryptocurrency, or the key will be deleted within three days (Ferguson, 2013).

Though the malware itself can be removed with some ease, the encrypted files cannot be readily repaired, which makes this a very challenging threat for home users and companies alike. In fact, ransomware operators initially

targeted individuals but pivoted to companies and enterprise systems as they have greater resources to pay exorbitant ransoms to avoid losing valuable data. For a time, victims were encouraged to simply pay the ransom in order to minimize the harm of infections (IBM, 2016). This trend appears to have persisted, with one estimate suggesting the average ransom paid by corporate victims was \$111,605 in the first half of 2020 alone (Coveware, 2020). In some cases, the cost is covered by cybersecurity insurance policies that are held by major corporations and enterprises so as to minimize the costs of any attack (Sophos, 2020; see [Box 4.4](#)).

There are myriad examples of major public and private entities around the world that have been targeted by ransomware, ranging from hospitals, financial institutions, police departments, government entities, to schools (Ians, 2016; Panda Security, 2015; Sophos, 2020). In fact, a survey by the cybersecurity firm Sophos (2020) found that Indian entities had the highest rates of ransomware infection, with 246 of 300 total organizations reporting being affected. Unfortunately, ransomware does not appear to have peaked in popularity or effectiveness among attackers at the time of this publication. So long as criminals set the

### **Box 4.4 An Example of Cybersecurity Costs in Ransomware Attacks**

#### **BWL Paid \$25,000 Ransom after Cyberattack**



<https://www.lansingstatejournal.com/story/news/local/2016/11/08/bwl-paid-25000-ransom-after-cyberattack/93488502/>

BWL has filed a \$1.9 million insurance claim for losses resulting from the attack. Peffley said. That figure represents \$2 million in covered losses, minus a \$100,000 deductible, he said. The claim has not yet been paid, officials said.

This article provides an overview of the costs of a ransomware attack affecting the Lansing, Michigan Board of Water and Light in 2016. The attack did not affect water or power services but affected their customer service communications capabilities. Not only was the ransom of \$25,000 paid to the attackers but also millions of dollars to remediate the attack and train staff in new policies and procedures. Thus, this article reinforces the high cost of ransomware with clear examples.

prices for individuals and organizations at levels where paying the ransom is more cost-effective than attempting to retrieve backup data (Sophos, 2020), such attacks will persist. Additionally, ransomware operators are increasingly targeting corporate data housed in cloud storage, which may increase the need for victims to pay the ransom to avoid losing information (Sophos, 2020).

**For more details on the ways victims should respond to ransomware, go online to:** [https://www.ey.com/en\\_us/consulting/ransomware-to-pay-or-not-to-pay](https://www.ey.com/en_us/consulting/ransomware-to-pay-or-not-to-pay)



## The Global Impact of Malware

Computer security experts continue to express alarm about the current number of malicious software programs and the increases they expect to see in the future. Unfortunately, the statistics over the last several years have not improved. Before providing additional statistics and insights, it should be pointed out that these companies profit by selling computer security services to individuals and corporations. Thus, it behooves them to discuss this issue as a crisis, though all available statistics appear to support their concerns.

The number of new malicious software programs introduced into the wild each year is tremendous. Although the figures provided by different security companies vary widely, they demonstrate the magnitude of the malware problem. Symantec (2019) reported that they found over 246 million new pieces of malware in 2018 alone. Similarly, SonicWall (2020) reported their software identified over 1.899 billion malware variants in the United States during the first six months of 2020 alone. Malware infections are also a global threat, with hundreds of millions of malware being found in the United Kingdom, and tens of millions of piece in India, Brazil, and Germany during the same period (SonicWall, 2020). Similarly, Symantec found that the highest rates of ransomware infections in 2019 were observed in China, India, the United States, Brazil, Portugal, and Mexico.

**For more details on the emergent threat of malware to various nations, go online to:** <https://securityintelligence.com/news/singapore-an-emerging-target-for-cyberthreats-and-banking-trojans>



A review of US-CERT weekly vulnerability summaries, released by a governmental agency and part of the National Cyber Alert System, illustrates that the identification of vulnerabilities is a constant challenge. Each Cyber Security Bulletin provides a summary of the new vulnerabilities recorded during the past week by the National Institute of Standards and Technology (NIST) National Vulnerability Database (NVD). This database is sponsored by the Department of Homeland Security (DHS) National Cybersecurity and Communications Integration Center (NCCIC)/United States Computer Emergency Readiness Team (US-CERT).

The vulnerabilities are categorized by severity (high, medium, and low) based on the Common Vulnerability Scoring System (CVSS) standard. For example, a vulnerability will be categorized as high if its CVSS score is between 7.0 and 10.0, medium if between 4.0 and 6.9, and low if between 0.0 and 3.9. This information is made more informative by organizations and US-CERT providing additional information, including identifying information, values, definitions, related links, and patches if available. Any examination of these weekly vulnerability reports shows how many serious vulnerabilities are identified and reported on a weekly basis. Dozens of pieces of software and hardware are included each week, particularly at a high vulnerability level, demonstrating the scope of threats facing the public.



**For more information, visit:** <https://us-cert.cisa.gov/ncas/bulletins>

Although this chapter primarily focuses on computer systems and their users, scholars and security experts also warn about the vulnerabilities of smartphones, particularly Android operating systems, and personal digital assistants (PDAs). Though mobile attacks are still less common relative to PC attacks, they are subject to the same forms of malware and creative attackers (F-Secure, 2017; Panda Security, 2015; Ruggiero & Foote, 2011; Symantec, 2019). In fact, Symantec (2019) found an increase in ransomware infections on mobile devices in 2018, particularly in the United States. In total, they identified 2,328 new variants of mobile malware in 2018 and blocked an average of 10,573 mobile applications every day.

It is expected that there will be an increase in attacks against Android operating systems because smartphones and PDAs have some of the same advanced computing abilities as traditional computer systems. They give the user access to the Internet and email, have address books, and have GPS navigation. They also

allow people to purchase items using wireless networks, access bank accounts, set alarms on houses, and make purchases through various online retailers. Thus, Android running devices are already at risk of the full spectrum of malware that affects PCs, including viruses, worms, trojans, ransomware, and others (F-Secure, 2017; Symantec, 2019).

The issue that separates mobile devices from computers is their use of security protections. Smartphones and tablets have lax or poor security as they do not come preinstalled with firewalls or antivirus programs. These tools are available for purchase, though it is unclear how many individuals actually install antivirus protection on their mobile devices. In addition, operating systems for mobile phones are updated less frequently than those for computers, creating greater opportunities for attackers to exploit known vulnerabilities (Symantec, 2019). This problem is compounded by the fact that smartphone and mobile device users are generally unaware of these problems but believe that their devices are just as secure as their computers. Thus, smartphones present a clear risk point for malware writers who seek to harm user systems and gain access to sensitive data (F-Secure, 2017; Symantec, 2019).

It is difficult to even create rough estimates on the amounts that hackers and malicious programs have cost citizens, organizations, government agencies, and the global economy. When considering the financial costs, one has to not only count the actual direct damage of the malware, such as having to replace a computer, but also the amount of time, money, and manpower spent trying to prevent an infection and then fix the problem if an infection occurs. Malware can disrupt network operations, delete, steal, or manipulate files, allow access to confidential files, and generally damage computer systems and hardware. In addition, there are the indirect costs to businesses that arise from consumer lack of confidence in online purchases or credit card usage. If consumers lose confidence in the security and privacy of their online purchases, they will be less likely to spend money online in general and with specific companies that had reported particular problems. On the other end, vendors themselves might also fear online transactions if they are unsure that the person on the other side is really who they say they are. In order to address these problems, companies and financial institutions spend billions of dollars on verification and other computer security programs to ensure safety. In the end, these costs increase the cost of doing business, which is handed down to the consumer.

Over the last decade, various experts and companies have estimated that hack attacks cost the world economy over \$1 trillion per year. Considering that

(1) more malicious software is created each year; (2) the number of specialized hacks occurring throughout the world has increased; (3) more individuals around the world are connected to the Internet; (4) more companies conduct online business transactions; and (5) more companies and governments spend additional funds on computer security to address these problems, it is safe to say that the cost of malware must be higher than what is otherwise spent to mitigate and prevent malicious software infections and hacks. In fact, the total cost of cybercrime may reach 10.25 trillion dollars globally by 2025 (Morgan, 2020). It is extremely difficult, however, to create total costs of cybercrime estimates due to the disparity in available loss metrics.

The costs of hacking and malware infection, however, are not only financial. There are also potential emotional consequences for victims, though there is little criminological research on the way that victims of malware infection and hacking incidents feel afterward. For many people, malware infection is nothing more than a minor nuisance that can be fixed easily. Some, however, may feel that their personal space was violated and personal privacy forever lost. Victims may not be able to identify the source of the infection, whether from a website, bad attachment, or other medium. As a result, some may change their online habits in order to reduce their perceived risk of future infections.

In addition, some victims may feel that they are to blame for their victimization experience. Since computer security principles currently revolve around self-protection practices, like the use of protective software, hard passwords, and careful online behavior, victims may see themselves as the source of their financial and emotional harm resulting from an infection.

### Hackers and Malware Writers

Although hackers are often associated with the use of malware, not all hackers have the ability to create these programs. It takes some degree of skill and knowledge of programming languages, vulnerabilities, and exploits in order to create effective malware. There is a good demand for malicious code among hackers of all types as they can make an attack much easier to complete. As a result, the demand for malware can far surpass the capacities present in the current hacker community.

The very limited body of research considering the activities and interests of malware writers suggests that they generally operate within and share the norms and values of the larger hacker subculture (see [Chapter 3](#) for details). Malware writers have a deep interest in technology, which is an absolute necessity

in order to identify distinct vulnerabilities in software or hardware and find innovative ways to exploit them. Writing malicious code can therefore be an exercise in creativity, as the individuals must challenge themselves and their understanding of the limits of an operating system and their own coding capabilities. For instance, the Elk Cloner virus mentioned earlier is an excellent example of creative malware coding as the author liked to play pranks and creatively apply his knowledge to computer systems.

They may also be motivated by the desire to cause harm or get revenge against someone who they perceive to have wronged them (Bissett & Shipton, 2000; Gordon, 2000). For instance, a system administrator named Andy Lin was sentenced to 30 months in a US federal prison in 2008 for planting a form of malicious code called a “logic bomb” on the servers of Medco Health Solutions where he worked for some time (Noyes, 2008). Lin installed a program in 2003 that would execute its payload and wipe out all data stored on over 70 servers in the company’s network in the event he was laid off. When it appeared possible that he would lose his job, he set the code to activate on April 23, 2004. The program, however, was unsuccessful. He therefore kept it in place and reset the deployment date to April 2005. A system administrator within the company found the bomb code in the system and was able to neutralize the code. While this scheme was unsuccessful, it demonstrates the inherent danger that malware can cause in the hands of the right actor.

Writers may also develop a piece of malware because they believe they may garner fame or notoriety in the hacker community (Bissett & Shipton, 2000; Gordon, 2000; Holt & Kilger, 2012). In the late 1990s and early 2000s, the preponderance of worms and viruses led their creators to generate worldwide attention because of the harm they could cause to the majority of computer users around the world. That kind of attention could easily serve as an individual’s calling card and help them to demonstrate their level of skill in order to gain a legitimate job in the security industry (Taylor, 1999). Alternatively, the author may simply be able to show everyone what they are capable of doing with enough careful planning and execution.

As patterns of technology use have changed and individuals are increasingly using technology in all facets of everyday life, malware writers have begun to target these users to set up stable attack platforms based on networks of infected computers (Holt & Kilger, 2012). Virus writers and creators now recognize that not everyone has the ability to write such code, but if the actor is proficient enough as a hacker they will understand how to leverage a tool to their own benefit. As a result, malware writers are increasingly motivated by economic



## Box 4.5 Interview with the Malware Writer Corpse

### Meeting the Swedish Bank Hacker

<http://computersweden.idg.se/2.2683/1.93344>

For the price of 3,000 dollars, our reporter was offered his personal bank Trojan. In an interview with Computer Sweden, the hacker behind the recent Internet frauds against Sweden's Nordea bank claims responsibility for more intrusions. "99 percent of all bank intrusions are kept secret," he insists.

This in-depth interview with Corpse, the creator of a well-known trojan, describes why he made it. The account demonstrates that some hackers are clearly aware of how their programs have malicious application and will harm individuals on a global scale.

gain through sales of tools and code to others in the community (Holt, 2013; Holt & Kilger, 2012). Typically, tools are advertised through forums and IRC channels and then direct negotiations occur between buyers and sellers. Direct sales of programs to others can generate a relatively healthy income that exceeds what may otherwise be available as a salary through existing jobs (see **Box 4.5** for details). Thus, malware writers share some common ideas with the larger hacker community, though the skill and sophistication involved in the creation of malware differentiate them from the larger population of unskilled or semi-skilled hackers.

## Legal Challenges in Dealing with Malware

Despite the substantial harm that malware can cause, many nations have not criminalized its creation. The process of creating malware is an exercise in creative thinking and innovation, which can be inherently valuable to the computer security community to better secure systems. Instead, most nations choose to prosecute malware use under existing statutes regarding computer hacking. The direct connection between malware use and hacking outcomes, such as data loss or manipulation, makes intuitive sense and creates a more streamlined criminal code without the addition of statutes that may not otherwise exist.

A few nations, however, have specifically defined malware in their criminal codes. The **US Computer Fraud and Abuse Act** includes malware-related offenses in addition to specific hacking-related offenses. The fifth statute of this act (18 USC § 1030(a)(5) involves the use of malware, making it illegal to:

- 1 knowingly cause the transmission of a program, information, code, or command and thereby intentionally cause damage to a protected computer;
- 2 intentionally access a protected computer without authorization and thereby recklessly cause damage; and
- 3 intentionally access a protected computer without authorization and thereby cause damage or loss.

The first portion of this statute recognizes the distribution of malware, though that term is not used in favor of the terms program, information, or code, as it provides greater latitude in the identification of viruses, worms, and forms of software (see [Box 4.6](#) for details on the arrest and prosecution of the creator of the Melissa Virus). The remaining two items involve ways that malware can be used in the course of either reckless or intentional damage. If an individual is found guilty of violating this act, they may receive a fine and a prison sentence of two years to life depending on the severity of their actions (see also [Chapter 3](#)). For instance, if the use of malware leads to the death of another human being, they may be eligible for a life sentence. Though the likelihood of such

### **Box 4.6 One of the First Modern Prosecutions for Malware Distribution in the United States**

#### **Creator of “Melissa” Virus Will Get Jail Time**

<http://usatoday30.usatoday.com/tech/news/2002/05/01/melissa-virus.htm>



The creator of the “Melissa” computer virus was sentenced Wednesday to 20 months in federal prison for causing millions of dollars of damage by disrupting e-mail systems worldwide in 1999.

This article provides a good roundup of the rationale for prosecuting David L. Smith for his role in the distribution of the well-known malware program called the Melissa virus, as well as the relative absence of arrests otherwise for similar activities across the globe.

an outcome is low, the recognition by legislators that malware may be used – intentionally or unintentionally – to cause harm in a real-world context is a clear step forward for federal prosecutors to fully pursue justice for the actions of cybercriminals.

Since malware may be used to acquire sensitive passwords and other data, the CFAA now includes language criminalizing the sale or exchange of user information. Specifically, 18 USC § 1030(a)6 makes it illegal to knowingly sell, buy, or trade passwords or other information used to access a computer with the intent to defraud the victims. For instance, if an individual used a keylogging trojan to gather passwords and then sold that information to others, he may be prosecuted under this statute. Importantly, the computers harmed must be either (1) involved in interstate or foreign commerce or (2) operated by or for the federal government. This language is quite broad and may be interpreted to include a wide range of computers connected to the Internet owned or operated by civilians (Brenner, 2011). Currently, any individual found guilty of this crime may be fined and imprisoned for one to five years depending on whether the offender gained commercial or financial gain for their actions or if the value of the data exceeds \$5,000. If, however, the individual is found guilty on multiple counts, they are eligible for up to ten years in prison (Brenner, 2011).

The use of malware in order to extort funds from victims also led to the creation of CFAA language to criminalize threats to computer systems. 18 USC § 1030(a)7 made it illegal for an individual to extort money or anything of value on the basis of (1) threats to cause damage to a protected computer, (2) threats to obtain information or affect the confidentiality of information from a computer without authorization or exceeding authorized access, or (3) damage to a computer when the damage was caused to enable the extortion. Anyone found guilty of this offense can be sentenced using the same guidelines for trafficking in passwords, namely, up to five years in prison and/or a fine, or up to 10 years in the event the offender has prior convictions. These laws can be used to prosecute the use of ransomware, as well as DDoS attack ransom attempts.

In addition to these statutes at the federal level, the laws related to computer hacking and intrusions in all states in the United States can be extended to the outcomes associated with malicious software (National Conference of State Legislatures, 2020). Some states have criminalized the creation and distribution of malware, though they may not include those words. Instead, states like California use the term “**computer contaminants**” or computer instructions as the programs contain code designed to damage, destroy, or transmit information

within a system without the permission of the owner (Brenner, 2011). The use of malware may constitute either a misdemeanor or felony depending on the harm caused and the individual's access to sensitive data or information of a monetary value.

Additionally, 26 states have specific language criminalizing either DDoS or DoS attacks (National Conference of State Legislatures, 2020). Six states (California, Connecticut, Michigan, Texas, West Virginia, and Wyoming) have added language to their criminal code regarding the use of ransomware (National Conference of State Legislatures, 2020). Several of these states also experienced distinct ransomware attacks, which may have precipitated the creation of the legislation. Regardless, these states are interesting examples of the ways that individual states may adapt to cyberthreats, though states may still be able to sanction offenders who use ransomware under existing malware or trespassing statutes.

Many other nations share similar legal frameworks regarding malware in that existing statutes concerning hacking can also be used to pursue malicious software cases. Few nations actually specifically criminalize the use of malware but rather apply existing laws regarding hacking in these incidents. Australia, Canada, and India are examples of this strategy. In the United Kingdom, the **Computer Misuse Act 1990** has some utility to account for malware-related offenses as it criminalized unauthorized access to computer material and unauthorized modification of computer material (see [Chapter 3](#)). This is a direct outcome of the use of malware, though the law did not allow for direct cases against malware writers. As a result, the **Police and Justice Act 2006** extended and revised this section of law to account for malware distribution. The Act added three offenses related to “making, supplying, or obtaining articles for use in computer misuse offenses,” including:

- 1 making, adapting, supplying, or offering to supply any article intending it to be used to commit, or to assist in the commission of, an offense under the Computer Misuse Act;
- 2 supplying or offering to supply any article believing that it is likely to be used in the commission of offenses under the Computer Misuse Act; and
- 3 obtaining any article with a view to its being supplied for use to commit or assist in the commission of offenses under the Computer Misuse Act.

These offenses carry a maximum sentence of two years and a fine, though it has drawn criticism for its potential use to prosecute professionals and legitimate security tool developers (Brenner, 2011).

The Council of Europe's Convention on Cybercrime does not specifically include language on malware in order to avoid the use of terms that may become dated or irrelevant over time (Council of Europe, 2013). Instead, the existing articles of the convention can be applied in some way to malware used in the course of cybercrime. The most relevant language is currently included in Article 6 regarding the misuse of devices. Specifically, this article makes it a violation of law to produce, sell, or otherwise make available a program or device designed to access computer systems, intercept or harm data, and interfere with computer systems generally (Council of Europe, 2013). This article is not designed for use in prosecuting cases where individuals have penetration-testing tools or codes designed to protect computer systems. Additionally, this article allows flexibility for each nation to decide whether they want to include this language in their own criminal codes (Council of Europe, 2013). However, the use of malware can be criminally prosecuted under laws designed to pursue illegal access to systems.

### Coordination and Management in Addressing Malware

Since malware is prosecuted using similar legislation to computer hacking, many of the same agencies are responsible for the investigation of these offenses (see [Chapter 3](#)). The Federal Bureau of Investigation in the United States, Metropolitan Police Central e-crime Unit (PCeU) in the United Kingdom, and other agencies all investigate these crimes. There is, however, a much larger body of private agencies and commercial entities involved in the detection and mitigation of malicious software.

One of the most prominent resources available for industry and businesses to help mitigate the threat of malware and insulate them from future attack are computer emergency readiness teams (CERTs). As noted earlier, the first CERT was born out of the Morris Worm, which demonstrated the need to develop a coordinated response to cyberthreats. As malware became more prevalent and damaging to the rapidly expanding population of Internet users in the mid-1990s, the need for coordinated responses to threats increased substantially.



For more information on CERTs, go online to: [www.us-cert.gov](http://www.us-cert.gov)

There are now 555 publicly identified response teams in 95 nations around the world (FIRST, 2020). They may go by different names depending on location. Some nations or locations may use the term CERTs while others use the name **Computer Security Incident Response Teams (CSIRT)**, but they serve generally similar purposes. There are 97 CERT or CSIRT groups in the United States alone. Some of these are housed in financial institutions like Bank of America and Scottrade, technology companies like IBM and Yahoo, while others are located in government agencies such as the National Aeronautics and Space Administration (NASA). The primary CERT within the United States (US-CERT Coordination Center) is now situated within the **DHS's Cybersecurity and Infrastructure Security Agency** (CISA) (see also Chapter 10; DHS, 2020). It provides reporting mechanisms for vulnerabilities and threats to systems, as well as security tools to help patch and protect systems from attack (DHS, 2020). The CERT can also serve to analyze and track threats as they evolve for virtually any branch of government and civilian networks, including threats for both home users and businesses. They act as a focal point for the coordination of information concerning cyberattacks that threaten civilian infrastructure (DHS, 2020).

At a global level, there are now CERTs or CSIRTS on every continent. The greatest representation of units is within industrialized nations. Given the wide distribution of teams and threats based on the resources within a given nation, there is a need for a unifying body to help connect all these groups together. The global **Forum for Incident Response and Security Teams (FIRST)** serves to coordinate information sharing and connections between all teams worldwide (FIRST, 2020). FIRST offers security courses, annual conferences for incident responses, best practice documents for all forms of incident response, and a full reference library of security research and materials from across the globe. The Forum also creates working groups based on common interests or specific needs, such as their **Special Interest Group (SIG)**, which links respondents together to discuss common interests in order to explore a topic of specific technology in order to share expertise. There is even an arm of FIRST that is connected to the International Standards Organization (ISO) in order to help inform policies and standards for cybersecurity incident management, evidence handling, and vulnerability disclosure in the field (FIRST, 2020).

Perhaps the most identifiable entities involved in the response to malware and hacking incidents are members of the antivirus and cybersecurity industry. There are dozens of companies offering security tools to protect desktop,

laptop, tablet, and mobile computer systems either for a fee or at no cost to the user to secure various operating systems, whether Mac OS, Windows, Linux, or mobile OSs. You may know some of the more prominent companies in the field and use some of their products, including BitDefender, Kaspersky, McAfee, Symantec, and Trend Micro. Most of these companies offer some type of antivirus software, which protects the user by checking incoming files and data requests to protect against active infection attempts in real-time and/or scanning existing files to detect and remove malware that may already be installed. Antivirus software works through the use of heuristics, or signature-based detection, where all system files on a computer are compared against known signatures or definitions of malware to determine whether an infection has taken place. Similarly, any attempted download is compared against known definitions of malware in order to eliminate the likelihood of being actively infected.

The benefit of antivirus software is that it can help to reduce the risk of malware being able to actively infect a protected system. The use of heuristic detection systems is, however, limited by their available knowledge. The definitions that the software has on file run the risk of being outdated every day, as new variants of malicious code are being produced all the time. Antivirus vendors have to create signatures for any new malware variant identified; thus, they are constantly updating definitions. In addition, there is no necessary agreement between security companies as to the name or classification for a specific form of malware. Some vendors may tag something as a trojan, while another labels it a virus, making it difficult to standardize the identification of malware generally. If users do not have an up-to-date definitions file for their antivirus software before it starts to scan for infections, the risk of infection from new malware is increased (Symantec, 2021). If an individual never updates this information, then his or her antivirus software can do very little to protect the system from new threats. As a result, the value of protective software is severely limited by the knowledge and skills of both the end user operating the software and the continual advancements in malware in the wild.



### For more information on antivirus vendors, go online to:

1. [www.norton.com](http://www.norton.com)
2. [www.sophos.com](http://www.sophos.com)
3. [www.avg.com](http://www.avg.com)

In light of the limitations of antivirus software and the challenges posed by malware generally, a nonprofit organization called the **Anti-Malware Testing Standards Organization (AMTSO)** was formed in 2008 (AMTSO, 2017). The organization exists to provide a forum to improve the process of malware identification and product testing, the design of software and methodologies for analysis, and identify standards and practices that can be implemented across the security industry. In fact, they have published a range of documents describing testing guidelines and standards for the analysis of malware and testing of security products. The AMTSO is comprised primarily of major security vendors, which is sensible given they have a vested interest in developing sound products. Some have questioned whether this is a good thing, as the vendors may have little interest in truly assessing the quality of their products or revealing the limits of what their tools can do (Townsend, 2010). Thus, the AMTSO is one of the few entities, which attempts to police the antivirus industry, though there are limits to its capabilities.

## Summary

The threat of malware is diverse and ever-changing, affecting virtually all forms of computer technology. Malicious software takes many forms, though the use of programs that blend various attack techniques into a single platform is increasingly common. The creation of malware is, however, a skill that only a few have and can implement in the wild. As a result, some have taken to selling their resources in open markets operating online, which increases the capability of less-skilled attackers while enriching talented programmers. The criminal laws available to prosecute malware users are substantive, though there are no necessary laws against actually writing malware. Thus, law enforcement agencies are not necessarily able to mitigate the threat of malware. Instead, the computer security industry has become the pertinent resource to minimize the threat of malware for the general public, governments, and industry generally.

## Key Terms

Anti-Malware Testing Standards Organization (AMTSO)

Blended threat

Boot sector  
Boot sector virus  
Botnet  
Code Red worm  
Computer contaminants  
Computer Emergency Response Team (CERT)  
Computer Misuse Act 1990  
Computer Security Incident Response Teams (CSIRT)  
Concept virus  
CryptoLocker  
Department of Homeland Security Cybersecurity and Infrastructure Security Agency  
Distributed denial of service (DDoS) attack  
Elk Cloner  
Exploit  
Exploit packs  
Forum for Incident Response and Security Teams (FIRST)  
Macro programming language  
Macro virus  
Malicious software (malware)  
Melissa virus  
Morris worm  
MuTation Engine (MtE)  
Operation: Bot Roast  
Payload  
Police and Justice Act 2006  
Ransomware  
Special interest group (SIG)  
Sub7  
Trojan  
US Computer Fraud and Abuse Act  
Worms  
Virus  
Vulnerability  
Zeus Trojan

## Discussion Questions

1. Since malware writers tend to target popular software and resources, what do you think will be the likely targets for infection over the next five years? Please explain why you think a certain target may be selected over another.
2. Why do you think nations have not criminalized the creation of malicious software generally? Should the legal code be amended to reflect this activity? Why?
3. If the antivirus software industry has grown since the 1990s, but malware continues to evolve and expand, is it reasonable to say that they are effective in reducing infections? If vendors are not technically stopping infections, then how can we assess their real value?

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# DIGITAL PIRACY AND INTELLECTUAL PROPERTY THEFT

## Chapter Goals

- Understand intellectual property and how piracy affects property owners
- Realize the ways that hacking and cybercrime engender theft of intellectual property
- Identify the ways that piracy has changed over time
- Examine the ways that pirates justify their theft of intellectual property
- Know the legal protections afforded to intellectual property and the legislation designed to protect digital media
- Recognize the methods employed by property owners to deter or sanction intellectual property theft

## Introduction

Over the last two decades, high-speed internet connectivity and the world wide web have transformed the way in which individuals access music, movies, television, and other forms of entertainment content. The ability to stream traditional terrestrial radio stations online allows individuals to access content from anywhere around the world. At the same time, streaming-music services like Pandora and Spotify allow individuals to listen to only the content they most prefer and to share with friends. Netflix, Hulu, YouTube, and other streaming-video services allow individuals to watch television, movies, and clips on demand. Even e-reader devices like the Kindle and Nook tablets provide wireless access to digital copies of books and magazines, allowing a virtual library to be transported and enjoyed anywhere. All of this content can even be enjoyed via smartphone applications, meaning you are no longer tethered to a television in order to view certain content.

The technologies that sustain the media-saturated environment we now live in provide unparalleled access to any and all forms of entertainment. At the same time, they can be readily subverted in order to acquire, copy, and unlawfully distribute media that was illegally obtained. These activities are commonly referred to as **digital piracy**, a form of cybercrime encompassing the illegal copying, using, or distributing of digital media such as computer software, digital sound recordings, and digital video recordings without the explicit permission of the copyright holder (Lee et al., 2018). When thinking about digital piracy, it is important to consider

other activities than illegally downloading movies and music. Rather, as the definition provided indicates, the term digital piracy is a large umbrella term that refers to copying, using, or distributing any form of digital media, including, but not limited to: music, movies, television shows, software, video games, and documents.

As the readers of this textbook are probably aware, digital piracy is a commonly committed offense. In fact, studies indicate that up to at least 40 percent of American college students, if not more, probably appear to have engaged in some form of piracy (Gunter, 2009; Higgins et al., 2009; Holt & Bossler, 2015). Some studies find that basically almost all 18–24 year olds have illegally downloaded music at some point in their lives (Dawson, 2010). Digital piracy is of course not limited to the United States, with estimates from other countries equally as high. For example, over 70 percent of Finnish teenagers were found to have committed some form of digital piracy over the previous 12 months in one study (Salmi, 2012). Another study found that more than half of Canadians between the ages of 16–34 years admitted to committing music piracy (Nandedkar & Midha, 2012). A study funded by the Asia Video Industry Association found that 49 percent of Filipino consumers accessed torrent sites or streaming piracy service websites (Asia Video Industry Association, 2020).

Piracy is so commonplace in fact that media companies fully expect their content to be made available for illegal download as soon as possible. The global spread of media markets also makes the rapid share of pirated content possible in ways that were not previously possible. For instance, the superhero film *Avengers: Endgame* was first released in Asian theaters on April 24, 2019, in advance of a release in North American and European markets (see [Box 5.1](#)). Within two days, the entire 3-hour film began to appear for download on piracy networks, making it possible for anyone to obtain the film prior to its theatrical release in their physical location. Additionally, a cable company in the Philippines aired a pirated version of the movie on one of their channels the day after its Asian premiere (Moon, 2019). The movie went on to make almost \$3 billion globally, but some industry experts suggested that less popular film series would have been severely impacted by the prerelease of pirated downloads (Abad-Santos, 2019).

**For more information on the rates of software piracy, go online to:** <https://gss.bsa.org/>



### Box 5.1 Pirating *Avengers: Endgame*

#### “*Avengers: Endgame*” Full Movie Hits Piracy Networks (Report)



<https://variety.com/2019/digital/news/avengers-endgame-pirated-online-china-1203196595/>

Disney/Marvel’s “*Avengers: Endgame*,” poised to be the hugest movie opening in history, has hit piracy networks—two days before its U.S. premiere....

This article provides an overview of the challenge inherent in stopping piracy with the rise of global film markets and how this may affect the box office returns for the film *Avengers: Endgame*.

In fact, this matches arguments made by those who regularly pirate materials in that they suggest downloading a movie, song, or piece of software does not cause any substantive harm (Hashim et al., 2018). Pirates argue that the economic loss associated with piracy should be relatively small by comparison to the millions or billions of dollars that media or software producers make. Such an argument may feel hollow to content producers, as they must make substantial investments in order to ensure they are successfully able to monetize their creations. Current estimates suggest that digital piracy has massive economic impacts on the recording and film industries, with as much as \$97.1 billion in losses to the film industry, and up to \$95.4 billion for television producers (Letic, 2019). In fact, the company MUSO (2020) estimated that there were over 190 billion site visits to piracy portals online in 2018, with the majority originating from the United States. These estimates may not be reliable as their methodologies are not always made clear by the companies and organizations that produce these statistics. Regarding software piracy, the Business Software Alliance (BSA) (2019) reports that 37 percent of software globally is pirated. Evidence suggests software piracy is especially high in low-income countries where the ability to acquire media is limited relative to its cost. The BSA suggests that piracy is highest and remains high in Central and Eastern Europe, Latin America, and Asia relative to Canada, Europe, and the United States.

Given the persistence of piracy, some have begun to question the value of pursuing criminal prosecutions against pirates in court. If copyright holders still

profit from their efforts despite individuals being able to access ideas and media for free, can any harm truly result from piracy? In fact, would the ability to access any and all information improve the open nature of society and stimulate creativity as a whole? The recently formed political group Pirate Parties International believes that reforming copyright laws to favor more open distribution would be a boon to society and foster transparency in governments across the world. This group has found success throughout the Americas, Europe, and Asia and may have far-reaching consequences for society over the next decade.

**For more information on Pirate Parties International, go online to:** <https://pp-international.net/pirate-parties/>



In order to understand the current climate toward piracy, it is important to identify the changes in technology, the law, and societal perceptions of media. This chapter will provide a focused discussion of intellectual property and the evolution of piracy techniques over the last 30 years. The relationship between piracy and corporate intellectual property theft will also be examined to highlight the interesting dynamics that increase the likelihood of economic harm to companies. Additionally, the laws and tactics used to pursue pirates internationally will be explored, so that readers understand the challenges posed by this offense in a globally connected world.

## What Is Intellectual Property?

Before discussing piracy, it is important to understand how ideas and intellectual works are legally protected. For instance, this book has value because it is useful to readers as an assembled document with information synthesized from works, ideas, and information that already exist. Similarly, music, movies, art, and creative endeavors all have value to their developer, as well as prospective economic value. When an original idea that involves some creative expression is put into a fixed medium, such as being written down on paper or drafted on canvas using paint, it can be defined as **intellectual property**. Ideas become “property” because they are physically tangible works that can be viewed by others. Thus, any work of art, novel, design, blueprint, invention, or song can be intellectual property.

Similarly, there are trade secrets that constitute intellectual property usually held by businesses and corporations. A **trade secret** is typically defined

as information that is confidential to a business' success and affects its general commercial value (Nasheri, 2005). For instance, the formula for Coca-Cola is unique to the brand and comprises a key piece of information that, if lost, would affect its ability to compete in the open market. As a result, companies are often extremely concerned if their trade secrets were to be stolen or acquired by someone outside of the organization.

To protect an idea or work from being stolen, and to ensure that an individual receives appropriate credit for a creation, many people try to **copyright**, **trademark**, or **patent** an idea. These are all forms of legal protection for intellectual property that provide exclusive use of an idea or design to a specific person or company, the right to control how it may be used, and legal entitlement to payment for its use for a limited period of time. For instance, the logos and branding for a product like Coca-Cola or Apple are important symbols that link a product to a company and have been trademarked to ensure that they are not misused by other companies or individuals for their own gain. Similarly, copyright protections are automatically granted to an individual who creates a literary, musical, or artistic work of some type from the moment it is created in a fixed format like a recording or a typed and printed medium (Yar, 2013).

It is important to note that while copyright protections are available in a cross-national context, there is a distinction with regard to US law. Individuals are given copyright protections from the time a work is created, though they must register their copyright with the government to ensure that they are given all necessary protection under the law. Specifically, an individual can only pursue criminal or civil actions through the state *if* the content creator has acquired a registered copyright or other legal protection. As a result, legal protection for intellectual property requires some forethought on the part of the creators to secure their ideas in the United States.



### For more information on copyright laws, go online to:

1. [www.copyright.gov](http://www.copyright.gov)
2. [www.ipo.gov.uk/types/copy.htm](http://www.ipo.gov.uk/types/copy.htm)

The ability to maintain and enforce copyrights and legal protections over intellectual property in the digital age, however, is extremely difficult due to the transitory nature of an idea and the ability to access information from anywhere at any given point in time. This is where the problem of intellectual property

theft, or piracy, has emerged as a substantive economic threat to artists and copyright holders. Our ability to access any work, be it cinematic, musical, or literary, through the Web, television, or streaming media has made it much easier to reproduce works without notifying the original creator of our intentions. This means that copyright holders do not receive appropriate reimbursement and must find ways to ensure that their rights are upheld. As a result, **copyright laws** have evolved substantially in the last 30 years to ensure that individuals and corporations with legal rights to a piece of intellectual property are given their appropriate due. Additionally, those who wish to circumvent legal protections continuously change their behaviors in order to reduce the likelihood of detection and risk of arrest.

## The Theft of Corporate IP Relative to Pirated Content

It is clear that the rise of the Internet has created ample opportunities for fraud and theft through hacking and other means. While we traditionally focus on the ways these offenses affect individuals, hacking and acquisition of information have unparalleled impacts on businesses and corporations (Andress & Winterfeld, 2013; Nasheri, 2005). Such attacks that target corporate intellectual property can be especially costly, if it involves key designs or research, such as the source code of software, plans or formulas for equipment, or materials that involve costly up-front research expenses to develop. For instance, there are extremely high costs involved in the design and manufacture of commercial airplane equipment. Engineers must develop not only software, but hardware and materials that are then used to produce prototypes to be tested in the field. If the designs appear stable and survive testing, they can then be manufactured in large scale for sale to airlines and countries around the world.

Mounting evidence demonstrates that some nations are sidestepping these upfront design and testing costs in favor of simply hacking the manufacturers and nations who produce the equipment (Cimpanu, 2019; Nasheri, 2005). Once the attackers gain access to sensitive files, they are then exfiltrated and shared within government and industry circles in their home country. This was evident in the production of a new Chinese commercial aircraft called the C919 (Cimpanu, 2019; Mares, 2019). Nation-state backed hackers, as well as seemingly independent actors, coordinated their efforts by working with the Chinese government-run airline company Comac to selectively target systems in various government and aerospace design companies, including Airbus and Boeing (Cimpanu, 2019; Mares, 2019). The information hackers

acquired would enable the Chinese government to produce various pieces of hardware and airplane parts within the country, rather than rely on foreign manufacturers. While it is not clear if these attacks will eventually increase the productivity and capacity of Chinese manufacturing, it is a clear demonstration of why intellectual property theft is a damaging proposition to economic competition globally.

The extent of the threat posed by intellectual property theft is often difficult to quantify through any tangible data points. As noted in [Chapter 1](#), companies do not like to report when sensitive information is lost, especially if it involves potential proprietary information or corporate secrets that could undercut their competitive abilities in the open market. The earlier example related to airline production is similarly instructive as the companies affected in this incident provided little detail to the public on what materials were actually lost, only that compromises occurred (Cimpanu, 2019). As a consequence, estimates from the US government suggest the loss of corporate intellectual property, separate from digital piracy, is likely between \$180 billion and \$540 billion per year (The National Bureau of Asian Research, 2017).

Given the substantive economic impact companies face from the loss of intellectual property, it would seem essential that violators are prosecuted to the extent possible. Legislators in the United States have consistently argued over the last decade that IP theft continues unabated because of the challenges present in proving that the act has occurred, and a lack of prosecutorial powers. Since much of the theft of IP stems from individuals in foreign nations, it is difficult to extradite and bring those persons to justice in a US courtroom. The airline incident described earlier is somewhat exceptional, as the attacks involved Chinese nationals and insiders within these companies who were located in the United States and other locations where they may be successfully extradited (Cimpanu, 2019). Those individuals were the first to be arrested, followed by the arrest of Chinese government official who coordinated efforts within independent hackers in 2018 (Cimpanu, 2019). It is unclear if such arrests will occur more often as greater efforts are made to crack down on IP theft, but it provides an important sign that the United States is taking the problem seriously.

Increased prosecution will likely not be enough to stem the tide of intellectual property theft. The continued evolution of technology and the Internet create multiple avenues for compromise of sensitive intellectual property by nation-states, and even competing businesses. For instance, the growth of cloud storage hosting services has revolutionized the ways that information is shared within and outside of corporate environments. As more information begins to

appear on these services, they are often only as secure as the username and password provided by users. Even if a business is savvy enough to avoid leaving key designs and plans out of these services, the presence of information about the employee team structures and roles of individuals may provide attackers with clues as to who and what to target next.

Similarly, the increased reliance that companies have on temporary and contract employees may reduce the security of their intellectual property. Individuals with no loyalty to a company and a fixed length of employment may be less inclined to implement full security protocols or report if they are experiencing problems that may signify they have been compromised. Since such employees may also work remotely, they may be more at risk for loss of information through email or cloud storage portals. Thus, there are ample opportunities for intellectual property theft that are not easily eliminated.

## Counterfeiting, E-Commerce, and Intellectual Property Theft

The increased use of the Internet by consumers to identify and purchase goods has also enabled fraudsters to find ways to distribute counterfeit goods through online outlets due to the large return on investment and low risk of detection (Wall & Large, 2010). The sale of counterfeit goods is actually a form of intellectual property theft in which individuals create, distribute, and sell products that closely replicate or blatantly copy the original designs of a privately owned product. The counterfeit product, however, is of a lower quality despite utilizing similar branding and designs to entice buyers, while none of the profits are returned to the original copyright holder (Wall & Large, 2010). As a result, counterfeiting can harm the economic health and reputation of a company due to the sale of poor-quality products utilizing stolen designs and intellectual property.

Email is a particularly practical way to advertise counterfeit products because the creator can use language that suggests their prices are very low for high-quality items that otherwise make a social statement or help the buyer gain social position (Wall & Large, 2010). The same is true for the monetization of various social media platforms, such as Instagram, where vendors can set up convincing profiles using images and logos from the real brands to sell fake products (Solon & Ingram, 2019). They can use hashtags to help increase the visibility of their products and link out to online storefronts that may be difficult for consumers to differentiate from the legitimate brand's sites (Solon & Ingram, 2019).

In fact, the lack of regulation in online markets enables sellers to offer counterfeit products, which may look like the authentic product, directly to consumers. Online spaces do not allow consumers to properly inspect an item, forcing them to rely on the images and descriptions of products (Solon & Ingram, 2019). As a result, counterfeiters can use images including legitimate brand logos and photos of the actual product to create advertisements that speak to the value and low cost of their merchandise (Balsmeier et al., 2004; Wall & Large, 2010). In turn, consumers are only able to evaluate the advertisement and may not realize they have been swindled until a poor-quality forgery or fake arrives in place of the original item. Furthermore, any regulatory attempts taken by social media companies and brand owners to remove counterfeit accounts are easily defeated by creating new profiles (Solon & Ingram, 2019).

Another reason counterfeiters may utilize email to advertise and lure in unsuspecting consumers is that they can easily drive traffic to the online markets and websites that they manage. Alternatively, they may use existing markets, like online retail sites, where they can artificially manipulate indicators of trust and reputation to appear more legitimate (Dolan, 2004). In fact, evidence from the brand protection company MarkMonitor (2017) found that 27 percent of respondents in a survey of individuals in ten countries unknowingly purchased counterfeit goods of all kinds. Many of these products came from online markets, search engine results, and social ads, suggesting they were identified through relatively traditional methods.

Counterfeiters can also utilize auction sites and secondary retail markets online as a means to sell their products. For instance, an existing eBay seller profile that has been inactive can be stolen and hijacked by a fraudster in order to sell counterfeit products while appearing to be a reputable seller in good standing (Chua et al., 2007; Gregg & Scott, 2006). Sellers can also create accounts using fake names or addresses, making it difficult to locate the identity of the person responsible for the sale of fraudulent goods (Gregg & Scott, 2006).

The Organisation for Economic Co-operation and Development (OECD) reported that the estimated value of imported fake goods worldwide was \$509 billion in 2016, which was 3.3 percent of all global imports (OECD, 2019). This included all physical counterfeit goods that infringe trademarks, design rights or patents, and tangible pirated products that would violate copyright protection. The overwhelming majority of these goods were footwear, representing 22 percent of all seized products, which is likely a

reflection of the high demand for unique, limited release shoes across global markets (OECD, 2019). At the same time, this does not include online piracy, which further affects retailers and copyright holders. Twenty-four percent of fake goods that were seized affected the intellectual property rights of US companies though corporations in France (17 percent), Italy (15 percent), Switzerland (11 percent), and Germany (9 percent) were also affected. Most all of these goods originated from China and Hong Kong, though a small percent also originate from various Southeast Asian countries (OECD, 2019).

Limited research suggests that consumers who buy counterfeit goods wish to conform to current fashion norms and be part of the “it-crowd.” They want to position themselves within the social elite who own authentic versions of a counterfeit product (Wall & Large, 2010). Thus, counterfeit luxury goods allow sellers to “trade upon the perception of and desire for exclusivity and to extract its high value by deceiving consumers into buying non-authentic and often low-quality products” (Wall & Large, 2010, p. 1099). Evidence suggests that the most popular brands sought after by consumers seeking counterfeit products are high-end luxury labels, including Louis Vuitton®, Gucci®, Burberry®, Tiffany®, Prada®, Hermes®, Chanel®, Dior®, Yves Saint Laurent®, and Cartier® (Ledbury Research, 2007). The majority of counterfeit products purchased through email-based ads are clothes (55 percent), shoes (32 percent), leather goods (24 percent), jewelry (20 percent), and watches (26 percent) (Ledbury Research, 2007).

Those consumers who are defrauded through eBay often have limited recourse to deal with the problem (Dolan, 2004). Currently, eBay does not offer monetary compensation to victims of fraud; the company will only log the complaint and mark the seller’s profile. PayPal and payment providers may absorb fraudulent charges, though this does not guarantee victims will be fully compensated. As a result, many victims of auction fraud do not know where to turn to file a complaint. Those who do complain to some agency often report dissatisfaction with the process (Dolan, 2004). However, their experiences do not keep them from engaging in online commerce, as more than 75 percent of victims go on to buy goods via auctions and e-commerce sites (Dolan, 2004; see [Box 5.2](#) for details on the development of brand protection communities to minimize risk of purchasing counterfeit goods).

In addition to counterfeit luxury goods, spammers frequently target prescription drugs and supplements through email and online advertising (Grow et al., 2006; Kaspersky, 2021). In fact, PwC (2017) estimated that counterfeit

## Box 5.2 The Rise of Virtual Brand Protection Communities

The rise of e-commerce and secondary-market sales has created unique opportunities for educated consumers to find products at very low prices. This system has also been exploited by counterfeiters and criminals as a means to dispose of fake merchandise with minimal difficulty as consumers are unable to examine their products prior to making a purchase. Given these risks, a number of so-called independent virtual brand communities have emerged online to help consumers make informed purchases. This term is largely born out of consumer research, referencing the fact that individual consumers band together online based on their shared interest in a specific brand or product (Muniz & O'Guinn, 2001). The group functions independently of the brand owner, operating by loyal customers as a means to share their commitment to the brand, communicate information and knowledge about its products, as well as the values they have imbued in the brand (Muniz & O'Guinn, 2001; Sloan et al., 2015).

Brand communities can also serve as a resource to minimize losses due to counterfeiting by detecting counterfeit retailers in advance of a purchase (Basu & Muylle, 2003, p. 163). Evidence suggests consumers participate in brand communities to learn about products and quality, as well as user experiences (Millán & Díaz, 2014). In turn, consumers may be properly informed of the ways that a product should be marketed, how it should appear, and what vendors may be considered legitimately associated with the brand (Royo-Vela & Casamassima, 2011).

In particular, independent virtual brand communities can be a valuable mechanism to authenticate products and sellers associated with a particular brand or industry (Basu & Muylle, 2003). Participants can share the potential red flags that are associated with counterfeit products and the perceived legitimacy of a vendor or their website (Mavlanova & Benbunan-Fich, 2010; Narcum & Coleman, 2015). There are a number of these communities associated with brands, such as niketalk.com, which functions as a forum for enthusiastic fans of the Nike brand (and other athletic shoe brands) to discuss products, rate their performance, and authenticate online retailers and independent vendors operating on sites like e-bay.com. The site has no association with Nike but operates as one of the world's largest online communities to discuss this brand. There

are similar forums for various retail categories, such as thebagforum.com operating as forum for individuals to discuss various purses and handbag makers and retailers, as well authenticate products prior to making a purchase. Thus, brand communities serve a vital role in assisting consumers in determining the legitimacy of a product and reducing the potential losses associated with counterfeit purchases.

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drug sellers earn between \$163 and \$217 billion per year through sales on various on and off-line platforms. Many counterfeiters target products that have high name recognition, such as Viagra, Cialis, and Lipitor, and various life-saving medications for HIV and malaria are common in various markets such as Africa (PwC, 2017).



**For more on the dangers of counterfeit pharmaceuticals, go online to:** <https://www.strategyand.pwc.com/gx/en/insights/2017/fighting-counterfeit-pharmaceuticals/fighting-counterfeit-pharmaceuticals.pdf>

The substantial volume of pharmaceutical counterfeiting is directly related to the increased use of prescription drugs in the general population across the globe (Finley, 2009). Many individuals legitimately use prescription drugs for assorted pains and ailments, and a small proportion of the population are addicted to prescription pain medications (Crowley, 2004). Additionally, requesting some medications like those for erectile dysfunction may embarrass the patient and reduce their willingness to ask for it from their regular physician. Regardless, the cost of pharmaceuticals rose substantially over the last decade, making it difficult for some to acquire necessary medications (Crowley, 2004).

The creation of internet pharmacies over the last ten years has enabled individuals to access legitimate and illegitimate needs at a low cost and, in some cases, without prescriptions (Finley, 2009). In fact, the Pharmaceutical Security Institute (PSI, 2017b) has documented a 51 percent increase in the number of arrests involving the seizure of counterfeit drugs between 2011 and 2015. The quantity of drugs seized varies, though 33 percent of all those arrests made in 2015 involved over 1000 doses of a medication, while 56 percent involved less than that amount. Seizures involving smaller quantities have increased substantially over the last few years, which is due to the increased volume of counterfeit drugs being sold online (PSI, 2017b). This is also a global problem, with arrests made in 128 countries; however, the majority of arrests and seizures occurred in Asian countries during 2015 (PSI, 2017a). North American seizures and arrests also increased 100 percent from 2014 to 2015, which is again likely a function of purchases of counterfeit pharmaceutical products online (PSI, 2017a).

Online pharmaceuticals present a substantial threat to consumers as they can obtain prescription drugs without an actual prescription. The United Nations' International Narcotics Control Board (INCB) found that approximately 90 percent of all pharmaceutical sales made online are made without a prescription (Finley, 2009). Similarly, the US General Accounting Office (2004) found that only 5 of the 29 pharmacies based in the United States required validation of a prescription before distributing drugs. Many online pharmacies hosted in foreign countries relied on medical questionnaires or required no information at all from the consumer in order to acquire a prescription (Finley, 2009).

As a consequence, it is difficult to distinguish legitimate online pharmacies from those designed expressly to sell counterfeit products to unsuspecting consumers. In fact, there is a distinct threat to consumer safety posed by the sale of prescription drugs online (Grow et al., 2006; Phillips, 2005; Stoppler, 2005; Tinnin, 2005). Unlike luxury goods counterfeiting, the consumers who buy from online pharmacies may not be cognizant of the potential for adulteration or outright useless ingredients included in these products. Stoppler (2005) reported that drugs purchased from illegal online pharmacies have the potential to: (1) be outdated or expired, (2) be manufactured in subpar facilities, (3) contain dangerous ingredients, (4) be too strong or weak, (5) contain the wrong drug, or (6) be complete fakes. In fact, the US Food and Drug Association reported that approximately 90 percent of all prescription drugs coming into the United States purchased through email or postal mail are dangerous and include minimal active ingredients (Tinnin, 2005).

An additional concern lies in the difficulty of regulating or deterring illegal online pharmacies. This is a consequence of the anonymity afforded by the Internet and computer technologies. Offenders can quickly create a pharmacy, sell products, and either move their website to a different address or completely disappear before law enforcement can begin a proper investigation. In addition, the website creators can set up their web address to appear to be hosted in any country and utilize branding and imagery that would make the site appear to be legitimate. For instance, LegitScript and KnujOn conducted an investigation of “rogue” internet pharmacies designed to “sell or facilitate the sale of prescription drugs in violation of federal or state laws and accepted drug safety standards” through the search engine bing.com (LegitScript & KnujOn, 2009). The authors were able to identify ten rogue pharmacies advertising on the search engine, though they were all removed within days of their initial investigation. The authors were, however, able to obtain a prescription drug without an actual prescription through another rogue pharmacy advertising on bing.com (LegitScript & KnujOn, 2009). Thus, the problem of counterfeit pharmaceuticals poses a potentially serious risk to vulnerable populations and is a direct result of intellectual property theft.

## The Evolution of Piracy and Pirating Methods

We will now shift to a discussion of a more digital form of intellectual property theft: digital piracy. The theft of music and video recordings existed prior to the emergence of the Internet. The development of affordable audio and

video recording equipment in the 1970s and 1980s enabled individuals to easily record music or videos during live concerts as well as radio and television broadcasts. For example, the audiotape allowed individuals to record songs and programming on the radio while it played live. This allowed individuals to create “mix tapes” with content that was aired for free. Similarly, the Video Home System (VHS) tape and home video cassette recorder (VCR) allowed individuals to record content from their televisions and replay it at a time of their choosing (Hilderbrand, 2009). In turn, those with multiple VCRs could connect them together in order to create “bootleg” tapes by playing content on their television while recording it on another VCR at the same time. This method could be applied in order to obtain free copies of films that were still prohibitively expensive for purchase but inexpensive to rent from various retail outlets (Hilderbrand, 2009).

Moving into the 1990s, the emergence of the compact disc (CD) helped usher in a change in the way in which media was recorded, formatted, and handled (Nhan, 2013). Vinyl records and cassette tapes were the standard media format of choice for many; these were analog formats, meaning that the sound waves produced by musicians, while playing, are reproduced in an analogous electrical signal that is then replicated into variations in the recording medium, such as the grooves on a record. The CD, however, was a digital medium, whereby sound waves were converted into a sequence of numbers that were then stored electronically. This format was thought to be of superior quality to traditional analog recordings and had the potential to be much less expensive than other formats to produce. As a result, media companies could obtain a higher rate of return on investments for their intellectual property.

In 1996, the Motion Picture Experts Group (MPEG) was actively working with the International Organization for Standardization (ISO) to develop a mechanism to compress large audio and media files into a smaller size for distribution over the Internet (Nhan, 2013). Since most users at this time used dial-up Internet connectivity, the connection speeds and volume of data that could be downloaded were relatively slow and small. Thus, they developed the **MP3 format** in order to compress audio files, which became the industry standard for compression and media formatting (Nhan, 2013).



**For more information on the evolution of MP3, go online to:**

[www.npr.org/blogs/therecord/2011/03/23/134622940/the-mp3-a-history-of-innovation-and-betrayal](http://www.npr.org/blogs/therecord/2011/03/23/134622940/the-mp3-a-history-of-innovation-and-betrayal)

The release of the MP3 format led to the creation of MP3 players, like Winamp, for desktop computers. These programs became extremely popular and the first portable MP3 player was produced and marketed just three years later, in 1999. In turn, individuals were able to use this compression standard to their advantage in order to pirate media and share it with others through various services (Nhan, 2013). In fact, the production of desktop computers with CD drives that could both read and write onto CDs made it tremendously easy to duplicate and pirate materials with immediate gratification and minimal risk.

The same can be said for DVDs and BluRay media, which provide high-quality image and sound in a format that can now be readily cracked and shared. There are now various “ripping” software programs that allow users to remove Digital Rights Management (DRM) protection from media in order to copy content to a storage device. In fact, the company 321 Studios in the United States developed a software product called DVD X Copy that allowed users to copy any DVD movie to a blank DVD (Karagiannis et al., 2004). This program required no technical knowledge, rather the user simply installed the software and followed the prompts in order to copy the media. An injunction was brought against the company that forced them to shut the service down in 2004, but various programs are available that provide the same facilities.

The availability of pirated materials has been intimately tied to the evolution of technology and the role of computer hackers who develop tools to enable piracy. Media and software companies have always utilized tools to minimize the likelihood of their intellectual property being copied. In fact, hackers in the early 1980s began to subvert protections on software in order to share programs with others (Meyer, 1989). The individuals who posted and shared programs were commonly referred to as **warez doodz**, which is a combination of the words “software” and “dudes.” Their **warez**, or pirated files, were initially distributed through password-protected Bulletin Board Systems (BBSs), and individuals could gain status by providing access to new or hard-to-find files (Meyer, 1989). Thus, warez doodz were important players in the early days of the hacker scene.

**For more information on the early days of piracy, go online to:**

<http://arstechnica.com/gadgets/2014/01/modems-warez-and-ansi-art-remembering-bbs-life-at-2400bps/>



As technology became more user friendly, and the cost of Internet connectivity decreased, warez creation and sharing became more prominent. The techniques to share files, however, began to change with innovations in the technology and creative computer engineering. For instance, the risk associated with sharing cracked or pirated files through single servers or web-based repositories increased because a law enforcement agency could take out that one server and eliminate all access to the files (Nhan, 2013). Thus, the development of various **peer-to-peer (P2P) file-sharing protocols** in the late 1990s enabled **file sharing** directly between users, which dramatically reduced the likelihood of detection. For instance, the development of Internet Relay Chat (IRC) channels in 1998 allowed users to connect and communicate with others in literally thousands of chat rooms established and run by various individuals (Cooper & Harrison, 2001). This was, and still is, a communications vehicle for technologically savvy users and was initially populated by those involved in the hacking and warez scenes.

The social nature of IRC coupled with its global reach led many to use it as a means to engage in direct file sharing, particularly for software and music (Cooper & Harrison, 2001). Typically, individuals would enter a chat room and specify what they were looking for, and a user with those materials would negotiate with that person in order to get some files in return. The reciprocal relationships that developed in IRC fostered the formation of a piracy subculture where individuals were judged on their ability to find and access programs or files and share them with others (Cooper & Harrison, 2001).

While the technical nature of IRC limited its use as a file sharing service to more technically literate populations, the larger population of Internet users was able to engage in piracy through the development of the program **Napster** in 1999 (Alderman, 2008; Nhan, 2013). This freely available specialized software was developed by Shawn Fanning and others in order to provide an easy-to-use program to share MP3-encoded music files between computer systems. Specifically, a user needed to download the Napster program, which would connect that computer to the larger network of user systems that also had the program installed (Nhan, 2013). Users would then select a folder or folders that they wanted to share with others, which would then be indexed onto servers maintained by the Napster Corporation (Alderman, 2008). This allowed users within the network to quickly identify media that they wanted and be directly connected to the appropriate computer to complete the download.

Napster became an extremely popular file-sharing service in a short amount of time (Alderman, 2008). In fact, over 2.7 billion music files were traded

between Napster users in February 2001. The development and adoption of high-speed internet connectivity for home users also stimulated involvement in piracy. Individuals could download several complete songs in the time it took to obtain one file through traditional dial-up connectivity. Thus, Napster played a pivotal role in the growth of the piracy problem.

**For more information on the government debates over Napster, go online to: [www.c-span.org/video/?159534-1/records-v-napster](http://www.c-span.org/video/?159534-1/records-v-napster)**



The popularity of Napster, however, was stymied by lawsuits brought against the corporation by the heavy metal band Metallica and A&M Records in 2001 (Alderman, 2008). These suits argued that the service was facilitating piracy and negatively impacting the financial well-being of artists and recording companies (McCourt & Burkart, 2003). These lawsuits forced Napster to become a paid service, which quickly declined in popularity. Several other P2P services quickly took its place, such as LimeWire and Kazaa, which utilized similar protocols in order to connect users and distribute media.

Shortly after the decline of Napster, a new file-sharing protocol called **Bit Torrent** emerged that became extremely popular. The use of **torrent** sharing software allows concurrent uploads and downloads of media through multiple sources (Holt & Copes, 2010). Specifically, users must download a **torrent client**, which connects them to the larger network of users. From there, a person can search for a piece of media he/she wants to download through various indexing services (Holt & Copes, 2010; Nhan, 2013). Once they find that movie or music, they then begin to download the file by connecting to a series of user computers who have that file, referred to as “seeders.” The torrent protocol links the downloader to an indexed list of all seeders and captures bits of the full file from multiple users at once (Nhan, 2013). This process makes downloading much faster and decentralized in order to make it more difficult to disrupt the network of file sharing. As a result, the torrent protocol is a true P2P mechanism because of the ability to access the required file directly from dozens of users at once.

**For more information on torrents, go online to: [www.bittorrent.com/](http://www.bittorrent.com/)**



Torrent clients became extremely popular in the mid-2000s and were thought to have accounted for over half of all pirated materials online by 2004

### Box 5.3 Changing Film Practices and Their Impact on Piracy

#### Studios Are Experimenting with Film Release Models. Here's What that Could Mean for Movie Piracy



<https://www.cnbc.com/2021/01/02/studios-experiment-with-release-models-what-that-means-for-film-piracy.html>

Heading into 2021, piracy experts told CNBC that they have theories about how pirates will react to these different models, but aren't entirely sure what will happen.

This article provides an overview of thoughts about the ways that piracy will change as the practices of film studios adapt to the COVID-19 pandemic and its impact on the entertainment industry overall. The experts quoted provide some interesting opinions on the ways that piracy rates and practices may evolve in tandem with changes in the release models of movies to online streaming platforms in lieu of theatrical releases.

(Pouwelse et al., 2005). In fact, one of the most popular resources in the torrent community is **The Pirate Bay** (TPB), which maintains indexed torrent files for music, software, video games, and new-release movies. The group operates out of Sweden and has been in existence for years despite being raided by police and having three of its key operators convicted of copyright law violations requiring one year in jail and millions of dollars in fines (Nhan, 2013). As a result, torrents appear to be the latest file-sharing mechanism available to pirates, though this may change in the next few years with innovations in technology as a whole (see **Box 5.3** for detail).

To that end, a few trends have emerged in piracy practices based on the proliferation of high-speed internet connectivity and streaming media consumption. First, many pirates are now actively encouraged to use **virtual private networks (VPNs)** when seeking to download torrent files. A VPN is a tool individuals can use to hide their IP address and physical details, as the VPN becomes the front-facing IP address that would be logged whenever an individual connects to a torrent client to access files (Holt & Copes, 2010). Such a strategy helps to minimize a pirate's risk of detection or potential sanction by

service providers because their personal information cannot be readily identified (Maxwell, 2013).

Second, the use of streaming media services like Netflix, Hulu, and other applications has become extremely popular, and a standard way to consume television and film content. Interestingly, there is some evidence that pirates are now streaming pirated content to consume it rather than downloading it and viewing it off-line (MUSO, 2020). A 2018 report from the MUSO corporation found that 53.2 billion visits to film and television piracy sites were to streaming sites in 2017. In addition, mobile devices are being increasingly used to identify and pirate materials that present a change in piracy behaviors generally (MUSO, 2020). Thus, it is necessary to constantly monitor the practices of pirates as they continue to change their methods due to shifts in entertainment consumption habits and technology.

## The Subculture of Piracy

The digital piracy subculture has clear similarities and overlap with the hacker subculture discussed in [Chapter 3](#). A hierarchy exists within the digital piracy subculture in which members can gain respect based on their skills and ability to create and share files with others (Holt & Copes, 2010; Steinmetz & Tunnell, 2013). Pirates who have a higher upload-to-download ratio, meaning that they share more digital files than they receive from others, are viewed with more respect as contributing members of the subculture (Steinmetz & Tunnell, 2013). Since true members of the digital piracy subculture believe that information and knowledge is supposed to be free, pirates who attempt to profit from selling digital files to others are condemned and are seen as antithetical to this foundational premise of the subculture (Holt & Copes, 2010).

Persistent pirates appear to develop large collections of media or content in order to have complete discographies or works by an artist or television show (Cooper & Harrison, 2001; Downing, 2011). As a result, those pirates who can share unusual or exotic materials with others are able to generate status within the subculture. Their ability to distribute these materials allows them to develop a reputation for file sharing that leads to respect from both casual and persistent pirates (Cooper & Harrison, 2001; Downing, 2011). The desire for exotic materials may have influenced TPB's decision to continue to host torrent files that had fewer than ten people sharing it, despite no longer hosting torrent files generally in February 2012. The operators indicated that they wanted to keep content available to all regardless of the

form of torrent software they used, while also keeping their own costs down (Van Der Sar, 2012).

Digital pirates, like hackers, can also gain respect in the subculture through their knowledge and skills. Digital pirates must have the knowledge to be able to discern legitimate digital files from “poisoned” files (i.e., files that the music or movie industry contaminate with malicious software) before downloading and sharing files with others. Not being able to distinguish between these types of files will lead to ostracism in the subculture (Holt & Copes, 2010), similar to how script kiddies are treated within the hacker subculture. Similarly, pirates who are able to remove the DRM protections that producers have attached to digital files, and share those products freely with others, have a higher status within the subculture (Steinmetz & Tunnell, 2013). The successful removal of these protections for a highly coveted digital file provides the pirate clear evidence to other members in the subculture of their skills, knowledge, effort, and dedication to the subculture, similar to a successful hack in the hacker subculture.

Within the existing research on piracy, there are specific justifications that pirates use to support their behaviors, regardless of the materials they acquire. One of the most common beliefs of the digital piracy subculture is denying any injury occurs to corporations or individuals as a result of their piracy. Most pirates view digital piracy as a victimless crime in which no one is hurt (Hashim et al., 2018). They argue that piracy involves copying a digital file and does not deprive the owner of the original file or work (Yu, 2010). They therefore view pirating media as something much different than the stealing of physical copies of media via shoplifting and theft (Holt & Copes, 2010). Thus, they are not ignoring the harm that is being caused; they reject the idea that they are causing any harm (Brown, 2016).

Pirates often also believe that media corporations should not be viewed as “victims” of digital piracy because of the pirates’ perceptions of the high prices of movies, music, software, and video games as a result of greedy corporate practices (Holt & Copes, 2010; Steinmetz & Tunnell, 2013). Pirates may simply argue that they could not afford to pay those perceived high prices. Pirates often also argue that piracy cannot be that wrong if almost everyone, especially those in their age group, appear to be pirating music and movies (Smallridge & Roberts, 2013). Even if they thought that pirating was inappropriate, they may feel that it is unfair that they have to pay for these forms of entertainment if everyone else is getting them for free. Some pirates may also simply claim that they did not know that what they were doing was illegal (Steinmetz & Tunnell, 2013).

The benefits of piracy are quite high as a person can obtain what they want with no cost and minimal risk of detection. The immediate material benefits

also facilitate larger individual interests in certain artists, genres, or gaming systems. For instance, media pirates report that they might download a single episode of a television show or piece of music to determine if they might enjoy the product, a technique or belief sometimes referred to as “Claim of Future Patronage” (Holt & Copes, 2010; Smallridge & Roberts, 2013; Steinmetz & Tunnell, 2013). If they find it entertaining, then they may actually buy the full season of that show or pay for other music by an artist so that they can enjoy the product in a better format. Similarly, individuals who pirate older video games indicate that their downloading helps to maintain their interest in older consoles and gaming systems (Downing, 2011). In fact, Downing (2011) argues that video game piracy may be a consequence of the general success and popularity of video games rather than a source of market failures.

At the same time, there are certain risks that arise as a consequence of engaging in piracy that cannot be ignored. There are clear legal risks that may come from violating copyright laws, such as fines or potential arrests depending on the depth of one’s involvement in piracy. The decision-making processes of pirates, however, do not appear to be impacted by the deterrent influence of legal sanctions (Al-Rafee & Cronan, 2006; Gillespie, 2006; Gunter, 2009; Holt & Copes, 2010). This is clearly evident in the continuous attempts to take down TPB and other torrent groups. Most all of these sites, particularly TPB, persist, which suggests that they can withstand any attempt to remove pirated content from the Internet.

Similarly, a persistent pirate noted: “I think the govt/companies pick people to make an example out of them … I think they take someone who they know cannot pay for it or is a regular person and try to make an example out of them to scare people” (Holt & Copes, 2010, p. 638). In fact, most individuals are able to justify their piracy based on the notion that they do not otherwise shoplift or steal CDs, software, and games from bricks-and-mortar stores. For instance, one individual involved in gaming piracy suggested, “Piracy is not Theft. It’s piracy” (Downing, 2011, p. 765). Thus, the subculture of piracy appears to support and justify these behaviors in a variety of ways.

## The Evolution of Legislation to Deal with Intellectual Property Theft

Though digital piracy is a recent phenomenon, the larger issue of protection for intellectual property is quite old. In fact, there have been laws pertaining to copyright in existence in England since the mid-1600s. These laws were primarily

designed to restrict the ability to reproduce materials at a time when printed type and the ability to read were still highly restricted to the wealthy classes. As technologies related to printing, recording, and photography evolved, so too did laws pertaining to the ownership and management of intellectual property.

### Berne Convention

The recognition of a need for consistent international protections for intellectual property came to the fore in the late 1800s. At that time, copyright protections were only afforded in the nation where they were published. A book published in France could be copied and sold in other countries with no concern for either the existing copyright or the author. This was particularly important because of the differences in the Anglo-Saxon concept of “copyright” which focused on economic issues with the French concern of the “right of the author.” Thus, nations became concerned about the ways that intellectual property would be handled and protected internationally. These concerns led to an international agreement on copyright laws at the **Berne Convention for the Protection of Literary and Artistic Works**, also known as the Berne Convention, in Berne, Switzerland in 1886. The original signees of the Berne Convention were the United Kingdom (although much of it was not implemented in the United Kingdom until the passage of the Copyright, Designs and Patents Act of 1988), France, Belgium, Germany, Italy, Spain, Switzerland, Haiti, Liberia, and Tunisia (WIPO, 2021a).

In addition to the important copyright agreements discussed below, the Berne Convention set up bureaus to handle various administrative tasks and to develop protections and frameworks for intellectual property. Two of these bureaus merged and became the United International Bureaux for the Protection of Intellectual Property, which later became the **World Intellectual Property Organization (WIPO)** in 1967 (WIPO, 2021b). In 1974, WIPO was integrated as an organization within the United Nations. Today, the WIPO has 193 nation members. It is a self-funding agency of the United Nations that provides a “global forum for intellectual property services, policy, information and cooperation” (WIPO, 2021b). Their mission is “to lead the development of a balanced and effective international IP (intellectual property) system that enables innovation and creativity for the benefit of all” (WIPO, 2021b).

The Berne Convention’s primary focus was to protect authors’ works and rights by ensuring that copyright laws of one nation were recognized and applied in other places (WIPO, 2021a). It accomplished this by focusing on three basic

principles. The first principle is the principle of national treatment, which states that works created in any of the signatory nations must be provided the same protection as that of works originating in that nation. Second, the principle of automatic protection states that protection must not be conditioned upon compliance with any formality. This means that works are automatically protected when they are “fixed,” or recorded on a physical medium, and that authors must not be required to register their work. Third, the principle of independence of protection holds that protection is independent of any existence of protection in the work’s country of origin (WIPO, 2021a).

In addition, the Berne Convention provided the minimum standard of protection that must exist to protect authors’ works and rights. For instance, Article 2(1) of the Convention holds that protections have to be made for all works, including “every production in the literary, scientific and artistic domain, whatever the mode or form of its expression.” In addition, the following rights were recognized as exclusive rights of authorization: (1) the right to translate; (2) the right to make adaptations and arrangements of the work; (3) the right to perform in public dramatic, dramatico-musical and musical works; (4) the right to recite literary work in public; (5) the right to communicate to the public the performance of such works; (6) the right to broadcast; and (7) the right to use the work as a basis for an audiovisual work, and the right to reproduce, distribute, perform in public, or communicate to the public that audiovisual work. Finally, the Convention provided for “moral rights,” meaning that authors have the right to claim ownership of their work and object to any action that may be considered prejudicial to the author’s reputation (WIPO, 2021a).

The Berne Convention also clarified the duration of the copyright protection. For most works, the general rule is that protections must be granted until 50 years after the author’s death. There are several exceptions. For example, anonymous work is protected for 50 years after the work was lawfully made available to the public unless the author’s identity becomes known, in which case the general rule would apply. Audiovisual work must be protected for a minimum of 50 years after being made available to the public, or if never released, 50 years after being created. Applied art and photographic works must be protected for a minimum of 25 years after the work was created (WIPO, 2021a). Finally, copyrighted work cannot be protected longer internationally than it is in the country of origin, referred to as the “rule of the shorter term.”

Although the Berne Convention concluded in 1886, it was later revised in 1896 in Paris and in 1908 in Berlin, finally being completed in Berne in 1914. The Convention continued to see many revisions and amendments over the

next century, as it was revised in 1928 (Rome), 1948 (Brussels), 1967 (Stockholm), and in 1971 (Paris), and amended in 1979. The Appendix to the Paris Act of the Convention importantly allowed developing countries to translate and reproduce works in certain cases connected to education (WIPO, 2021a).

As of the end of 2020, 177 nations were parties to the Berne Convention (WIPO, 2021c). The large number of nations who are parties to the Berne Convention is a result of all World Trade Organization nation members needing to accept almost all of the conditions of the Berne Convention under the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement). They are not bound to the moral rights provisions of the Convention (WIPO, 2021a).

The United States, however, did not enter into force in the Berne Convention until 1989. The United States' primary concerns with ratifying the treaty were its reluctance to change its copyright laws which require copyright works to be registered. The United States had instead ratified other Conventions throughout the 20th century, such as the Universal Copyright Convention in 1952, to address some of the other issues regarding copyrights. Even with the United States ratifying the Berne Convention, citizens who create a work that they want to be protected in US courts have to obtain a copyright within the United States to ensure they receive equal protection under the law. For instance, if a US citizen or organization develops intellectual property and feels that their idea has been infringed upon, they cannot legally file suit unless they have received a copyright there (Brenner, 2011).

### **Copyright Act of 1976**

The United States has had criminal penalties for the infringement of protected intellectual property, however, since 1909 (Copyright Act of 1909). Interestingly, the United States also removed the power to prosecute copyright infringement cases from state courts in 1976 with the introduction of the revised **Copyright Act of 1976**, which introduced new criminal sanctions under Titles 17 and 18 of the US Criminal Code (Brenner, 2011). Currently, the most stringent legal statutes in the US pertaining to copyright infringement are contained under Title 17 of the US Criminal Code (506), which make it a federal crime for someone to willfully infringe an existing copyright for either commercial advantage, private gain, or by reproducing or distributing one or more copies of a copyrighted work with a value of more than \$1,000 in a 180-day period (Brenner, 2011). In fact, distributing or reproducing one or

more copyrighted works with a value of at least \$1,000 in a 180-day period can lead to misdemeanor charges. A felony charge requires that a person reproduce or distribute at least ten copies of one or more copyrighted works with a total value of more than \$2,500 within 180 days (Brenner, 2011). As such, persistent pirates would be more likely prosecuted with felony charges, such as the members of TPB.

This statute is commonly used to prosecute software piracy due to the high costs associated with certain forms of commercial software. For instance, popular design software programs like Photoshop or AutoCad can cost hundreds of dollars for a single copy. Thus, an individual who makes two copies of this program could easily be charged with a misdemeanor under this law. The low cost of music and movies makes it much more difficult to successfully prosecute an individual under these statutes due to the massive volume of materials they would have to reproduce.

## WIPO Copyright Treaty

Even with the multiple revisions to the Berne Convention over the 20th century, copyright owners did not feel that the Convention appropriately protected the rights of authors in a new digital age. Thus, the WIPO Copyright Treaty (WCT) was passed in 1996 and entered into force in 2002 to provide further copyright protections to two types of works: (1) computer programs; and (2) databases, or compilations or data or other material, in which the selection or arrangement of the contents constitute intellectual creations (WIPO, 2021d).

The WCT also granted three additional rights to authors: (1) distribution; (2) rental; and (3) communication to the public. The right of distribution includes the authorization to make available to the public the original and copies of the work through either sale or transfer of ownership. The right of rental provides authorization for the owner to rent to the public the original and copies of computer programs, cinematographic work, and works embodied in phonograms. The right of communication to the public includes the right to authorize any communication to the public, regardless of it being wired or not, to allow the public access to the work from any place at any time, such as on-demand and interactive services.

Consistent with the Berne Convention, the duration of these rights must be protected for at least 50 years for any work. The treaty also required the signatories to “provide legal remedies against the circumvention of technological measures (e.g., encryption) used by authors in connection with the exercise

of their rights, and against the removal or altering of information, such certain data that identify works or their authors, necessary for the management (e.g., licensing, collecting and distribution of royalties) of their rights ('rights management information')" (WIPO, 2021d). The WCT was implemented in the United States via the passage of the **Digital Millennium Copyright Act (DMCA)** and in the European Union (EU) by Decision 2000/278/EC, more specifically Directive 91/250/EC (covering software copyright protection), Directive 96/9/EC (database copyright protection), and Directive 2001/29/EC (prohibition of circumventing devices).

### ***US Legislation in the 1990s on Intellectual Property Theft***

Media conglomerates began to pressure the US Congress in the 1990s to change existing copyright laws and increase protections for intellectual property. Their efforts led to the creation of several laws including the **No Electronic Theft (NET) Act of 1997**, which increased the penalties for the duplication of copyrighted materials (Brenner, 2011). Specifically, this law revised the language of the copyright act to recognize infringement when an individual receives or expects to receive a copyrighted work, including through electronic means, regardless of whether they receive commercial or private financial gain. Until this point, criminal infringement had to involve some sort of economic advantage. Thus, the expected receipt of uploaded and/or downloaded copyrighted materials online was made illegal, making it possible to pursue individuals who acquired pirated materials through file sharing rather than paying for these items (Brenner, 2011). Additionally, these revisions introduced sanctions for the reproduction or distribution of one or more copies of "phonorecords," making it possible to legally pursue music piracy. Finally, the act increased the penalties for piracy to up to five years in prison and \$250,000 in fines and increased the statutory damages that copyright holders could receive.

Shortly after the adoption of the NET act, the US Congress also approved the DMCA in 1998 (Brenner, 2011). This law was designed to directly affect media piracy online through further revisions to the Copyright Act. Specifically, this law extended protection to various music and performances that have been recorded in some fashion. The second section under this title added section 1201 to the Copyright Act, making it illegal to circumvent any protective technologies placed on copyrighted works, and section 1202 making it illegal to tamper with copyright management software or protections (Brenner, 2011).

While this law was intended to apply to computer software, it can be extended to DVDs and music with protections on the disc that provide a modicum of protection from infringement or copy. Criminal sanctions for these behaviors were also added under section 1204 of the Copyright Act.

Title II of the DMCA is titled the *Online Copyright Infringement Liability Limitation Act*, which gives extended protections to ISPs against copyright infringement liability (Brenner, 2011). In order to qualify for these protections, ISPs must block access to infringing materials or remove them from their systems once a complaint is received from a copyright holder or their agent. This Title also enables copyright holders to subpoena ISPs for the IP addresses, names, and home addresses of customers who have engaged in the distribution of copyrighted materials (Brenner, 2011). These changes enabled copyright holders to pursue civil or criminal suits against those sharing pirated materials with others, rather than the services making it possible to engage in file sharing overall.

## ***European Directives***

While US laws may seem particularly punitive, European legislation is equally punitive in some cases. For instance, the EU also has a series of directives designed to protect intellectual property in various forms. **European Directive 91/250/EEC/2009/24/EC** provides legal protection for computer programs and harmonized copyright protection across the EU. This Directive was first implemented in 1991 and afforded copyright protection to computer programs in the same way as literary works, like books or poems. The Directive also gives the copyright owner the right to temporary or permanent copying of the program, any translations of the program, or the right to distribute it by any means. The life of the copyright extends for the lifetime of the software creator plus 50 years, though it has been extended to 70 years through a subsequent directive in 2009. This Directive also provides the person purchasing software the right to back up the software for their personal use, though they must have a license for the program itself. Similar protections are also afforded to databases of distinct information under Directive 96/9/EC.

Additionally, **European Directive 2001/29/EC**, or the Copyright Directive, establishes guidelines concerning the adequate legal protection of copyrighted materials through technological means. This Directive defines rights to copyright holders, including the right to reproduce their materials, and make them available to the public through publication and transmission of products over the Internet, including music, media, and software. This Directive also

requires all Member States to provide legal protections against attempts to circumvent technologies that prevent copying of intellectual property and databases. Additionally, Member States must provide protection against products and services designed to circumvent protective measures on intellectual property for illegal purposes or limited commercial goals. As a result of this language, this Directive is more stringent than the US DMCA.

### ***Additional US Legislation Protecting Trademarks and Patents***

There are two additional pieces of US legislation that can be used to affect the illegal acquisition or use of intellectual property protected by trademarks or patents. The **Lanham (Trademark) Act** (15 U.S.C. 1127), created in 1946, introduced legal protections for trademarked products by making it illegal to use counterfeit trademarks on a product or use language suggesting that a product is associated with an existing trademark (Kerr, 2018). The intent of the law was to minimize any confusion consumers may have when viewing trademarks on products. For instance, a company could utilize similar imagery or language in their product branding and attempt to confuse consumers into thinking they are somehow related to a more famous trademarked brand's products (Kerr, 2018). Such actions could also drain a trademark holder of its share of a product market because competitors are impugning or harming their famous trademark.

There are two conditions to this law. First, the trademark must be in use in commercial settings. Second, it must be distinctive so as to be readily associated with a specific product in the public eye (Kerr, 2018). This law provides civil options for the trademark holder, including ex parte seizure of all the goods used by the offender to produce materials. In addition, trademark holders are entitled to have their attorney fees paid by the offender, as well as receive economic damages including all profits made by the offender or an amount equal to three times the overall harms the holder experienced.

Additionally, the Lanham Act led to the creation of the **Trademark Counterfeiting Act of 1984** as a means to provide criminal penalties for unauthorized use of, or creation of, counterfeit trademarks (Kerr, 2018). Specifically, this law makes it illegal to sell or attempt to sell a product with a counterfeit mark, which was defined as:

a spurious mark and spurious designations (1) used in connection with trafficking in goods or services (2) identical with, or substantially indistinguishable

from, a mark registered for those goods and services on the United States Patent and Trademark Office's Principal Register (whether or not the defendant knew the mark was registered) and in use and (3) the use of which is likely to deceive, confuse, or cause mistake on the part of the consuming public.

As a result, attempting to sell a product that knowingly featured labels, branding, or tags that resemble an existing trademark became illegal through this law. The penalty for a first offense includes incarceration of up to ten years, as well as a fine of between \$2 million for individuals and \$5 million for corporate offenders (Kerr, 2018). Repeat offenders could be imprisoned for up to 20 years and pay a fine of \$5 million, while corporations could pay up to \$15 million. Additionally, individuals who produce counterfeit medications or pharmaceuticals would receive the maximum penalty under the statute.

Second, the **Economic Espionage Act of 1996** criminalized the theft or misappropriation of trade secrets on behalf of another party (18 U.S.C. 1831) or a foreign power (18 U.S.C., 1832). Violations where the party is accused of knowingly stealing secrets, or intending to do so in order to aid a nation-state, have criminal penalties of as much as 15 years in prison and up to \$500,000 per offense for individuals. Companies that engage in such behaviors can be fined up to \$10 million (Kerr, 2018).

Should an individual acquire trade secrets involving products that are available in domestic or foreign commercial markets to harm the secret holder, they could be imprisoned for up to ten years. Organizations or companies that engage in such behaviors can be fined up to \$5 million. Additionally, this law allows the government to seize physical assets related to the offense and all profits made by the offenders, and pursue civil proceedings on its own behalf to seek damages against the parties involved. This act was amended through the **Defend Trade Secrets Act (DTSA) of 2016** to allow trade secret holders to sue offenders in federal court (Goldman, 2016). Additionally, the DTSA allows companies to engage in the seizure of materials related to the stolen secrets in the defendant's possession. This process can occur *ex parte*, meaning without notice to the defendant.

Similar provisions are available at the state level in the United States through the **Uniform Trade Secrets Act, or UTSA** (Kerr, 2018). This act was initially produced in 1979 as a means to harmonize the ways that trade secrets could be handled across all the states. It was later amended in 1985. Until this time, each state had taken its own approach to the theft of trade secrets, leading to discrepancies in enforcement, particularly for companies that had locations in multiple

states (Kerr, 2018). This Act essentially created consistent language regarding the ways that a secret may be criminally obtained and misused (Kerr, 2018). First, the act provided language related to the ways that the theft occurred, whether through physical or electronic means. Additionally, the act provided opportunities for the aggrieved party to seek an injunction against any further actions by the defendant on the basis that it may cause further harm to the secret holder. Additionally, the Act allows victims to seek economic damages and receive attorneys' fees from the defendant in the case (Kerr, 2018). As of today, 48 states have adopted this legislation, excluding New York and North Carolina, as well as the District of Columbia, the Virgin Islands and Puerto Rico.

### The Law Enforcement and Industry Response

Though there are myriad laws designed to protect intellectual property, there are relatively few law enforcement agencies that pursue cases against those who engage in either piracy or intellectual property crimes. For instance, the United States removed the power to prosecute copyright infringement cases from state courts in 1976 with the introduction of the revised **Copyright Act of 1976** (Brenner, 2011). As a result, the **Federal Bureau of Investigation (FBI)** tends to prosecute active investigations involving intellectual property rights violations (Federal Bureau of Investigation [FBI], 2020). Not only has the FBI actively disrupted piracy groups (Nhan, 2013), but they now also respond to offenses that affect trade secrets and counterfeiting that affect the public's health and safety. In particular, the FBI now operates an **Intellectual Property Theft/Piracy** group that engages in criminal investigations involving counterfeit pharmaceuticals, auto parts, electronics, and other equipment that could cause harm if it fails (Federal Bureau of Investigation [FBI], 2020).



**For more on the FBI and its enforcement of intellectual property theft and piracy, go online to:** <https://www.fbi.gov/investigate/white-collar-crime/piracy-ip-theft>

The FBI also coordinates responses with the Department of Homeland Security through its **Global Trade Investigations Division** (NIPRCC, 2020). This division breaks into three structures, the first of which is the **National Intellectual Property Rights Coordination Center (NIPRCC)**, which is designed to coordinate the response to intellectual property crimes across

the US federal government, as well as work in concert with Interpol, Europol, and the Canadian and Mexican governments (NIPRCC, 2020). Second, the **Counter-Proliferation Investigations (CPI) Unit** focuses on keeping criminals, terrorists, and nation-states from obtaining sensitive military and technological secrets and equipment, including weapons of mass destruction. Finally, the **Export Enforcement Coordination Center (E2C2)** acts as an intelligence collection and dissemination arm to improve the quantity of information available on issues associated with IP violations (NIPRCC, 2020).

This structure is thought to be an essential way to produce an improvement in the way that investigations occur and increase the number of successful prosecutions for violations. To that end, many different government agencies can play a role in helping to enforce IP law, including the **Bureaus of Customs and Border Patrol (CBP), Immigration and Customs Enforcement (ICE), the United States Postal Inspection Service (USPIS), and the Food and Drug Administration (FDA) Office of Criminal Investigations (OCI)** (NIPRCC, 2020). These agencies all investigate and seize goods that infringe upon existing intellectual property rights. This includes physical transportation of counterfeit products, as well as digital transfers of pirated goods, as individuals who attempt to bring these materials from outside servers onto their home computer are technically importing pirated goods (Haberman, 2010).

Similarly, the City of London Police operates the **Police Intellectual Property Crime Unit (PIPCU)** in order to investigate and handle various forms of intellectual property theft (City of London, 2021). This unit works as an independent group designed to handle serious forms of intellectual property crime, including counterfeit products and pirated materials on and offline. It operates with the National Crime Agency (NCA) (see [Chapter 3](#)), various international enforcement, and industry agencies and serves as a hub for investigations to disrupt organized piracy and fraud. The PIPCU also develops strategies to deter and reduce the sale of counterfeit goods broadly (City of London, 2021).

One of the greatest challenges law enforcement agencies face in dealing with intellectual property laws is the fact that it is exceedingly difficult for intellectual property owners to identify when and how their materials are shared illegally. Copyright holders must scour sites across the globe in order to locate distribution networks and participants. As a consequence, industry groups play a more prominent role in the enforcement of intellectual property rights. They manage and promote the interests of major corporations and copyright holders within their country, and internationally as well. For instance, the **Recording Industry Association of America (RIAA)** is a trade organization that supports the

recording industry and those businesses that create, manufacture, or distribute legally sold and recorded music within the United States. The group was founded in 1952, helped define standards related to music production, and is a broker for the collective rights management of sound recordings. In fact, its stated goals are to (1) protect intellectual property rights and the First Amendment rights of artists; (2) perform research about the music industry; and (3) monitor and review relevant laws, regulations, and policies. Currently the RIAA represents over 1,600 recording companies and other industries, such as Sony Music Entertainment and Warner Music Group (Brenner, 2011).



**For more information on the various industry bodies protecting intellectual property, go online to:**

[www.iprcenter.gov](http://www.iprcenter.gov)

There are many other groups, such as the **Motion Picture Association of America (MPAA)**, that operate to protect the intellectual property of their artists and creative producers. In the United Kingdom, the **Federation Against Copyright Theft (FACT)** is the primary trade organization dedicated to the protection and management of intellectual property, notably those of film and television producers. The group was established in 1983 and is actively engaged with law enforcement to combat piracy. For instance, FACT regularly works with the UK police to take down piracy websites and sue groups engaged in the distribution or facilitation of digital piracy (FACT, 2013). They also work in conjunction with the **Australian FACT (AFACT)**, which targets pirates in the Australia and Oceania generally (AFACT, 2013). Similarly, the **Indian Music Industry (IMI)** represents recording industry distributors and producers across the nation (IMI, 2016).

All of these entities work in concert to pursue and protect their economic and intellectual interests. This is a substantive challenge in the current international landscape as the laws of one country governing intellectual property may be entirely different than those of another nation. Consider TPB, the aforementioned group central in the distribution of torrent files, which was founded in Sweden in 2003. Though the members assumed they would be safe from law enforcement efforts, several of their homes were raided and they were prosecuted by Swedish and US law enforcement for facilitating the

distribution of pirated materials. In an attempt to avoid future incidents, the group attempted to purchase Sealand, a micro-island off the coast of England. The group raised \$25,000 in donations to facilitate this endeavor, operating under the assumption that they could turn the island into a safe haven for pirated materials. This attempt was unsuccessful, as the government of Sealand felt that the group was only going to violate international laws. Their efforts, however, demonstrate the extent to which piracy groups are organizing and attempting to avoid legal efforts.

The recording industry also pursues civil suits against various individuals and businesses for their role in the facilitation of piracy. For instance, the music industry sued the file-sharing service Napster over their role in the distribution of pirated materials, which led to an out of court settlement and the shuttering of Napster as a free service. The recording industry also began to sue individual pirates for their downloading behaviors, which often involved hundreds of thousands of dollars in fines against the pirates. This tactic, however, has been largely abandoned in favor of tracking file-sharing programs to detect torrent seeders. In turn, they work with ISPs to send cease and desist letters in order to help slow down the volume of pirated materials traded online. In fact, the RIAA and FACT began to distribute letters to Internet users who were thought to have engaged in illegal file sharing to demand payment in settlement for their copyright violations (Nhan, 2013). This tactic was thought to be a way to directly reduce the legal costs these entities incurred as a result of pursuing settlements against file sharing.

Other nations have pursued options to directly limit individuals' access to pirated content online. For instance, India began to allow ISPs to block access to websites where individuals could acquire pirated media beginning in 2011 (ONI, 2012). The blocks were often selective and developed on the basis of so-called John Doe orders, where an entity could claim that unknown individuals would cause harm to their intellectual property or copyright (Anwer, 2016). The identification of sites was also questionable as they were developed by attorneys working for industry groups such as the IMI. As a result, entire sites would be blocked, not just a single URL where content could be identified. They were not also enforced across all ISPs causing gaps in enforcement.

In 2012, the Madras High Court ordered that only specific URLs could be blocked and not entire web sites in an attempt to minimize free use of the Internet by citizens. This was challenged, however, by a 2014 request from Sony Entertainment which ordered the court to allow fully blocking of various file sharing and hosting sites that could enable the distribution of pirated material.

The court ruled in favor of Sony and eventually allowed 219 sites to be blocked entirely. In 2015, the IMI group was able to successfully argue that ISPs across the nation block access to sites that enable media piracy (Collier, 2015). The Delhi High Court instructed all of the ISPs in the nation to block users from accessing 104 different websites identified by the IMI as a source for pirated content (Collier, 2015). If an individual attempted to access such a site via their web browser, they would see the following message:

This URL has been blocked under the instructions of the Competent Government Authority or in compliance with the orders of a Court of competent jurisdiction. Viewing, downloading, exhibiting or duplicating an illicit copy of the contents under this URL is punishable as an offence under the laws of India, including but not limited to under Sections 63, 63-A, 65 and 65-A of the Copyright Act, 1957 which prescribe imprisonment for 3 years and also fine of up to Rs. 3,00,000/-. Any person aggrieved by any such blocking of this URL may contact at urlblock [at] tatacommunications [dot] com who will, within 48 hours, provide you the details of relevant proceedings under which you can approach the relevant High Court or Authority for redressal of your grievance

There has been substantive criticism of this strategy across India for numerous reasons.

Specifically, the basis for blocking may include something as simple as the appearance of the name of a piece of copyrighted material in the URL (Anwer, 2016). In the case of full site blocks, the list could extend beyond traditional illegal file sharing sites like TPB and include sites like Google. Should an individual receive an alert message that content has been blocked due to potential pirated material, it may not be because they were actually attempting to access illegal content. Telling the person that they could be arrested may be useful information but is also a relatively empty threat due to the difficulty of prosecuting the individual (Anwer, 2016). Furthermore, a person could easily use proxy services, such as Tor, in order to mask their physical location and gain access to pirated content. Thus, blocking content from Internet users is a somewhat questionable tactic to affect piracy rates. See [Box 5.4](#) for more details.

The recording and media industries have also employed unique extralegal attempts to affect piracy networks. For instance, some private companies have been hired to disrupt file-sharing processes by “poisoning” torrent files to either corrupt content, identify the downloaders, or disrupt P2P networks generally

## Box 5.4 Digital Piracy in India

### Torrent Downloads: Fiasco Over Three-Year Jail Term Shows Absurdity of India's John Doe Orders

<http://indiatoday.intoday.in/technology/story/the-3-years-jail-fiasco-for-torrents-shows-absurdity-of-indias-john-doe-orders/1/745886.html>



So, can you land up in jail for viewing a torrent site in India or not? Yesterday, IndiaToday. In reported that you may get a jail term as well as may have to pay a fine of Rs 3,000,000 if you visit a blocked URL, including a torrent site. Today, you must have seen reports that no, you won't be jailed just because you visit a torrent site ...

This article provides an overview of the issues present in India's decision to block pirated content, and the questionable legal grounds on which potential offenders may stand.

(Kresten, 2012). Some of the more common methods involve attempting to share a corrupted version of a piece of music or media to deter users from downloading the file or making it more difficult to identify the actual content. Alternatively, some companies such as MediaDefender will attempt to share a file that attempts to download content from nonexistent peers or false sites in order to deter offenders (Kresten, 2012).

More extreme measures have been employed by various companies in order to disrupt P2P sharing groups. In 2010, multiple Indian film studios hired the company Aiplex Software to engage in DDoS attacks against websites like TPB that would not respond to takedown notices to remove pirated movies they produced (Whitney, 2010). These tactics were largely ineffectual at disrupting piracy networks and actually led to a backlash by members of both the piracy and hacker subculture (Whitney, 2010). Members of the group Anonymous engaged in a number of Denial of Service attacks against recording artists, companies, and the RIAA website in order to protest their efforts to stop piracy (Whitney, 2010). The attack, referred to as Operation Payback, effectively knocked critical websites offline and slowed email traffic, making it difficult for these groups to engage in regular commerce (Nhan, 2013). As a result, there has been a reduction in the use of these extralegal methods by the recording industry to avoid further embarrassment.

## Summary

Taken as a whole, the problem of piracy and intellectual property theft is extremely complicated. Individuals interested in obtaining copyright-protected materials without paying for them have had a variety of ways to acquire these goods, though it has become increasingly easy to acquire pirated materials over the last two decades. The emergence of the Internet and digital media has made it easy for individuals to share media, though pirates have subverted these technologies to share copyrighted files. Additionally, technological innovations have made it easier for individuals, corporations, and nation-states to engage in the theft of sensitive information and trade secrets that can severely impact the economic competitiveness of another nation.

As a consequence, it is extremely challenging to affect the rates of these offenses through traditional measures such as lawsuits or arrests. As copyright holders continuously adapt legal strategies to deter pirates, the piracy subculture is increasingly vocal about their right to have access to digital media of all sorts. Similarly, nation states have become even more adept at surreptitiously gaining access to sensitive information to reduce their own investments and labor to compete in open markets. These tensions cannot be easily solved, especially as technologies that increasingly provide access to digital materials, such as the Kindle, rise in popularity. Therefore, the criminal justice response to intellectual property violations will continue to evolve over the next decade.

## Key Terms

- Australian Federation Against Copyright Theft (AFACT)
- Berne Convention for the Protection of Literary and Artistic Works
- Bit Torrent
- Bureau of Customs and Border Patrol (CBP)
- Copyright
- Copyright Act of 1976
- Copyright laws
- Counter Proliferation Investigations (CPI) Unit
- Defend Trade Secrets Act (DTSA) of 2016
- Digital Millennium Copyright Act (DMCA)
- Digital piracy

Economic Espionage Act of 1996  
European Union Directive 91/250/EEC/2009/24/EC  
European Union Directive 2001/29/EC  
Export Enforcement Coordination Center (E2C2)  
Federation Against Copyright Theft (FACT)  
Federal Bureau of Investigation (FBI)  
Intellectual Property Theft/Piracy Division  
File sharing  
Food and Drug Administration (FDA) Office of Criminal Investigations (OCI)  
Global Trade Investigations Division  
Immigration and Customs Enforcement (ICE)  
Indian Music Industry (IMI)  
Intellectual property  
Lanham Act  
Motion Picture Association of America (MPAA)  
MP3 format  
Napster  
National Intellectual Property Rights Coordination Center (NIPRCC)  
No Electronic Theft (NET) Act of 1997  
Patent  
Peer-to-peer (P2P) file-sharing protocols  
The Pirate Bay  
Police Intellectual Property Crime Unit (PIPCU)  
Recording Industry Association of America (RIAA)  
Torrent  
Torrent Client  
Trademark  
Trademark Counterfeiting Act of 1984  
Trade Secret  
Uniform Trade Secrets Act (UTSA)  
United States Postal Inspection Service (USPIS)  
Virtual Private Network (VPN)  
Warez  
Warez doodz  
World Intellectual Property Organization (WIPO)

## Discussion Questions

1. What are your thoughts on digital piracy? Do you think there is a victim involved in intellectual property theft?
2. Consider how the evolution in technology has influenced how you watch movies and listen to music. Think about how it must have been to listen to music on vinyl records or watch movies on tapes. Would holding a physical object, such as a record or cassette tape, affect your views on digital piracy?
3. How different is digital piracy from traditional theft?
4. Have you considered digital piracy as being intellectual property theft before reading this chapter?
5. Considering that hackers are always one step ahead of the cybersecurity industry, how should private companies effectively protect their intellectual property?

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Chapter

6

# ONLINE **FRAUD**

## Chapter Goals

- Understand the definitions of fraud and identity theft
- Identify how and why fraudsters have adapted to online environments
- Explain the various forms of email-based fraud currently circulating
- Know the laws pertaining to fraud and cyber-based theft
- Recognize the agencies responsible for the investigation of fraud

## Introduction

When many people discuss the benefits of computer technology and the Internet, they may identify the ease with which these resources allow us to shop and manage our personal finances. Consumers can now acquire virtually any item from anywhere in the world through major online retailers, like Amazon, or directly from other consumers via eBay and craigslist. In the United States, the total estimated sales from online retailers in 2021 was \$870.8 billion (U.S. Department of Commerce, 2022). With the rise of COVID-19 infections around the world, 41 percent of respondents in a global survey indicated they shopped daily or weekly with their mobile or smartphone as a tool to shop in light of limited physical shopping options, compared with 12 percent five years ago (PwC, 2021). Much of this expansion stems from the belief that consumers can shop safely, save money, and actively research products and price points by purchasing goods through online retailers (Wilson, 2011). At the same time, consumers often increase the size of their orders and spend more to get the benefit of free shipping (Mintel, 2015). Thus, there has been a significant increase in the use of websites and online auction houses to identify goods and services at lower price points than are otherwise available in bricks-and-mortar stores.



**For more information on consumer shopping trends, go online to:**  
<https://www.pwc.com/gx/en/industries/consumer-markets/consumer-insights-survey.html>

Consumers also depend on the safety and security of online retailers to manage their financial data. Services like Amazon and iTunes store credit or

debit card information on file so that customers can pay for an item through a single click in order to minimize the processing time required to pay for a product. Others use third-party payment systems like PayPal to send and receive payments for services rendered. While customers do not report consistent confidence in retailers' ability to manage their data, they are willing to forgive any breaches of their personal information if the company takes steps to mitigate threats if the information is lost (Narula et al., 2014). As a result, web-based financial transactions have become commonplace in the modern world.

The ability to access and buy goods anywhere at any time represents a revolution in commerce. The benefits of these technological achievements, however, are balanced by the increasing ease with which our personal information can be compromised. The paperless nature of many transactions means that we must now put our trust in companies to maintain the confidential nature of our financial data from hackers and data thieves. At the same time, consumers have to be vigilant against deceptive advertisements for products that are either too inexpensive or lucrative to miss.

In fact, one of the most commonly reported forms of cybercrime are forms of cyber-deception and theft, otherwise known as **fraud**. Though there are many definitions for fraud, one of the most commonly accepted involves the criminal acquisition of money or property from victims through the use of deception or cheating (Button & Cross, 2017). Various forms of fraud existed prior to the Internet and required some interaction between the victim and the offender, either through face-to-face meetings (Kitchens, 1993; Knutson, 1996) or telephone-based exchanges (Stevenson, 1998). As technology, such as email and web pages, became more popular, fraudsters began to adapt their schemes to suit online environments where less direct interaction with victims was necessary to draw in prospective targets. In fact, some forms of fraud require virtually no interaction with a victim, as criminals can now compromise databases of sensitive information in order to steal identities or hijack payment providers in order to illegally transfer funds (Ayyagari, 2020; Holt & Lampke, 2010; James, 2005).

**For more information on the role of hacks and fraudulent transactions using the international SWIFT transaction system, go online to:** <https://www.newyorker.com/magazine/2021/04/26/the-incredible-rise-of-north-koreas-hacking-army>



## Box 6.1 Twitter Promoting a Phishing Site

### Twitter Promoted a Tweet that Steals Your Credit Card Details



<https://www.thedailybeast.com/twitter-promoted-a-tweet-that-steals-your-credit-card-details>

After providing some basic information, the site then asks for a user's credit-card number, expiration date, security code, and billing address—likely enough information for a cybercriminal to then use those payment details elsewhere.

This article summarizes a recent problem with Twitter in which it was promoting a phishing site stealing personally identifiable information, such as credit card information and Twitter passwords.

The near ubiquity of technology has now afforded fraudsters multiple opportunities to obtain money or information from victims for various purposes. Fraudsters can utilize email, texts, instant messaging systems, Facebook, Twitter, and online retailing sites to capitalize on unsuspecting victims. Some offenders have even begun to track the behavior of certain groups of individuals to obtain sensitive information. For instance, teens and young adults have begun a dangerous habit of posting pictures of new drivers' licenses, passports, and credit/debit cards online to brag to friends (see Box 6.1 for details). In this case, the victims are providing their **personally identifiable information (PII)** to others freely, which can be used to engage in identity crimes with some ease. As a result, this presents an immediate and simple resource for fraud based solely on the poor personal security habits of users.

This chapter will provide an overview of the most common forms of fraud employed online, most notably those sent via email to wide audiences (see Chapter 17 for detail on the evolution of fraud due to COVID-19). The utility of e-commerce sites for the mass acquisition and theft of sensitive personal information for identity crimes will also be considered in detail. We will also consider the difficulty law enforcement agencies face in attempting to combat these crimes, due in part to their international scope.

## Fraud and Computer-Mediated Communications

When discussing online fraud, it is important to note that email and social media sites are a critical resource for fraudsters. Prior to the World Wide Web and Computer-Mediated Communications (CMCs), scammers had to depend on their ability to craft convincing stories, whether in person or through either phone-based or print scams in magazines and newspapers. These efforts required some degree of investment on the part of the scammer, as they had to develop and pay for an ad to be created or pay for bulk mail. In fact, some of the most well-known email scams today were previously run through handwritten letters in postal mail or faxes in the 1980s (United States Department of State, 1997).

The creation and proliferation of email and social media was a boon to scammers, as they could use this medium in order to access millions of prospective victims simultaneously for virtually no cost (Wall, 2004). The use of email is ubiquitous; many people have multiple accounts at their disposal for different purposes. Email is extremely simple to use, requires virtually no cost for users or senders, and allows the distribution of images, text, web links, and attachments. Similarly, individuals can hide behind various false profiles made on social media sites at no-cost using various content sourced from legitimate websites and user profiles. This enables a scammer to create convincing messages using branded, well-known images that can fool even the most careful of users. For instance, if individuals wanted to create an email that appeared to come from a bank, they could visit that institution's website to download the official logos and language posted in order to craft a more realistic message. They can also utilize HTML redirects that would not otherwise be noticed by a casual web user in order to make a more believable message.

In 2015, the Internet Crime Complaint Center (IC3) (2015) received 288,012 complaints of various forms of Internet fraud. Approximately 44 percent of these complaints reported losses of \$1 billion. Only four years later, the IC3 received 467,361 complaints leading to losses of an estimated \$3.5 billion (Internet Crime Complaint Center, 2020). Despite these estimates, it is unclear how many victims of various forms of online fraud report their experiences to law enforcement.

**For more information on fraud statistics, go online to:** <https://review42.com/resources/ecommerce-fraud-statistics/#:~:text=In%202018%2C%20the%20FTC%20registered,reports%20E2%80%93%20an%20increase%20from%202017.&text=%E2%80%93%20In%20fact%2C%20compared%20to%202010,internet%20sales%20fraud%20in%202018>



## Identity Theft

In addition to economic losses stemming from fraud, there is a tremendous threat posed by the loss of sensitive, **personally identified information (PII)**, or the unique identifiers individuals use in their daily lives (Posey et al., 2017). A range of personal details are considered PII, including names and birthdates, as well as government identification numbers assigned to you, like social security numbers, passport numbers, and drivers' license numbers. This information is inherently valuable since it serves as the basis for obtaining credit cards, mortgages, loans, and government assistance (Federal Trade Commission, 2021a). Criminals who obtain this information can use it to fraudulently apply for such services. Additionally, they may use this information to create fraudulent identification in order to conceal their identities or evade law enforcement.



**For more information on the value of your PII, go online to:**  
<https://www.lifelock.org/value-personal-info-much-identity-worth/>

The use of PII to engage in fraud or impersonation has led to a unique set of terms in the legal and academic fields: identity theft and fraud. These terms are often used interchangeably, though their use varies by place. In addition, there is no single definition for either term (Claugh, 2015; Copes & Vieraitis, 2009). There are, however, some consistencies in their meaning. One of the most widely recognized and accepted definitions of **identity theft** in the United States involves the unlawful use or possession of a means of identification of another person with the intent to commit, aid, or abet illegal activity (Allison et al., 2005; Copes & Vieraitis, 2009). The Bureau of Justice Statistics (BJS) defines identity theft as "the attempted or successful misuse of an existing account, such as a debit or credit card account, the misuse of personal information to open a new account or the misuse of personal information for other fraudulent purposes, such as obtaining government benefits or providing false information to police during a crime or traffic stop" (Harrell, 2014).

In Australia, India, and the United Kingdom, the term **identity fraud** is more commonly used to reference when someone else's personal information is used by another individual in order to obtain money, credit, goods, or services, and can be used to enable other forms of fraud, such as mortgage fraud (Button & Cross, 2017). In fact, this creates an interesting dichotomy: possession of PII without authorization from those persons is not illegal in the United Kingdom, though it is in the United States.

Over the last decade, evidence suggests identity crimes are increasing exponentially and cause substantive economic harm. In the first six months of 2020, the US Federal Trade Commission (2020) received 571,181 complaints of identity theft, comprising 31 percent of all complaints received. The majority of these complaints involved some type of credit card fraud (34 percent), though many also reported misuse of loan or lease information, government documents, and employment and tax related fraud.

The number of identity theft complaints made to the Federal Trade Commission (FTC) pales in comparison to the estimates of identity theft victimization in the United States. The BJS estimated that 26 million US residents, or approximately 10 percent of the US population over the age of 16, were the victims of identity theft in 2016 (Harrell, 2019). The BJS found that the most common form of identity theft victimization was the unauthorized misuse or attempted misuse of an existing account experienced by 25.95 million individuals. More specifically, 13.42 million individuals experienced credit card fraud, 11.95 million were victimized by bank account fraud, and 2.61 million were victims of other type of account fraud, such as telephone or insurance accounts (Harrell, 2019).

It should be noted that some individuals may have experienced multiple forms of victimization. In many cases, the victims only found out when a financial institution contacted them (in 47.6 percent of the incidents) or when noticing fraudulent charges on their accounts (18.7 percent of incidents; Harrell, 2019). Although two-thirds of identity theft victims reported direct financial losses, the average losses were \$850 which is higher than in previous years (Harrell, 2019). Additionally, only 7 percent of identity theft victims reported the incident to law enforcement. Rather, the majority (88 percent) reported the victimization to a credit card company or bank (Harrell, 2019).

Similarly, estimates from the United Kingdom vary depending on whether the figures are based on reporting or survey estimates. There were 364,643 identity fraud cases were reported in the United Kingdom in 2019, which was a 13 percent increase overall from 2018 (Cifas, 2021). It is thought that criminals were able to acquire more than £1.2 billion in funds via fraud within the United Kingdom during the same year (UK Finance, 2019). Evidence from India suggests that there has been a substantive increase in fraudulent applications for financial products in 2019. One estimate suggests that 40 percent of Indian consumers experienced some form of identity theft in 2019 (Mehta, 2020).

Given the scope of identity theft and fraud, it is important to note that criminals can obtain PII in two ways: *low-tech* and *high-tech* methods. Low-tech

identity theft can involve simple techniques such as taking personal information out of mailboxes and trash cans or during the commission of a robbery or burglary (Allison et al., 2005; Copes & Vieraitis, 2009). Offenders may also use high-tech methods via computers and/or the Internet to obtain personal information that is seemingly unprotected by the victim (Holt et al., 2016; Leukfeldt et al., 2017; Newman & Clarke, 2003).

It is not clear how many identity crimes stem from low- or high-tech means due to the fact that victims may not be able to identify when or how their identity was stolen (Harrell, 2014). Also, law enforcement and trade agencies are only beginning to measure the scope of identity crimes and capture this information effectively (Federal Trade Commission, 2021a; Harrell, 2014; National Crime Agency, 2021). It is possible that there may be an increase in the number of identity theft and fraud incidents stemming from high-tech means due to the ease with which individual offenders can compromise the PII of thousands of victims at once. For instance, businesses and financial institutions store sensitive customer information in massive electronic databases that can be accessed and compromised by hackers (Ayyagari, 2020; Chu et al., 2010; Holt & Lampke, 2010; Newman & Clarke, 2003; Wall, 2007).

The extent of hacks affecting consumer PII was demonstrated repeatedly throughout the last two decades, like the 2008 announcement that the US company Heartland Payment Systems had been compromised by a small group of hackers. The company processed over 11 million credit and debit card transactions for over 250,000 businesses across the United States on a daily basis (Verini, 2010). Thus, hackers targeted their systems and were able to infiltrate and install malware that would capture sensitive data in transit without triggering system security (Krebs, 2011). In turn, they were able to acquire information from 130 million credit and debit cards processed by 100,000 businesses (Verini, 2010).

These sorts of mass breaches are increasingly common. The compromise of the US retail giants Target and Neiman Marcus in late 2013 exposed more than 40 million credit and debit card accounts with prospective losses for consumers estimated to be in the millions (Higgins, 2014). Two online dating services, AdultFriendFinder and Ashley Madison, also experienced major data breaches in which the personal information of their clients were released. In the case of Ashley Madison, 37 million customers had their information released, including completed transactions, email addresses, and sexual preferences (PandaLabs, 2015).

The targets of breaches continue to evolve over time, with more and more reported annually. In fact, some estimate that 2019 was the worst year

for data breaches on record due to the diverse number of companies and organizations affected worldwide (Henriquez, 2019). For instance, Facebook allowed over 540 million client records to be captured and accidentally exposed online by third-party application providers in 2019. Similarly, the financial service provider Capital One had more than 106 million customer records exposed in the same year (Henriquez, 2019). Additionally, over 275 million Indian and 202 million Chinese job-seekers lost their data when an employment company called MongoDB was affected by breaches in these nations (Henriquez, 2019).

While financial data is a tremendously attractive target for thieves and fraudsters, there is also evidence that health-care data breaches are increasing. The amount of sensitive PII that could be acquired through an error or weakness in health-care data storage is tremendous (Heath, 2015). The information stored by health-care providers in the United States frequently includes social security information and other bits of identifying information that can be used for traditional identity fraud but could also provide information to assist in medical and insurance fraud in the United States. In fact, the US medical service provider Quest Diagnostics was affected by a breach in 2019 that led to the loss of 24 million patient records thanks to hackers (Henriquez, 2019).

## Email-Based Scams

In the context of online fraud, some of the most common schemes are perpetrated based on initial contact via email. The interactive nature of email content coupled with the ability to access hundreds of thousands, if not millions, of users makes this an ideal medium for fraudsters. There are several fraud schemes that are sent to prospective victims every day. In the following sections, we discuss some of the most prevalent forms. This is not meant to be an exhaustive list, particularly as scams have begun to evolve in the time of the COVID-19 pandemic (see [Chapter 17](#) for more detail). Instead, our purpose is to expose you to the most common types of schemes you may encounter on a consistent basis.

### Nigerian Email Schemes

In the realm of online fraud schemes, one of the most common and costly types is the **advance fee email scheme**. These are so named because the sender requests a small amount of money up front from the recipient in order to share a larger sum of money later (Gottschalk, 2010; Kigerl, 2020) (see [Box 6.2](#) for an

## Box 6.2 Nigerian Email Text

Subject: MR SULEMAN BELLO

FROM THE OFFICE MR SULEMAN BELLO  
AFRICAN DEVELOPMENT BANK (ADB).  
OUAGADOUGOU BURKINA FASO.  
WEST AFRICA.

TRANSFER OF (\$25,200.000.00) TWENTY FIVE MILLION, TWO HUNDREN THOUSAND DOLLARS.

I AM SULEMAN BELLO, THE AUDITOR GENERAL OF AFRICAN DEVELOPMENT BANK HERE IN BURKINA FASO. DURING THE COURSE OF OUR AUDITING, I DISCOVERED A FLOATING FUND IN AN ACCOUNT OPENED IN THE BANK BY MR JOHN KOROVO AND AFTER GOING THROUGH SOME OLD FILES IN THE RECORDS I DISCOVERED THAT THE OWNER OF THE ACCOUNT DIED IN THE (BEIRUT-BOUND CHARTER JET) PLANE CRASH ON THE 25TH DECEMBER 2003 IN COTONOU (REPUBLIC OF BENIN).

AND NOBODY HAS OPERATED ON THIS ACCOUNT AGAIN, THE OWNER OF THIS ACCOUNT IS MR JOHN KOROVO A FOREIGNER, AND A TRADER WHO TRADE ON GOLD AND MINING, HE DIED, SINCE 2003 AND NO OTHER PERSON KNOWS ABOUT THIS ACCOUNT OR ANY THING CONCERNING IT, THE ACCOUNT HAS NO OTHER BENEFICIARY AND MY INVESTIGATION PROVED TO ME AS WELL THAT MR JOHN KOROVO DIE ALONG WITH HIS TIRED FAMILY. THE AMOUNT INVOLVED IS (USD 25.2 M) TWENTY-FIVE MILLION, TWO HUNDRED THOUSAND UNITED STATES DOLLARS ONLY, I AM CONTACTING YOU AS A FOREIGNER BECAUSE THIS MONEY CAN NOT BE APPROVED TO A LOCAL PERSON HERE, BUT CAN ONLY BE APPROVED TO ANY FOREIGNER WITH VALID INTERNATIONAL PASSPORT

OR DRIVERS LICENSE AND FOREIGN ACCOUNT BECAUSE THE MONEY IS IN US DOLLARS AND THE FORMER OWNER OF THE ACCOUNT MR JOHN KOROVO IS A FOREIGNER TOO, AND THE MONEY CAN ONLY BE APPROVED INTO A FOREIGN ACCOUNT.

I NEED YOUR STRONG ASSURANCE THAT YOU WILL NEVER, NEVER CHEAT ME AS SOON AS THIS FUND HIT INTO YOUR ACCOUNT. WITH MY INFLUENCE AND THE POSITION OF THE BANK OFFICIAL WE CAN TRANSFER THIS MONEY TO ANY FOREIGNER'S RELIABLE ACCOUNT WHICH YOU CAN PROVIDE WITH ASSURANCE THAT THIS MONEY WILL BE INTACT PENDING OUR PHYSICAL ARRIVAL IN YOUR COUNTRY FOR SHARING. THE BANK OFFICIAL WILL PROVE ALL DOCUMENTS OF TRANSACTION IMMEDIATELY FOR YOU TO RECEIVE THIS FUND LEAVING NO TRACE TO ANY PLACE AND TO BUILD CONFIDENCE.

ON THE CONCLUSION OF THIS TRANSACTION YOU WILL BE ENTITLED TO 30% OF THE TOTAL SUM AS GRATIFICATION, WHILE 10% WILL BE SET ASIDE TO TAKE CARE OF THE EXPENSES THAT MAY ARISE DURING THE TIME OF TRANSFER AND ALSO TELEPHONE BILLS, WHILE 60% WILL BE FOR ME.

SO ON THE INDICATION OF YOUR WILLINGNESS I WANT YOU TO FORWARD TO ME YOUR: FULL NAME: SEX: COMPANY: IF ANY FULL CONTACT ADDRESS: PHONE: CELL: FAX: CITY: STATE: ZIP CODE COUNTRY: OCCUPATION AND ALL THE NECESSARY INFORMATION WILL BE SENT TO YOU ON THE ACCEPTANCE TO CHAMPION THIS TRANSACTION WITH ME.

THANKS  
YOURS TRULY  
SULEMAN BELLO

(Source: Email received by one of the authors)

example). These messages are more commonly referred to as “Nigerian” scams because the emails often come from individuals who claim to reside in a foreign country, particularly Nigeria or other African nations. Some also call them **419 scams** as a reference to the Nigerian legal statutes that are used to prosecute fraud (Edelson, 2003; Holt & Graves, 2007; Kigerl, 2020; Smith et al., 1999).

There are several variations of this scam used on a regular basis to defraud individuals. One of the most common messages involves the sender making a claim that they are a wealthy heir to a deceased person who needs help moving inherited funds out of the country. In turn, they will give the recipient a portion of the sum in exchange for financial and legal assistance (Edelson, 2003; Holt & Graves, 2007). Another popular variation of the message involves the sender posing as a public official who has been able to skim funds from a business or government contract (Edelson, 2003). They are seeking a contact to help get the money they illegally obtained out of the account. A similar scheme takes the form of a banker or attorney trying to close a dead customer’s account using the potential victim as the deceased’s next of kin (Edelson, 2003). Other adaptations have been identified, including the sender being in legal trouble or involved in some form of illegal behavior. Thus, the sender attempts to ensnare the recipient in an illicit, yet ultimately false, transaction.

Potential victims who receive and respond to one of these messages are defrauded through the use of two techniques. First, and most often, the respondent will contact the sender, and the sender will then ask for a small donation to get an account or fund out of a holding process. The sender will then continue to receive small payments from the victim because of complications in obtaining their account or additional legal fees that are needed to move the account (Anderson et al., 2013; Smith et al., 1999). The process continues until the victim is no longer willing or is too embarrassed to pay additional money, which can cause a significant dollar loss for the victim.

An additional proportion of scammers will avoid the long-term process in favor of more immediate fraud. They achieve this by requesting the recipient provide personal information, such as their name, address, employer, and bank account information. The sender may make this request under the guise of ensuring that the recipient is a sound and trustworthy associate (Edelson, 2003; King & Thomas, 2009). The information is, however, surreptitiously used to engage in identity theft and drain the victim’s accounts.

Due to the millions of spam messages that are sent every day, it is unknown how many respondents are victimized each year. In addition, fraud victimization has one of the lowest reporting rates of any crime type (Button et al., 2014).

Some victims may not report their experience to law enforcement agencies out of fear they will be prosecuted for their involvement in the potentially illegal fund transfers described in the initial message they received (Buchanan & Grant, 2001). Many victims also do not report their fraud victimization to law enforcement or family members because of shame, embarrassment, and guilt for being deceived. In many cases, family members and law enforcement may blame the victim for their role in the victimization because of their decision-making and naivety. They therefore may feel double victimized by the societal and legal response and feel further isolated (Buchanan & Grant, 2001; Button et al., 2014; Cross, 2015; Cross & Blackshaw, 2015).

As a result, advance fee fraud victims constitute a substantial dark figure of cybercrime. It is clear, however, that victims of advanced fee fraud email scams lose massive amounts of money each year. The Internet Crime Complaint Center (2020) received 14,607 complaints associated with advance fee fraud schemes, though complainants lost \$100 million to these schemes in 2019. This averages to approximately \$6,887 per victim, which is a substantial increase in losses from prior years. In addition, victims reporting potentially related scams like lottery and inheritance schemes lost \$48.64 million in the same year (Internet Crime Complaint Center, 2020). Given that scammers obtain these funds slowly from multiple victims over the course of a few weeks, that may account for the high profits associated with these fraud schemes. Thus, it is to a scammer's advantage to send out as many messages as possible in order to increase the likelihood of a response.

**For more information on advance fee frauds, go online to:** <https://www.onlinebanktours.com/banks/moneyBasics/preview.php?id=83>



## Phishing Emails

The use of **phishing** messages is another insidious form of fraud perpetrated in part by email in which individuals attempt to obtain sensitive financial information from victims to engage in identity theft and fraud (James, 2005; Lastdrager, 2014; Wall, 2007). In many cases, the scammer sends emails to thousands of potential victims at one time in order to cast their net as wide as possible to increase their odds of someone responding to the email. These messages often mimic legitimate communications from financial institutions and service providers, such as PayPal or eBay. The message usually contains some of the branding

### Box 6.3 Phishing Example

From: [service@amazon.com](mailto:service@amazon.com)

Subject: Update your Amazon.com account information

Dear Customer,

You have received this email because we have strong reason to believe that your Amazon account had been recently compromised. In order to prevent any fraudulent activity from occurring we are required to open an investigation into this matter.

Your account is not suspended, but if in 36 hours after you receive this message your account is not confirmed we reserve the right to terminate your Amazon subscription.

If you received this notice and you are not an authorized Amazon account holder, please be aware that it is in violation of Amazon policy to represent oneself as an Amazon user. Such action may also be in violation of local, national, and/or international law.

Amazon is committed to assist law enforcement with any inquiries related to attempts to misappropriate personal information with the intent to commit fraud or theft.

Information will be provided at the request of law enforcement agencies to ensure that perpetrators are prosecuted to the full extent of the law.

**To confirm your identity with us click the link below:** <http://www.amazon.com/exec/obidos/sign-in.html>

[this link actually leads to <http://ysgrouse.com/www.amazon.com/>]

We apologize in advance for any inconvenience this may cause you and we would like to thank you for your cooperation as we review this matter.

(Source: Email received by one of the authors)

and language commonly used by that institution in an attempt to convince the recipient that the message is legitimate (see Box 6.3 for an example). The message usually suggests that a person's account has been compromised, needs to be updated, or has some problem that must be corrected as soon as possible. The time-sensitive nature of the problem is commonly stressed to confuse or worry the prospective victim in order to ensure a rapid response.

The email will also include web links that appear to connect to the appropriate website so that the victim can immediately enter their login information for the affected account. Generally, however, the link redirects the user to a different site controlled by the scammer that utilizes collection tools to capture user data. Better fraudulent sites will also feature branding or logos from the institution to help further promote the legitimacy of the phishing email. Upon arriving at the site, individuals are prompted to enter sensitive information, such as their bank account number, username, password, or even in some cases **Personal Identification Numbers (PINs)** to validate their account. Upon entering the data, it is captured by the scammer for later use and may either redirect the victim back to the original website for the company or provide a page thanking them for their information.

This type of fraud is actually quite old, dating back to the 1990s when ISPs billed users by the hour for access. Skilled hackers would try to capture the usernames and passwords of unsuspecting victims by posing as an ISP, especially America Online (AOL) due to its scope and penetration in the market. Fraudsters would harvest known AOL email addresses and send messages claiming to need account updates or validation of user profiles. The mass mailing strategy was like fishing, in that they were hoping to hook victims through deceptive bait. The term “phishing” emerged as a corruption of the term akin to that of phreaking within the general argot of the hacker community. Unsuspecting victims who thought these messages to be legitimate would forward their information to the sender in the hopes of correcting their account. The fraudsters, however, would keep the accounts for their own use or trade the information with others for pirated software or other information.

The success of phishing techniques led some to begin to target e-commerce and online banking sites as they became popular with larger segments of the population in the early 2000s. Hackers began to recognize the value in targeting these institutions, and some began to create sophisticated phishing kits that came preloaded with the images and branding of the most prominent global banks. These kits, combined with spam email lists, enabled hackers to readily steal financial data from thousands of unsuspecting users around the world. In fact, the Anti-Phishing Working Group (2020) tracked 749,335 unique phishing email campaigns in 2019 alone. These schemes most often targeted payment service providers and financial institutions (39.2 percent), followed by webmail service providers (30.8 percent). The Internet Crime Complaint Center (2020) also received 114,702 complaints of phishing and related scams, though victims reported \$57.836 million in losses during 2019. These figures may rise as the

COVID-19 pandemic continues to affect the world (see [Chapter 17](#)). Thus, phishing is a global problem that cannot be understated, though the prevalence of phishing victimization in the general population is largely unknown.

## Romance Scams

An additional email-based scams with similar elements to the scams discussed above are [romance scams](#). Unlike other email scams, however, victims of romance schemes are not interested in economic gain but rather forming an emotional and romantic bond with another person (Buchanan & Whitty, 2014; Cross, 2015; Cross et al., 2018). The popularity of online dating sites and social media create a target-rich environment for scammers to contact a broad audience who are either actively seeking or interested in a romantic partner. As such, scammers can manipulate these environments in order to create a virtual identity that will appear enticing to their potential victims (Buchanan & Whitty, 2013; Cross, 2015).

The typical scheme begins via an unsolicited contact sent via a dating profile or social media account where they attempt to garner a response from their target. The scammer creates fake profiles in various social media and dating sites using attractive pictures of men or women in order increase the likelihood a victim will respond. Additionally, many scammers indicate they are the United States or European citizens working abroad with no real relatives or family to help them cope with the distance. Their “loneliness” creates a potential bonding point with their target, and if a person responds to their messages, they will carry on protracted discussions with the recipient (Buchanan & Whitty, 2013; Cross, 2015).

Careful scammers will ask a great deal of questions of their potential victims in an attempt to “get to know them,” while surreptitiously using the information to help adjust the scam to increase the likelihood of responses over time. The scammer will also indicate their romantic interests and profound love for the victim relatively soon, which may take the victim by surprise (Buchanan & Whitty, 2013; Cross, 2015). They may also get the victim’s address information and begin to send them gifts on and offline in an attempt to help cement their relationship and bond the scammer and victim.

Once a relationship has been established, there are a range of ways the scammer may defraud the victim. All of these techniques are similar to the practices used in other email scams to acquire funds. In most cases, scammers will try to make arrangements with the victim to pay them a visit in person, so that

they can consummate their love and enjoy each other's company (Whitty & Buchanan, 2012). Some issue keeps them from traveling and they have insufficient funds to get them out of their specific predicament. For instance, they may be unable to pay a hotel bill and will not be given back their passport until the debt is resolved. They may also claim to have been mugged or beaten, and they need funds to pay their hospital bill (Whitty & Buchanan, 2012).

Victims who send funds are continually strung along for more money until such time as they realize they are being defrauded. Scammers may also ask the victim to help them by cashing checks on their behalf as they are unable to accept the payment for some reason. Others may ask the victim to accept goods on their behalf and reship them to another location as the company will not ship to their location (Cross, 2015).

Regardless of the methods of the scammer, romance schemes are extremely harmful to victims. The prevalence and cost of victimization are unknown as many victims may feel too embarrassed or ashamed to report their experiences to law enforcement (Cross, 2015). In the United States, 19,473 victims of romance scams reported losing approximately \$475 million in 2019 (Internet Crime Complaint Center, 2020). These losses averaged to over \$24,393 per victim, making it the second-largest category of fraud as measured by victim loss (Internet Crime Complaint Center, 2020).

A nationally representative survey of Great Britain in 2010 found that almost 230,000 people had been scammed out of funds by romance schemes (Whitty & Buchanan, 2012). While this survey has not been replicated, evidence from other UK reporting agencies suggests victims lost more than £12.6 million across over 7,557 payments made to scammers in 2018, though only 1,400 total cases were reported (UK Finance, 2019). Similarly, the Australian Competition and Consumer Commission found that romance frauds cost citizens over \$28.6 million across almost 4,000 reported incidents in 2019 alone (ACCC, 2020). These estimates do not, however, take into account the emotional hardships victims of romance schemes experience (see [Box 6.4](#) for the experience of victims in their own words). Even if an individual does not experience any economic losses, they may feel substantive psychological hurt and a sense of rejection upon realizing that the scammer was not in love with them at all (Buchanan & Whitty, 2013; Cross, 2015).

Victims of romance schemes may not fit into a particular demographic profile. There is a hypothesis that victims are more likely to be heterosexual women who are older (Whitty & Buchanan, 2012), though recent research found that both gay men and women were as likely to be victims as heterosexuals (Buchanan

## Box 6.4 Understanding the Human Dimensions of Romance Scams

**Dr. Cassandra Cross, Senior Lecturer, School of Justice, Faculty of Law, Queensland University of Technology**

### Techniques Used by Offenders to Target Victims

“Frank” had recently lost his wife to a brain hemorrhage. He had started using various social networking websites to chat to women across the globe and in particular, started communicating with a woman in Ghana. During their conversations, Frank had shared details about himself and more importantly, details about his wife’s death. After a few months, Frank received a request for money from the brother of the woman he had been communicating with, after being advised she had been in a car crash and was suffering from the same illness that had taken his wife.

...Then her brother calls me, sends me an email under her name and said she got hit by a car, her brain's bleeding anyway, I just lost my wife with a brain hemorrhage, and they wanted \$1000 for the doctor to operate, they won't do anything unless you pay, so I sent them \$1000 [or] \$1200, then it started...

(Frank, 73 years)

Frank was suspicious of the situation presented to him, but was willing to send the money on the off chance that the situation was legitimate and that this woman was sick. He had also been in phone contact with the alleged doctor who was treating her, which added to the plausibility of the situation.

...She got hit by this car... I phoned the doctor and everything I phoned the doctor because I want to know. My wife had died from a brain hemorrhage you know and I'd spent two one hour sessions, probably a long time with two different neurosurgeons down there I wanted to give them my brain. [I said to them] why don't you try this and [this], and as it turned out a lot of the things I suggested had been tried and don't work. She'd had a massive internal bleed in the brain, you could see the scan it was just black... the doctor said if it's on the

perimeter on the edge of the brain, yeah they can drain the pressure off and fix it up and I thought you know, and that's how they got me with her. \$1000 wasn't much, but I didn't really believe it but I said maybe if it is going to happen and she is going to die I said for a thousand dollars they can have it you know...

(Frank, 73 years)

Frank's situation illustrates the insidious way that offenders will manipulate a person's emotions and circumstances to obtain financial benefits. It demonstrates the way that Frank was presented with a situation that involved multiple actors (the woman, her brother and the doctor) in order to increase the likelihood that he would consent to the request for money. The use of the same illness that had claimed his wife also reinforces the ways that offenders will specifically target victims to gain compliance to financial requests (Drew & Cross, 2013, p. 33).

### Impact of Romance Fraud on Victims

Romance scam victims experience devastating effects as a result of the financial impact of fraud but also the loss of the relationship. For many, the relationship can be more difficult to grieve than the loss of money by itself.

The severity of online fraud victimization was clearly evident in a small number of victims interviewed for Cross et al. (2016). As detailed below, the emotional and psychological impacts of online fraud victimization were so great for some that they had considered, or even attempted suicide. The below excerpts are all taken specifically from **romance fraud** victims.

I have come close to ending my life, honestly, I still feel that way (interview 13).

[At the time I reported the fraud] I said 'As far as I'm concerned, I am ready to suicide' (interview 34).

I even tried to kill myself I was so depressed, because [of] not just the money but because of the shame. My family was very upset (interview 43).

I [was] sort of really despairing and about to commit suicide....I was desperate, I mean I was considering suicide. I was that distraught with what I'd actually done... [further in the interview] I was really despairing. I was, I saw this end for myself through suicide. And then I thought, 'this is ridiculous. If I don't say something to somebody, I'm going to do it [commit suicide]' (interview 49).

One woman, whose fraud victimization followed a number of other adverse life events, including a violent intimate partner relationship and the loss of her job, described taking steps towards ending her life:

- Participant: I had literally torn up any personal things – letters, diaries, photos – so there would be no trace left.
- Interviewer: Of this [online fraud] incident?
- Participant: Of me....You just feel so stupid....[I felt] pretty useless really, that is what I kept thinking, a bit of a waste of space, that is what I kept thinking about myself.
- Interviewer: Did you ever think of suicide?
- Participant: Yeah I did. I just shut down, but I would make sure my underwear was clean. It was just so bizarre, and there would be no trace of me left, I would just evaporate (interview 44).

(Cross et al., 2016, pp. 28–29)

### Shame and Embarrassment in Disclosing Romance Fraud

For many victims of romance fraud, embarrassment stemming from both using online dating services, and having been defrauded, combined to prevent them seeking support from loved ones. Many victims of romance fraud had either not disclosed to their family and friends that they were seeking romance online, or had provided only limited details about this. For example, one woman said

I've got adolescent kids....They knew about it, they knew I was on a [dating] site....But they're not real comfortable talking about it... [later in the interview] My kids were certainly okay about the fact that I was on the [dating] site but didn't really want any sort of detail' (interview 5).

A male victim, who had sought out a relationship on an international dating website, described his reluctance to tell his family about being defrauded as follows:

The stigma is twofold. One is to admit to your family that you have gone onto an international dating site, which is socially something which most Anglo-Saxon children would struggle with....It's the whole stigma of being on a site that's a problem with the mail order bride thing....The other thing is I got stung. That is two things there that you will emotionally not share (interview 4).

(Cross et al., 2016, p. 61)

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& Whitty, 2013). In addition, victims appear to have an idealistic worldview of romantic partners, placing them in high emotional and psychological regard while simultaneously ignoring their potential negative attributes (Buchanan & Whitty, 2013). These results are based on relatively limited research, demonstrating a need for continuing empirical analysis to better understand the risks associated with romance scam victimization.

## Business Email Compromise

A final form of fraud that has emerged over the last few years combines multiple aspects of other email-based fraud schemes, as well as hacking and malware in some cases. This fraud is often called **business email compromise (BEC)**, as it targets a range of businesses in order to move massive sums of money quickly under the guise of seemingly legitimate transactions (Mansfield-Devine, 2016). Unlike the messages noted in this chapter, the senders

do not utilize spam messaging in order to contact potential victims. Instead, they must take steps to carefully target a specific victim to create a convincing scenario that would increase the likelihood of a response (Mansfield-Devine, 2016). The sender may also utilize tools to spoof or make an unrelated email account appear as a legitimate email address. This is essential to ensure that the request appears legitimate on the surface to be more convincing. This concept is sometimes called **spear phishing**, referring to the fact that the attacker is targeting a single entity within an organization rather than all employees (Burns et al., 2019).

There are several forms of BEC, ranging from relatively simple to more complex based on the tools utilized to complete the scheme (Mansfield-Devine, 2016; Trend Micro, 2021). Some of the most straightforward of these schemes involves a sender contacting a business under the guise of being a legitimate vendor or service provider with whom they conduct business. The sender will indicate that payment is due but must be made via a wire transfer to a different account than what is normally used. They may also pose as executives within the target organization to increase the perceived legitimacy of the request. The senders will often attempt to target accounts receivable/payable department email addresses so as to minimize the number of recipients within the organization and reduce the likelihood of detection.

More sophisticated forms of BEC involve a fraudster actually compromising existing email accounts within the target organization (Mansfield-Devine, 2016; Trend Micro, 2021). If they can obtain an employee's username and password for their email system, they will then use the account to send messages to either the company's accounting department or to those of their clients in an attempt to receive payments for services rendered. There have also been documented incidents of fraudsters compromising high-level executive email accounts and then sending messages to human resources and accounting departments to request personal information of other employees and clients, including tax details and PII. The information is then used to file fraudulent tax returns and engage in different forms of fraud and theft (Mansfield-Devine, 2016; Trend Micro, 2021).

The various forms of BEC cause substantial economic harm to victims, with estimates suggesting there were over \$1.7 billion in losses related to this fraud within only 23,775 reports the United States in 2019 alone (Internet Crime Complaint Center, 2020). Similar estimates from the Anti-Phishing Working Group (2020) estimated that scammers requested an average of \$55,395 per request in the last three months of 2019 alone. In addition, the number of scams reported

has increased consistently year over year across multiple reporting sources (Internet Crime Complaint Center, 2020; Trend Micro, 2019). The scams employed by senders are also evolving, with more sophisticated methods being employed over the last few years (Internet Crime Complaint Center, 2020). Additionally, the range of targeted organizations is changing, with more real estate and mortgage companies being targeted (Trend Micro, 2018). As a result, there is a need to better understand these scams to reduce the likelihood of victimization generally.

## Data Breaches and Identity Crimes

As ecommerce sites and social network use have increased the quantity of consumer information stored in large-scale databases that are connected to the Internet, hackers have shifted their energies to target these resources, especially bank records, personal information, and other sensitive information (Holt et al., 2016; Leukfeldt et al., 2017; Newman & Clarke, 2003; Wall, 2007). This includes payment processing systems, which may be housed in larger financial institutions, or even point of sale terminals within brick and mortar stores. A hacker need only find a way to gain entry into the sensitive internal parts of a company or financial institution in order to get access to one of these data repositories. If successful, they will have access to hundreds of thousands, if not millions, of pieces of sensitive information that can be monetized in some way. For instance, they may be able to utilize credit card data for fraudulent transactions, or sell identity data to others to enable broad scale identity fraud and theft (see [Box 6.5](#) for detail).

The success of such compromises is evident in the fact that offenders regularly target institutions for mass exploitation (Ponemon Institute, 2021). These incidents are typically referred to as a data breach, as a large quantity of data is identified and then exfiltrated from an organization through illegal means by attackers. A data breach may occur as a result of various errors or deliberate attacks by insiders and outsiders. For instance, if an employee within an organization leaves a laptop or hard drive containing sensitive information in a taxi or restaurant, the information may be acquired by others. Similarly, if sensitive information is inadvertently emailed through unencrypted means to others outside of an organization, the data could be considered lost. Such incidents are often referred to as “human factor” errors by the Ponemon Institute, as the information is lost by virtue of human error.

A wider range of hacks are the cause of data breaches, though they may stem from internal or external attackers. As noted in [Chapter 3](#), insiders differ from

## Box 6.5 Synthetic Identity Theft Stemming From Data Breaches

### Synthetic Identity Theft: The “Frankenstein” of Identity Crime



<https://www.idtheftcenter.org/synthetic-identity-theft-the-frankenstein-of-identity-crime/>

One of the most baffling forms of identity theft and fraud is synthetic identity theft. This crime occurs when a would-be thief assembles an identity from stolen or assumed parts.

This article provides an overview of the concept of synthetic identity theft driven in large part by the massive number of data breaches that have led to the loss of hundreds of millions of pieces of PII. The author explores the risk of so-called Frankenstein fraud and how it impacts victims.

outsiders on the basis of their trusted position within an organization. Insiders may engage in different attack methods, such as the use of malware to delete sensitive information or release it through public means. At the same time, external attackers could masquerade as internal trusted actors through the use of fraudulently obtained user credentials. For instance, a major breach occurred in 2013 targeting the United States department store chain Target, which led to the loss of 40 million of customer credit and debit card records in less than 30 days' time (Krebs, 2014). The breach was performed by external hackers who first identified and phished a third-party service provider called Fazio Mechanical. The company provided heating and cooling maintenance for Target stores and received payments for their services. Thus the attackers used Fazio's established user credentials to access and interact with Target's vendor payment portal online.

Once the attackers had access to the internal Target network, they then acquired sensitive information from various parts of the retailer's systems. For instance, customers who made purchases through the company's website had their names, phone numbers, email, and mailing addresses lost in the breach. In addition, the attackers placed malicious software on the point of sale terminals within certain stores, enabling them to acquire millions of credit and debit card numbers while the information was sent from the register to the payment processor (Krebs,

2014). It is thought that the attackers may have been able to sell between 1 and 3 million of the accounts they stole, potentially earning over \$50 million in profits (see [Chapter 12](#) for more on online markets; Krebs, 2014). The financial institutions who had to reissue and manage compromised card accounts, however, spent potentially \$200 million to avoid further harm to their customers (Krebs, 2014). Thus, the economic harm caused by data breaches cannot be understated.

## Identity Theft and Fraud Laws

In light of the myriad forms of fraud that can be perpetrated online, it is critical that the criminal justice system have various mechanisms that can be employed to pursue these offenders. Interestingly, the United States does not actually have any specific online federal fraud statutes. Instead, prosecutors use traditional mail (18 U.S.C. § 1341) and wire fraud (18 U.S.C. § 1343) statutes to prosecute Internet-based fraud. The primary difference between the mail and wire fraud statutes is simply whether the fraudulent activity occurred via traditional mail or telephony. The wire fraud statute has more utility for prosecuting online fraud as the fraudulent communication occurred through the Internet. However, purchases, counterfeit goods, payments, and possibly correspondence related to online fraud may all be sent through traditional postal mail as well, which would allow prosecutors to use the mail fraud statutes as well (Brenner, 2011). The penalties for both wire and mail fraud include a fine and up to 20 years in prison, with the possibility of up to 30 years if the fraud involved a financial institution. Those conspiring to commit online fraud can be penalized with a fine and imprisonment up to five years if the offense was a felony under the US's conspiracy statute 18 U.S.C. § 371.

There are several legislative mechanisms that have emerged, primarily at the federal level, to punish fraud. The most pertinent laws in the United States are listed under the [Identity Theft and Assumption Deterrence Act of 1998](#), which makes it a federal crime to possess, transfer, or use a means of identification of another person without authorization with the intent to commit or aid in the commission of illegal activity at the local, state, or federal level (Brenner, 2011). This includes a variety of specific acts outlined in Title 18 of the US Legal Code § 1028, including:

- 1 Knowingly, and without authority, produce an identification document or supporting materials for identification documents, such as holograms or other images (a) (1)
- 2 Knowingly transfer an identification document or materials with the knowledge that the item was stolen or produced without authority (a) (2)

- 3 Knowingly possess with the intent to use or transfer, five or more identification documents or materials (a) (3)
- 4 Knowingly possess an identification document or materials with the intent to use the item to defraud (a) (4)
- 5 Knowingly produce, transfer, or possess a document-making implement or authentication feature that will be used in the creation of a false identity document (a) (5)
- 6 Knowingly possess an identification document or supporting materials of the United States that is stolen or produced without lawful authority (a) (6)
- 7 Knowingly transfer, possess, or use a means of identification of another person without authorization with intent to engage in unlawful activity (a) (7)
- 8 Knowingly traffic in false authentication materials for use in the creation of false identification. (a) (8)

These activities could affect interstate or foreign commerce, as well as any materials that are sent through the mail, such as personal identifications or passports. The punishments for identity crimes range from 5 to 15 years in prison, as well as fines and prospective forfeiture of goods and materials obtained while using an identity (Brenner, 2011).

Under this law, an **identification document** is defined as “a document made or issued by or under the authority of the United States government ... with information concerning a particular individual, is of a type of intended, or commonly accepted for the purpose of identification of individuals” (USC 1028 d). This law also specifically outlaws the use of means of identification, which includes names, social security numbers, date of birth, drivers’ license or identification numbers, passport information, employer identification numbers, biometric data (such as fingerprints), unique electronic identification numbers, addresses, bank routing numbers, or even the telecommunications identifying information of an access device, such as the IP address of a computer system (Brenner, 2011). Finally, this legislation made the FTC a clearinghouse for consumer information on identity-related crimes.

The **Identity Theft Penalty Enhancement Act of 2003** added two years to any prison sentence for individuals convicted of a felony who knowingly possessed, used, or transferred identity documents of another person (Brenner, 2011). This act also added five years to the sentence received for identity theft convictions related to an act of violence or drug trafficking, and ten years if connected to international acts of terrorism. This specific enhancement is designed to further punish actors who may develop or create fictitious identities in support of acts of terror.

In addition, the **Identity Theft Enforcement and Restitution Act of 2008** is important because of its impact on sentencing and the pursuit of identity crimes (Brenner, 2011). Specifically, this act allows offenders to be ordered to pay restitution as a penalty to victims of identity theft. This statute also enables more effective mechanisms to prosecute offenses unrelated to computer fraud that could otherwise be prosecuted under the Computer Fraud and Abuse Act. Additionally, it expands the ability for agencies to pursue computer fraud actors engaging in interstate or international offenses. Finally, this act imposes criminal and civil forfeitures of property used in the commission of computer fraud behaviors.

A final piece of federal legislation to note is the **Fair and Accurate Credit Transactions Act of 2003**. This law provided multiple protections to help reduce the risk of identity theft and assist victims in repairing their credit in the event of identity theft (Brenner, 2011). This includes requiring businesses to remove customer credit card information (except the last four digits) from receipts to reduce the risk of victimization. The law also allowed consumers to obtain a free credit report every year from the major credit monitoring services to assist in the identification of fraudulent transactions or potential identity theft. Finally, the act provided mechanisms for consumers to place and receive alerts on their credit file to reduce the risk of fraudulent transactions. These steps are integral to protecting consumers from harm.

Every US state has implemented laws regarding identity theft or impersonation of another person, whether through on or offline means (National Conference of State Legislatures, 2020a). Some choose to prosecute these offenses under existing computer hacking statutes, while others include separate language pertaining to computer fraud (e.g., Arkansas, Hawaii). A number of states have also outlawed computer theft, which may include forms of piracy or computer hardware theft (e.g., Colorado, Georgia, Idaho, Iowa, Minnesota, New Jersey, Pennsylvania, Rhode Island, Vermont, Virginia). Additionally, 29 states have established specific laws and regulations for victims of identity theft to receive restitution for their experiences (National Conference of State Legislatures, 2020a).

The United States does not have a federal statute that covers how corporations and agencies need to respond to all types of data breaches. Instead, specific statutes cover specific types of data breaches. For example, the Financial Modernization Act of 1999, also known as the Gramm-Leach-Bliley Act, requires that banks and financial institutions need to have established written information security plans and data breach response programs, which normally should

include notifying customers of a data breach if one occurs, and to take appropriate steps to ensure that third-party vendors area protecting confidential data (Federal Trade Commission, 2021c). All 50 states, Washington, DC, Guam, Puerto Rico, and the Virgin Islands, however, have developed legislation related to large-scale **data or security breaches**, like the Heartland Bank or TJX compromises (National Conference of State Legislatures, 2020b). Breaches can affect hundreds of thousands of victims through no fault of their own, creating a substantive need to ensure that consumers are protected. California was the first state to develop such a law in 2003, titled the California Security Breach Notification Act (Cal. Civil Code). This legislation required California residents to be notified of a breach whenever a database compromise leads to the loss of an individual's first and last name along with any of the following information: (1) social security number, (2) driver's license number or California State ID card number, or (3) an account, debit, or credit card number in combination with any security information that could be used to authorize a transaction, such as the three-digit security code on the card.

This law was designed to serve as a safeguard for consumers in the event that a breach led to the loss of sensitive information. Additionally, this legislation validated the idea that companies and organizations are obliged to protect consumer data from harm. The nearly unanimous passing of this legislation led other states to develop their own language pertaining to breach notifications. Though all parts of the United States currently have laws in place, they differ in the extent to which a breach is defined, what entities must comply with the law, and the extent to which data must be protected. This will no doubt continue to evolve as the threats to large databases of information change and increase with time.

Many nations around the world have also criminalized identity crimes in some fashion, though their statutes may not actually include this phrase. For instance, India utilizes the phrase “identity theft” in their criminal code under Section 66C, making the fraudulent or dishonest use of passwords or unique identity information punishable by up to three years in prison and fines (Brenner, 2011). Australia does not use this phrasing in its Criminal Code Amendment Act 2000 in section 135.1, but this new code recognizes general dishonesty where a person is guilty if they do anything with the intention of dishonesty, causing a loss to another person, and that person is a Commonwealth entity (Brenner, 2011).

Canada’s federal Criminal Code also has multiple sections related to identity crimes. Under section 402.2, anyone who knowingly obtains or possesses another person’s identity information, such that the data can be used to commit

some form of fraud or deceit, can be subject to up to five years in prison (Holt & Schell, 2013). Additionally, Section 403 criminalizes the fraudulent use of another person's identity information to (1) gain advantage for themselves or others, (2) obtain or gain interest in property, (3) cause disadvantage to the person being impersonated or others, or (4) avoid arrest or prosecution (Holt & Schell, 2013). Any violation of this statute can be punished with a prison sentence of up to ten years in total.

The United Kingdom utilizes similar language regarding fraudulent or dishonest use in order to gain advantage or cause another person to lose in some fashion in its Fraud Act of 2006. This statute applies specifically to England, Wales, and Northern Ireland and also identifies three forms of fraud, including false representation of facts or laws, failure to disclose information when legally mandated, and fraud based on abuses of individual power to safeguard or protect personal or financial information (Holt & Schell, 2013). Similarly, the United Kingdom's Data Protection Act 1998 provides protections for personal data held by companies and persons, ensuring it is not only up-to-date, but accurately maintained, and able to be viewed by each individual to ensure that it is correct (Holt & Schell, 2013).

The EU Convention on Cybercrime (CoC) also includes two articles pertaining to computer forgery and fraud, though it does not use the phrase identity fraud or theft (Brenner, 2011). The CoC requires nations to adopt legislation criminalizing access, input, deletion, or suppression of data that leads it to be considered as inauthentic or fraudulent, even though it would otherwise be treated as though it were authentic data (Brenner, 2011). Additionally, the CoC criminalizes the input or alteration of data and/or interference with computer systems with the intent to defraud or procure economic gain and cause the loss of property of another person. This language directly applies to various forms of online fraud and data theft, making it a valuable component for the development of cybercrime law globally.

## Investigating and Regulating Fraud Globally

The myriad forms of fraud that can be perpetrated, coupled with the potential for fraudsters to victimize individuals around the world, makes this a difficult form of crime to investigate. In the United States, local law enforcement agencies may serve as a primary point of contact for a victim, as do the offices of state Attorneys General, who typically act as information clearinghouses for consumer fraud cases. Additionally, states' Attorneys General offices can accept

complaints on behalf of fraud victims and can help to direct individuals to the correct agency to facilitate investigations when appropriate. It is important to note that federal agencies will be responsible for cases where the victim and offender reside in different states or countries. We will focus our discussion on the primary federal agencies in various nations which are responsible for the investigation of online fraud due to the fact that the majority of online fraud cases involve victims living in a separate jurisdiction from their offender (Internet Crime Complaint Center, 2020).

The **United States Secret Service** is one of the most prominent federal law enforcement bodies involved in the investigation of online fraud in the United States. The Secret Service was initially part of the US Department of the Treasury and had a substantive role in investigating the production of counterfeit currency and attempts to defraud financial payment systems (Moore, 2010). As banks and financial industries came to depend on technology in the 1980s and 1990s, the Secret Service increasingly investigated Internet-based forms of fraud. Today, the cyber operations of the Secret Service include the detection, criminal investigations, and prevention of financial crimes, including counterfeiting of US currency, access device fraud (including credit and debit fraud), complex cybercrimes, identity crimes and theft, network intrusions, bank fraud, and illicit financing operations (US Secret Service, 2020). Financial institution fraud (FIF) offenses typically involve the use of counterfeit currency created in part by computers and sophisticated printing devices, as well as checks and other protected financial products (Moore, 2010). Access-device fraud, whereby an individual utilizes credit card numbers, PINs, passwords, and related account information to engage in acts of fraud, is also a high priority of the Secret Service. The practices of carders are of particular interest to the Secret Service, as the sale and use of dumps and other financial information constitute acts of access-device fraud. Another area of interest involves the investigation of general acts of fraud involving computers and systems of “federal interest,” such that they play a role in, or directly facilitate, interstate or international commerce and government information transfers (Moore, 2010). This is a very broad area of investigation, including hacking offenses and the use of computers as storage devices to hold stolen information or produce fraudulent financial materials. As a result, the Secret Service has been given the power to investigate a wide range of cybercrimes.

To help ensure successful detection, investigation, and prosecution of these crimes, the Secret Service also operates so-called **Cyber Fraud Task Forces (CFTFs)** across the globe (US Secret Service, 2020). These task forces are

brand new as of 2020, and integrate the capacities of the former Electronic Crimes Task Forces (ECTF) and Financial Crimes Task Forces (FCTF) programs. There are now 42 of these CFTFs across the country, and operate as a sort of global network of task forces to respond to the variety of financial fraud and theft affecting local, state, and federal agencies, as well as the private sector.

In addition to the Secret Service, the Federal Bureau of Investigation (FBI) plays a prominent role in the investigation of cybercrime, including online fraud. The FBI is considered the lead federal agency for investigating various forms of cybercrime (FBI, 2021). The FBI also identified internet fraud and identity theft as top crimes of interest (FBI, 2021). This is a change for the Bureau, which had a focus on traditional forms of white collar crime and fraud in the real world until the early 2000s, when Internet use became nearly ubiquitous across the industrialized world. The expansion of FBI investigative responsibilities into online fraud is in keeping with their general role in the investigation of cyberattacks against national infrastructure and security (FBI, 2021). Criminal entities, terrorist groups, and even nation-states may have a vested interest in identity theft in order to fund various illicit activities and generally harm the economic safety of the nation and its citizens. Thus, both the Secret Service and the FBI now play a role in the investigation of online fraud. This creates potential investigative challenges as investigators across agencies must find ways to coordinate operations in order to avoid the duplication of effort and de-conflict which criminal actors may be working with law enforcement (see [Box 6.6](#) for details).

The FBI also houses the **Internet Crime Complaint Center (IC3)** within its Cyber Operations Division. The IC3 Unit is staffed by both FBI agents and professional staff with expertise in the prevention, detection, and investigation of cybercrime. They also partner with industry representatives, such as Internet service providers, financial institutions, and online retailers, as well as with regulatory agencies and local, state, and federal law enforcement agencies to understand the scope of various forms of online fraud. Victims can contact the agency through an online reporting mechanism that accepts complaints for a range of offenses, though the most common contacts involve non-delivery of goods or non-payment, advance fee fraud victimization, identity theft, auction fraud, and other forms of online fraud driven via spam (Internet Crime Complaint Center, 2020). In turn, victims may be directed to the appropriate investigative resources to further handle complaints.

**For more on the IC3, go online to:** <https://www.ic3.gov/#>



## Box 6.6 The Overlapping Role of the Secret Service and Federal Bureau of Investigation

### Crime Boards Come Crashing Down



<http://archive.wired.com/science/discoveries/news/2007/02/72585?currentPage=2>

While Thomas had been working on the West Coast for the FBI, the Secret Service's New Jersey office had infiltrated Shadowcrew separately, with the help of a confidential informant, and begun gathering evidence against carders on that site.

This article provides an overview of the relationships between the FBI and Secret Service in the investigation and takedown of the group "the Shadowcrew" and subsequent investigations of other hacker groups.

The US **Immigration and Customs Enforcement (ICE)** and **Customs and Border Patrol (CBP)** agencies also have an investigative responsibility regarding financial crimes, fraud, and counterfeiting. Given that CBP agents monitor border crossings and ports, they serve a pivotal role in the identification of attempts to smuggle in cash and currency, as well as use or transfer fraudulent documents. ICE is the largest investigative agency within the Department of Homeland Security, Homeland Security Investigators (DHS HSI), including ICE agents, investigate a wide variety of crimes in order to protect "the United States against terrorist and other criminal organizations who threaten [US] safety and national security and transnational criminal enterprises who seek to exploit America's legitimate trade, travel, and financial systems" (Immigration and Customs Enforcement, 2021). In order to prevent or investigate terrorist acts and criminal behavior, they investigate the flow of people, money, drugs, guns, fraudulent items, and other items across US national boundaries. Therefore, ICE and other HSI investigators play a major role in investigating identity crimes, fraud, and smuggling (Immigration and Customs Enforcement, 2021).

In the United Kingdom, the primary agency responsible for managing fraud between 2008 and 2014 was the National Fraud Authority (NFA), which was formed in order to increase cooperation between both the public and private sector (National Fraud Authority, 2014). The NFA acted as a clearinghouse

for information on various forms of fraud and reports on the scope of fraud in any given year through the publication of the Annual Fraud Indicator report. Through assessments of threats to the public and not-for-profit sectors, this report attempted to estimate the total costs of fraud to United Kingdom residents each year (National Fraud Authority, 2014). In March 2014, NFA functions were transferred to other agencies (National Fraud Authority, 2017). NFA staff that were working on strategic development and threat analysis were transferred to the **National Crime Agency** (NCA). The NCA addresses serious and organized crime in the United Kingdom, including cybercrime, fraud, and other Internet crimes. They operate the National Cyber Crime Unit which “leads the UK’s response to cybercrime, supports partners with specialist capabilities and coordinates the national response to the most serious of cyber crime threats” by working with Regional Organized Crime Units, the Metropolitan Police Cyber Crime Unit, industry, and law enforcement and government agencies (National Crime Agency, 2021). Within the NCA, the Economic Crime Command focuses on reducing the impact of economic crime, including money laundering, fraud, and counterfeit currency, on the United Kingdom.

Action Fraud, which was housed in the NFA, was transferred to the City of London Police (Action Fraud, 2021). Action Fraud is a reporting service that enables citizens and businesses to file reports of fraud online or via phone and obtain information about how to better protect themselves from being victimized. In fact, the **Action Fraud** service is similar to that of the US IC3, in that victim complaints are forwarded to law enforcement. In this case, Action Fraud reports are examined by the City of London Police and the **National Fraud Intelligence Bureau (NFIB)**, operated by the City of London police, for further investigation (Action Fraud, 2021). The NFIB collects information on various forms of fraud and aggregates this data along with reports from business and industry sources into a large database called the NFIB Know Fraud system. Analysts can query this database to generate intelligence reports on the credibility of fraud reports and develop information that can be used to pursue criminal charges or other operations to disrupt fraudsters (Action Fraud, 2021).

**For more on reporting fraud in the United Kingdom, go online to: [www.actionfraud.police.uk/report\\_fraud](http://www.actionfraud.police.uk/report_fraud)**



Canada also utilizes a similar fraud reporting structure called the **Canadian Anti-Fraud Centre (CAFAC)**, which is a joint effort of the Royal Canadian

Mounted Police, Ontario Provincial Police, and the Competition Bureau Canada. The CAFC collects reports and complaints on various forms of fraud, both on and offline, from victims through either an online process or over the phone. The complaints received are aggregated and examined by the Operational Support Unit (OSU) to develop intelligence packages and briefs for Canadian agencies and taskforces that investigate fraud, prepare fraud prevention campaigns, and to the private and public sector on alternative preventative measures to reduce the ability of fraudsters to communicate with potential victims and their ability to launder funds (CAFC, 2021).

There are also a number of non-governmental organizations and groups that offer assistance in dealing with fraud. For instance, the **Anti-Phishing Working Group (APWG)** is a not-for-profit global consortium of researchers, computer security professionals, financial industry members, and law enforcement designed to document the scope of phishing attacks and provide policy recommendations to government and industry groups worldwide (Anti-Phishing Working Group, 2021). The APWG has members from 2,200 institutions around the world, including financial institutions and treaty organizations, such as the Council of Europe's Convention on Cybercrime and the United Nations Office of Drugs and Crime (UNODC). The group collects statistics on active phishing attacks provided by victims and researchers to provide information on the most likely targets for phishing attacks and shares this information with interested parties to help combat these crimes. Furthermore, the APWG operates various conferences designed to improve the detection, defense, and cessation of phishing and fraud victimization.

The **Federal Trade Commission (FTC)** is a key resource for consumers and victims of fraud, particularly after the passing of the Identity Theft Assumption and Deterrence Act of 1998. The FTC is an independent watchdog agency within the federal government responsible for consumer protection and monitoring the business community to prevent monopolies and regulate fair practice statutes (Federal Trade Commission, 2021c). There are three separate bureaus within the FTC: (1) Bureau of Competition; (2) Bureau of Consumer Protection; and (3) Bureau of Economics. The Bureau of Consumer Protection is tasked with the enforcement of laws related to consumer safety, fraud, and privacy protection. This Bureau is staffed with attorneys who have the power to pursue cases against various forms of fraud and identity crimes. In particular, the FTC serves as a key reporting resource for consumer complaints of identity crimes though both an online and telephone-based reporting mechanism. It is important to note that the FTC does not pursue individual claims to any resolution. Instead, the aggregation of reporting information is used to determine when and how federal

lawsuits may be brought against specific groups or to develop legislation to protect consumers. The FTC also operates a spam-reporting database to help track the various scams that are used by fraudsters over time. Finally, they offer a variety of consumer-focused publications that discuss the risks for identity theft and ways to protect credit scores, bank accounts, and other sensitive information.

**For more consumer information from the FTC, go online to:**  
[www.consumer.ftc.gov](http://www.consumer.ftc.gov)



The FTC is also increasingly involved in the regulation and monitoring of online advertising campaigns. As consumers increasingly utilize e-commerce sites in the course of their shopping, it is vital that their rights and personal information are safeguarded from deceptive advertising practices or unfair tracking policies. For instance, the FTC filed a complaint against a company called Just in Time Tickets, Inc. in January 2021 (Federal Trade Commission, 2021b). The company operated a ticket broker business selling tickets for concerts, sporting events, and other live events at a premium price.

What the company did not explain to consumers was that it utilized automated software, colloquially known as bots, to purchase tickets at their face value when they went on sale for events (Federal Trade Commission, 2021b). The FTC was empowered to take legal action against the company on the basis of little-known law called the **Better Online Ticket Sales (BOTS) Act**. This act, implemented in 2016, was designed to limit the use of automated software to purchase tickets for events, and gave the FTC the power to pursue legal action for violations of the law. As a result, the company was required to pay \$3.7 million in damages to consumers (Federal Trade Commission, 2021b).

There are similar entities for data protection across the world, such as the UK's Information Commissioner's Office (whose main purpose is to protect the public's information rights and privacy) (ICO, 2021), the Australian Government's Office of the Australian Information Commissioner (OAIC) (OAIC, 2021), and Spain's Agencia Española de Protección de Datos (AEPD) (AEPD, 2021). These agencies provide detailed information on governmental regulations, the protections that should be in place for personal data, and what individuals should do in the event that they are victimized in some fashion. Additionally, these agencies may work together to share information and investigate some forms of offending. For instance, these nations all have a collaborative working agreement with the FTC to collect data on spam and other consumer threats (Lake, 2020).

## Summary

As a society, we have increasingly come to depend on the Internet and computer technology to manage most every aspect of our financial lives. This has unparalleled benefits in that we can track expenses and monitor our purchases in near real time. Our ability to connect to others and to pay for purchases has also increased the opportunities for fraudsters to take advantage of vulnerable populations. The use of email-based scams allows individuals to create convincing replicas of messages from legitimate service providers and vendors. Consumers must now be extremely cautious about accepting what they see in online messages at face value. The amount of sensitive information about our financial and personal lives that is now outside of our regulation has also created opportunities for fraud that are beyond our control. Fraudsters can now victimize hundreds of thousands of people in a short amount of time and gain a substantial profit from the sale of this data.

The response from the criminal justice and financial sector to these crimes has improved greatly over the last decade. There are still great challenges involved in the detection, investigation, and successful prosecution of these cases due to the jurisdictional challenges that may exist. Since offenders and victims can be hundreds, if not thousands, of miles away from one another, it is difficult to arrest responsible parties or even make victims whole through restitution. Thus, we must continually improve consumer awareness of fraud to reduce the likelihood of victimization and simultaneously expand the capabilities of law enforcement to respond to these crimes.

## Key Terms

- 419 scams
- Action Fraud
- Advance fee email schemes
- Anti-Phishing Working Group (APWG)
- Better Online Ticket Sales (BOTS) Act
- Business email compromise (BEC)
- Canadian Anti-Fraud Centre (CAFC)
- Customs and Border Patrol (CBP)
- Cyber Fraud Task Forces (CFTFs)
- Data or security breaches

Fair and Accurate Credit Transactions Act of 2003  
Federal Trade Commission (FTC)  
Fraud  
Identification document  
Identity fraud  
Identity theft  
Identity Theft and Assumption Deterrence Act of 1998  
Identity Theft Enforcement and Restitution Act of 2008  
Identity Theft Penalty Enhancement Act of 2003  
Immigration and Customs Enforcement (ICE)  
Internet Crime Complaint Center (IC3)  
National Crime Agency (NCA)  
National Fraud Intelligence Bureau (NFIB)  
Personal identification number (PIN)  
Personally identifiable information (PII)  
Phishing  
Romance fraud  
Romance scam  
Spear phishing  
United States Secret Service

## Discussion Questions

1. As we continue to adopt new technologies to communicate, how will scammers utilize these spaces? For instance, how might a scammer use FaceTime or TikTok to lure in prospective victims?
2. What demographic groups seem most susceptible to fraud schemes, like romance scams? Why do you think this might be the case?
3. What steps and techniques can individuals use to reduce their risk of victimization via a data breach or other non-interactive forms of fraud?
4. How can nations work together better to address fraud? What is a nation supposed to do if its citizens are routinely victimized online by citizens of another nation which refuses to do anything about it?

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Chapter

7

# PORNOGRAPHY, IMAGE-BASED SEXUAL ABUSE, AND PROSTITUTION

## Chapter Goals

- Connect the evolution of pornography with technology
- Explore the impact of image-based sexual abuse on victims
- Examine the role of the Internet in prostitution
- Know the laws pertaining to obscenity and image-based sexual abuse
- Explore the role of self-regulation in dealing with obscenity around the world

## Introduction

Computer-mediated communications allow individuals to easily engage in sexually explicit discussions, view pornography (Lane, 2000), and commit more serious acts, including creating, disseminating, downloading, and/or viewing pedophilia and child pornography (Durkin & Bryant, 1999; Quayle & Taylor, 2002). In addition, the Internet has engendered the formation of deviant subcultures that were otherwise unlikely or limited in the real world (see Quinn & Forsyth, 2005). Individuals can connect with others who share their interests to find social support and information sharing. Virtual environments provide an opportunity for deviants to connect and communicate without fear of reprisal or scorn, though their actions may often take place in the real world (Quinn & Forsyth, 2005).

As a result, the Internet now provides resources that cater to all individuals, regardless of sexual orientation or preferences. Additionally, these services can be arrayed along a spectrum from legal but deviant to illegal and strongly sanctioned depending on the nature of the content and the laws of a given country (Quinn & Forsyth, 2005). For example, there are a number of service providers offering completely legal resources to connect individuals together, such as dating apps like Tinder, Bumble, and Match.com. These sites allow individuals to make personal profiles noting their likes and dislikes, connect with others who share their interests, and potentially meet offline for a date or build a long-term relationship. Similar services also exist that are designed to facilitate short-term sexual encounters, including extramarital affairs, based on personal profiles that connect interested parties together. Websites like AshleyMadison.com, Victoria Milan, and Casualx have become extremely popular to connect people for overt, short term casual sex between people, regardless of their involvement in monogamous relationships (Bort, 2013).

In addition to content designed to facilitate sexual and/or romantic relationships, a great deal of **pornography**, defined broadly as the representation of sexual situations and content for the purposes of sexual arousal and stimulation (Lane, 2000), is available online. These erotic writings, photos, video, and audio content, which are easily accessible, are largely legal, but may be viewed as deviant depending on the social norms and values within a community (Brenner, 2011). In the United States and most Western nations, pornographic content is legal so long as the participants (or those depicted in the work) are over the age of 18 and the consumer is of legal age. Some content, such as sex between animals and humans, rape or physical harm, and images featuring children and minors, are illegal (Quinn & Forsyth, 2013). The lack of boundaries in online spaces, however, makes it hard to completely regulate or restrict individuals' access to this content.

**For more on the legal status of pornography, go online to:** [http://en.wikipedia.org/wiki/Pornography\\_by\\_region](http://en.wikipedia.org/wiki/Pornography_by_region)



The availability of pornography and erotica has enabled individuals to find content that appeals to any interest, no matter how unusual. In fact, there is now a wide range of online content providers that cater to specific **sexual fetishes**, where individuals experience sexual arousal or enhancement of a romantic encounter based on the integration of physical objects or certain situations (Quinn & Forsyth, 2013). Fetishes can include anything from wearing high heels or a certain type of clothing (e.g., nursing or police officer uniforms), to more extreme acts, including sex with animals (**bestiality**) or the dead (**necrophilia**). The range of subjects that are now featured in pornographic content online has led to the concept of "**Rule 34**," which essentially states that "if it exists, there is pornographic content of it" (Olson, 2012).

**For more on sex work, go online to:** <http://rabble.ca/books/reviews/2014/05/working-it-sex-work-labour>



Technology also facilitates traditional prostitution in the real world, where individuals pay for sexual encounters with another person. For instance, clients

of sex workers use forums and other computer-mediated communications (CMCs) to discuss the sexual services available in a location and the acts that sex workers will engage in (Holt & Blevins, 2007; Milrod & Monto, 2012; Weitzer, 2005). Sex workers use websites, blogs, and email in order to arrange meetings with clients and vet them before they meet in the real world (Cunningham & Kendall, 2010). Though these communications are not illegal, laws pertaining to the act of prostitution vary from country to country (Weitzer, 2012). Some nations, such as the United States, Russia, and China, have criminalized both the sale of and solicitation of sex. Other nations including Sweden, Norway, and Canada have made it illegal to pay for sex as a client, though sex workers can legally engage in prostitution. Still other nations have legalized prostitution entirely, such as the United Kingdom, though they may have laws against certain activities such as soliciting sex in public places (Weitzer, 2012). For those nations that have criminalized both the solicitation and sale of sex, technology is making it easier for both clients and providers to reduce their risk of detection and arrest.

Technological innovation and sexuality have clearly been intertwined since the first human attempted to paint on cave walls (Lane, 2000). This relationship has been brought to the forefront as we now utilize devices that can record and transmit any and all of our activities to others. As a result, this chapter will consider the ways that humans use technology to engage in various forms of sexual expression. In addition, the chapter will discuss how the intersectionality of technology and sexual exploration has influenced sexting and the traumatic consequences of revenge pornography or image-based sexual abuse (IBSA) on victims. We will also explore the impact of technology on paid sexual encounters, or prostitution, which has been in existence since the emergence of society. Finally, we cover the complex legal structures used to define obscenity and pornography, as well as the wide range of well-connected agencies that investigate these offenses.

### Pornography in the Digital Age

Prior to the Internet and consumer access to digital media, the production of sexual materials was primarily limited to professional production studios and artists. Amateurs were able to write their own erotic fiction and paint or sculpt images, though they may vary in quality. The development of audio and visual recording equipment in the 19th century revolutionized the creation of sexual images. No longer were individuals limited to line drawings or other artistic

representations of sexual images; instead, the human body could be represented as it was in real life (Yar, 2013). The first photographs featuring nudes were popularized by Louis Daguerre of France as a means to support the training of painters and other artists. Due to the process of photography at this time, it took between 3 and 15 minutes for an image to be captured, making it virtually impossible to present individuals engaged in actual sex acts (Lane, 2000). As photographic processing evolved in the 1840s and 1850s, the cost of creating images decreased, allowing nudes and erotic photos to be sold at a cost the middle class could easily afford. Images of nudes were also printed on postcard stock and sent through the mail to others, becoming colloquially known as “**French postcards**” (Lane, 2000).

The development of motion picture films in Europe in 1895 was followed almost immediately by the creation of the first erotic films (Lane, 2000). In 1896, the film *Le Couche de la Marie* was made by Eugene Pirou and showed a woman engaging in a striptease. Shortly thereafter, European and South American filmmakers produced films featuring actual sex between couples, such as *A L'Ecu d'Or ou la Bonne Auberge* from 1908 and *Am Abend* from 1910.

Producing erotic images or pornographic films during this period was extremely risky, as social mores regarding sex were very different from those of today. Until the Victorian era of the mid-1800s, there were few laws regarding possession or ownership of sexual images and objects. In fact, the world's first laws criminalizing pornographic content were created in the United Kingdom through the **Obscene Publications Act (OPA) of 1857** (Yar, 2013). This act made it illegal to sell, possess, or publish obscene material, which was not clearly defined in the law. Law enforcement could also search, seize, and destroy any content found, which was a tremendous extension of police powers at the time (Lane, 2000). Shortly thereafter, similar legal structures began to emerge throughout Europe and the Americas in order to help minimize the perceived corrupting influence of such content on the masses.

As a way to skirt these laws, pornography producers began to market their materials as either art materials or celebrations of health or nature, such as nudist lifestyles. Gentlemen's magazines also included images and drawings of nudes. The development of *Playboy* magazine in the 1950s epitomized the attempt to combine tasteful nudity coupled with traditional content regarding fashion, fiction, and news stories (Lane, 2000). These works pushed conventional attitudes toward perceived obscene content in mass media, while underground publishers were producing images of sexual intercourse and fetish materials that were sold through direct mail and in less reputable stores. These materials often

drew the attention of law enforcement, though social standards began to soften in the late 1960s and 1970s toward erotica and pornography. As a result, magazines and films became more prevalent and could be purchased at newsstands and some retailers, leading to a range of publications from *Hustler* to *Penthouse* (Lane, 2000).

Social attitudes toward obscene content evolved concurrently with technological innovations that became available to consumers in the 1970s through 1990s. In the 1970s, the development of the Polaroid instant camera and relatively affordable home video recording equipment made it easier for individuals to create their own pornographic media in the privacy of their own homes (Lane, 2000). The creation of the **video cassette** during the 1970s was also revolutionary, as consumers could record content using inexpensive recording cameras that put images onto blank tapes rather than film stock. Thus, individuals could film their own sexual experiences and could then watch them using **video cassette recorders (VCRs)** in their own homes on demand. These affordable devices revolutionized the production of pornography, so much so that the pornographic film industry began to record using video home system (VHS) tapes rather than actual film stock. As a result, the industry exploded and became extremely profitable due to low costs and high volume sales and rentals. Similarly, amateur content became increasingly possible as consumers owned the equipment needed to make their own sex tapes at home.

As technology continued to improve in the late 1990s with the expansion of the World Wide Web, individuals began to experiment with how they could use computers and media to create sexual images in their own homes without the need for major distribution through existing publishers (Yar, 2013). Digital cameras, web cams, and high-speed Internet connectivity allowed individuals to develop materials to sell directly to interested parties, regardless of whether they worked with existing pornography producers or on their own out of their own homes.

One of the prime examples of such a story is that of Sandra and Kevin Otterson, or **Wifey and Hubby**, who have operated their own pornographic website selling content that they produce since 1998 (Cromer, 1998). The couple had no prior involvement in the pornography or sex industry but were simply interested in sharing images of themselves. Kevin first posted scanned images of Polaroid pictures of his spouse on a Usenet group in 1997 and received extremely positive feedback from others. They continued to post pictures and eventually started to sell the materials through direct mailing. Their website first came online in January 1998 and had a monthly fee of \$9.95 in order to access

pictures, videos, and additional content that could be purchased through the real world. At the time, the couple estimated that they had made a few hundred thousand dollars from the sale of their content (Cromer, 1998).

The popularity of the web and computer technology led to a massive explosion of adult content online. In fact, there were some questions as to the impact that immediate access to pornography could have on society as a whole. A study which exacerbated this issue was published by an undergraduate student named Martin Rimm at Carnegie Mellon University in 1995 who attempted to document the scope of pornography online at the time (Godwin, 2003). His study, commonly referenced as the **Carnegie Mellon Report**, suggested that over 80 percent of images on the Internet involved sexually explicit content. The report's findings led to tremendous coverage in major news outlets, like *Time* magazine and *Nightline*, about the threat of cyberporn (Godwin, 2003). Policy-makers began to call for restrictions on pornographic content on the Internet, which created a small moral panic over how youth may be corrupted by the ability to see pornography online. Shortly after this firestorm began, academics began to review the methods employed in his work and discredited its findings based on limited methods and questionable ethics (Godwin, 2003). Regardless, Rimm's work had long-standing impact on the perceived availability of pornography on the Internet and affected legislation to deal with obscene content.

**For more on the fallout from the Carnegie Mellon Report, go online to:** [www.columbia.edu/cu/21stC/issue-1.2/Cyber.htm](http://www.columbia.edu/cu/21stC/issue-1.2/Cyber.htm)



Even now, the evolution of applications, high-quality digital cameras in mobile phones and tablets, and online outlets are affecting the production of pornography and adult content. The photo-sharing application SnapChat, which deletes images after being viewed by the recipient, has a base of users who have monetized the service as a mechanism to produce pornographic photos and videos. Individuals need only set up a premium account, where others pay to view the user's content via various services like PayPal (Moloney, 2019). Individuals have also used sites like Instagram as a means to advertise their own content. Interested parties can become subscribers to a content creator's feed on Patreon or OnlyFans and get access to all the materials they generate (Zen, 2020). Not only do amateurs use these sites, but so do traditional porn stars, as well as celebrities like Cardi B and Amber Rose (Rana, 2020). As a result,

estimates from OnlyFans indicates that content creators have been paid over \$1 billion via subscriber fees (Rana, 2020).

The popularity of photos and videos taken by amateurs using mobile phone cameras, whether voluntarily or as “revenge porn” (discussed below), has created a unique demand for this content. Not only have professional pornography producers simulated this content with professional performers, but individuals also share amateur content with others online via forums and file sharing sites. The desire for amateur content may have been part of the driving force for the release of illegally acquired photos and videos of multiple celebrities on August 31, 2014 (Drury, 2015). The images initially appeared on the website 4chan, but later appeared on a range of websites around the world, and has been referred to as **The Fappening** (slang for masturbation), or **Celebgate** due to the target of the releases. The content of major and minor celebrities who were iPhone users were acquired through phishing schemes to obtain their user-names and passwords (Drury, 2015). In turn, several hackers gained access to hundreds of celebrities’ content hosted on the Apple iCloud storage platform. The images acquired were shared widely across the web, though attempts to remove the content from websites or blogs are always defeated by individuals who repost it elsewhere.



**For more on the ways that celebrity data was acquired from iCloud, go online to: <https://www.zdziarski.com/blog/?p=3783>**

The Internet also facilitates paid sexual services of all kinds, which operate at varying degrees of legality. The development of high-speed Internet connectivity and live-streaming video feeds allow male and female performers to engage in sex shows on demand where they are paid for their time (Roberts & Hunt, 2012). Sites like LiveJasmin and CamSoda provide access to performers who engage in text-based conversations with individuals viewing them on streaming-video feeds and take requests for specific behaviors or sexual acts. In turn, the performer can be taken into a private session where the viewer pays by the minute to interact with and direct the performer to engage in various activities (Roberts & Hunt, 2012). Though these exchanges do not involve actual physical contact between the provider and client, making the encounters completely acceptable from a legal standpoint, the acceptance of payment makes this a form of sex work.

## Box 7.1 The Growth of VR Porn Content in 2020

### More and More People Are Turning to VR Porn during Self-Isolation for Comfort from Depression, Anxiety, and Frustration

<https://www.insider.com/adult-entertainment-industry-seeing-rise-in-vr-porn-isolation-2020-3>



Daniel Abramovich, the CEO and cofounder of VR Bangers, told Insider his company has seen a 30% growth in sales since the coronavirus lockdown began. He said this is probably because “people are going crazy at home.”

This article gives an assessment of the increased proportion of porn site visits and use of VR pornography during the COVID-19 shutdowns globally.

As technology continues to evolve, pornography producers have also attempted to stay current with new trends. In particular, the pornography industry is creating content specifically for use in virtual reality (VR) headsets, where individuals insert their smartphones into a special wearable headset-cradle that produces an entirely immersive experience (see [Box 7.1](#) for more detail). Scenes are shot specifically for VR users using multiple cameras and are edited so as to place the viewer directly into the scene. Regardless of the acceptance of VR as a new media platform, this example clearly demonstrates that the landscape of porn will continue to evolve in tandem with our use of popular technologies.

## Image-Based Sexual Abuse

As technologies have improved over the last two decades, the ability for humans to connect in real time has increased dramatically. In the early days of the web, bulletin board systems (BBSs) and chat rooms gave people the ability to talk via text, though this lost some of the context of facial and emotional expression, such as laughter or anger. As camera and video technology evolved, so did its use online through the introduction of Skype and other video-chat programs. The inclusion of cameras in virtually all computing devices has led to the growth of social media platforms focused on sharing photos and videos with others, such as Snapchat and Instagram.

As a result, an increasingly large number of people are using these technologies to enhance their romantic relationships or flirt with others, though this was not perhaps the intention of the developers. People can send photos or videos of themselves in provocative outfits or engage in sexually suggestive activities with great ease through text messaging. This activity, colloquially called **sexting**, has become popular as it is perceived as a way to attract or stimulate a prospective partner with a degree of security since it is directed toward only one recipient, rather than routed through an email client, which might make the content visible to others (Mitchell et al., 2012). In fact, the impact of sexting on popular culture can be seen in songs such as the 2015 Top-40 rap song by Yo Gotti called “Down in the DM” which explores the process of sending and receiving nude images via social media sites.

The seemingly common practice of sexting has led researchers to examine the prevalence of this activity among young people. Estimates of the prevalence of sexting vary by place, but have consistently increased over time (Madigan et al., 2018). A recent meta-analysis of American studies indicated an average of 14.8 percent of high school students sent sexts, and 27.4 percent received sexts (Madigan et al., 2018). In Australia, researchers have reported substantially wider uptake. For example, Lee et al. (2015) found that two-thirds of a large convenience sample of Australian high school students had received a sext and almost half reported they had sent a sext of themselves (also see Patrick et al., 2015).

Regardless of the proportion of people who engage in sexting, it is important to know that the instant the photo or video is sent, it is no longer something that the sender can control. Even content sent via social media sites like Snapchat, that suggest no user content is retained, can still be captured via screenshots. A recipient can easily circulate the content to others or repost the image on a social media site, like Facebook, to embarrass the sender (Mitchell et al., 2012). Worse still, a number of websites have emerged specifically for individuals to post sexual images and videos they received or acquired for others to see. These sites are often referred to as **revenge porn**, as people often post content they received from an intimate partner after a relationship sours, or by hacking someone’s phone or email account in order to acquire pictures and embarrass the sender (Halloran, 2014).

The release of revenge pornography, or the uploading of nude or seminude images or videos of others without their consent (Bates, 2017), has become popular, leading to the development of multiple websites dedicated to such content. For instance, the website IsAnyoneUp.com, which was subtitled “Pure Evil,”

was created by Hunter Moore in 2010 (Dodero, 2012). He began to post pictures of a woman who continuously sent him sexual images on a blog space and provided a link for others to submit photos to be posted. As content began to roll in – some from hackers, some from ex-girlfriends and boyfriends, and some from individuals just interested in seeing themselves online – Moore would link the photos to the Facebook or Twitter page of the individual featured (Dodero, 2012). The site became quite popular, though it drew substantial criticism from individuals who were unwittingly featured on the site. As a result, Moore sold the site to an anti-bullying group in 2012, arguing that he was no longer able to support the site due to its expenses and the difficulties of reporting the submitted images of child pornography to law enforcement. Eventually, Moore and a hacker he worked with were indicted in January 2014 in federal court on 15 counts of violations of the Computer Fraud and Abuse Act on the premise that photos were acquired through the use of hacking techniques and identity theft (Liebelson, 2014). Both were eventually found guilty, though some argue their sentences were too lenient relative to the impact they had on their victims' lives (see [Box 7.2](#) for more discussion).

## **Box 7.2 The Impact of Image-Based Sexual Abuse on Its Victims**

### **Hunter Moore Revenge Porn Victim Got a Whopping \$145.70 in Restitution**

<http://motherboard.vice.com/read/hunter-moore-revenge-porn-victim-got-a-whopping-14570-in-restitution>



The \$145.70 is being paid to a single victim, identified only as L.B. Her email account was hacked in 2011 by Moore's co-defendant, Charles Evens, who was sentenced to 25 months in prison last week. Hunter Moore paid Evens to acquire as many hacked photos as possible.

This article provides a discussion of the outcome of the prosecution of Hunter Moore and Charles Evens, who published sexual images of multiple women on the website [isanyoneup.com](http://isanyoneup.com). The issue of victim restitution relative to the impact that the publication of revenge porn content has on their lives is explored, giving context to the need for greater legal solutions to assist individuals whose lives have been affected.

Studies have shown that revenge pornography is a significant and growing problem in both youth and adult samples. Estimates vary based on sampling, methodology, and definitional differences. Crofts et al. (2015) found that one in five young people reported showing a nude image of an individual to another without the depicted person's permission. For adults, victimization rates for the nonconsensual sharing of nude images generally range between 1 and 12 percent (Henry & Flynn, 2020). For example, 8 percent of a sample of Facebook users reported that someone had posted a sexually explicit image or video of themselves without their permission (Eaton et al., 2018). Similarly, 10 percent of an Australian sample reported that a nude image of themselves has been shared without their consent (Powell & Henry, 2017). Unfortunately, all estimates of revenge pornography will always be underestimated because victims have to be aware that their images were shared or posted without their consent in order to be able to report their victimization (Henry & Flynn, 2020).

Victims of revenge pornography may suffer serious consequences as a result of their images being shared either privately and/or publicly without their permission. Victims often experience shame and humiliation as well as significant mental health problems resulting from this traumatic and possibly repeating victimization, including anxiety, depression, post-traumatic stress disorder, and suicidal thoughts (Bates, 2017; Powell et al., 2018). The Cyber Civil Rights Initiative (2014) found that 93 percent of IBSA victims suffered significant emotional distress as a result of their nude images being distributed online without their consent. Almost half (49 percent) also experienced online harassment or stalking by individuals who had seen the images. It is therefore not surprising that many victims are extremely fearful for their safety (Powell et al., 2018). As a result, many victims may also self-isolate and alter both their online and offline behavior to avoid interacting with others (Bates, 2017). The ripple effects of this victimization may lead victims to lose their employment, have difficulties obtaining new jobs, and have challenges with future relationships (Citron & Franks, 2014).

Today, many victim advocacy groups, policy makers, and scholars reject the term "revenge pornography" for four primary reasons (Henry & Flynn, 2020). First, offenders in many cases may have other motivations than revenge for "revenge pornography." Second, the term leads to an over focus on offenders and victims who were in previous relationships and ignores other categories, such as offenders who take or steal nude images of the victim without their knowledge. Third, the term has victim-blaming connotations in that it implies

the victim is responsible for the creation of the nude images and behaved in a way that caused the offender to act in the way that they did. Fourth, the term brings more attention to the images themselves rather than the behavior of the perpetrator (Henry & Flynn, 2020).

As a result, many scholars have transitioned from the term “revenge pornography” to other terms, such as “nonconsensual pornography” (Citron & Franks, 2014) or more notably “**image-based sexual abuse (IBSA)**” (e.g., Powell & Henry, 2017). These terms can better capture the different behaviors (e.g., upskirting, downblousing, hacking someone’s computer and stealing images, etc.) and relationships (e.g., strangers, current relationship) that can exist within the unauthorized taking and sharing of nude images. In addition, the terms allow for examination of motivations other than revenge, such as monetary gain, power, sexual pleasure, and entertainment. The different terms hopefully also remove some of the victim blaming connotation that can occur when discussing “revenge pornography” and instead better capture the traumatic effects this abuse has on victims. Finally, these terms focus more on the abusive actions of the offender than the sexual content of the images (Henry & Flynn, 2020).

**For more information on how to remove image-based sexual abuse images from the Internet, go online to the Cyber Civil Rights Initiative’s Online Removal Guide: <https://www.cybercivilrights.org/online-removal/>**



## Prostitution and Sex Work

In recent years, researchers have explored the influence of technology on what is arguably the world’s oldest trade – **prostitution**. The practice of paying for sex can be viewed as a sort of labor market where there is both a demand from clients or those who pay for the encounter and those suppliers who are paid for their services.

There is a range of providers currently engaged in the sale of sexual services, with prostitutes who work soliciting individuals on the street comprising the lowest rung of sex work (Lucas, 2005). Though studies estimate **street prostitutes** compose 10–20 percent of all sex workers, they are often racial minorities who receive very low wages and face significantly higher rates of

arrest (Alexander, 1998; Cooper, 1989; Hampton, 1988; Levitt & Venkatesh, 2007; Rhode, 1989; West, 1998). The larger proportion of sex workers operates behind closed doors in homes, apartments, and businesses (such as **massage parlors** and strip clubs), where the risk of arrest is substantially lower. Finally, **escorts** and high-end call girls comprise the highest echelon of sex workers and are thought to make much higher wages than any other sex workers (Lucas, 2005; Moffatt, 2005; Weitzer, 2000, 2005).

Paid sexual encounters were traditionally driven by discrete face-to-face exchanges on the street or behind closed doors in the real world. The emergence of the Internet and CMCS has revolutionized the practice by enabling providers and clients to connect on a one-to-one basis at any time. For instance, individuals can text or email sex workers to determine their availability and set up meetings. In fact, many escorts now operate their own websites and blogs and advertise in various outlets online to attract customers.



**For more on the role of the Internet in prostitution and human trafficking, go online to: <http://www.commercialappeal.com/story/news/crime/2017/01/27/ex-mata-ceo-among-arrests-memphis-sex-trafficking-sting/97132652/>**

Similarly, the customers of sex workers now use the web in order to communicate with others in order to gain insights into the resources available in their area and review the services of various providers (Blevins & Holt, 2009; Cunningham & Kendall, 2010; Holt & Blevins, 2007; Hughes, 2003; O'Neill, 2001; Raymond & Hughes, 2001; Sharp & Earle, 2003; Soothill & Sanders, 2005). These exchanges often occur in web forums and review websites and focus on the customer experience, including detailed discussions of the services offered by all manner of sex workers, as well as the attitude and behavior of prostitutes before, during, and after sex acts (Cunningham & Kendall, 2010; Holt & Blevins, 2007; Sharp & Earle, 2003; Soothill & Sanders, 2005). There are now numerous websites where individuals can post reviews of their experiences with sex workers (see **Box 7.3** for details). In addition, these websites provide specific detail on the negotiation process with sex workers, final costs for various sex acts, and the use of condoms during encounters (Cunningham & Kendall, 2010; Holt & Blevins, 2007; Sharp & Earle, 2003; Soothill & Sanders, 2005).

### Box 7.3 The Challenges of Escort Review Sites

#### "Yelp for Sex": Review Boards that Rate Women Flourish after Crackdown on Ad Sites

<https://www.nbcbayarea.com/news/local/sex-review-boards-internet/151516/>



Rarely do these men wonder aloud about whether the woman or girl they're reviewing is a consensual sex worker or coerced, despite evidence that at least some of the providers are victims of sex trafficking. Nor do they seem to consider the humanity of the other person, who is often boiled down to her physical attributes and objectified.

This article provides a unique exposé on the ways that local law enforcement in the United States use escort-review websites as a means to investigate prostitution and sex crimes generally.

The volume of information available online provides substantive detail on the largely hidden processes of the negotiations between clients and sex workers operating in the streets, as well as behind closed doors (Holt et al., 2013). Additionally, these posts give the client's point of view, which is often under-examined but critical, since their demand for sexual services affects the supply available. Prospective clients of sex workers who access these forums can use the information posted to evade high-risk areas while identifying and acquiring the sexual services they desire. This may decrease the success of law enforcement efforts in those nations where prostitution is illegal and, simultaneously, increase the knowledge of prospective customers to negotiate with workers across various environments (Holt et al., 2013; Scott & Dedel, 2006).

### The Clients of Sex Workers

The emergence of online communities that enable information sharing among the clients of sex workers has changed the process of soliciting sex workers. The development of online communities allowed individuals to discuss their preferences and experiences with no fear of rejection or embarrassment. In fact, research by Blevins and Holt (2009) found that there is now a subculture of clients in the US operating in a series of web forums that is guided by their

preferences and interests. This subculture places significant value on the notion that paid sexual encounters are normal and non-deviant. In fact, those who visited sex workers placed significant value on their experiences and knowledge of the sex trade. As a result, they would not refer to themselves as “**johns**” or “**tricks**,” as they are known in popular culture (Scott & Dedel, 2006). Instead, forum users avoided such derogatory terms in favor of terms like “monger” or “hobbyist” to recognize that they are interested in paid sexual encounters and enjoy the experience. Individuals who posted great detail about their experiences with sex workers were often viewed as senior members. As a result, those who were unfamiliar with the sex trade can ask for assistance from more senior or experienced members in the forum to gain information.

Additionally, the customers of prostitutes viewed sex and sex workers as a **commodity**, in that encounters cannot occur without payment. Thus, johns regularly referred to sex workers on the basis of where they worked, whether in streets, strip clubs, or advertised online using abbreviations such as **street-walker** or **SW** to indicate the worker is a street-walking prostitute. Similarly, forum users would include terms to describe the build and appearance of sex workers that objectify them in some fashion. In particular, forum users typically discussed the **mileage** of a sex worker, referring to their appearance and how it had degraded over time in the sex trade. The notion of mileage is most often used in reference to cars, motorcycles, and vehicles, suggesting that customers of sex workers view the providers, first and foremost, as a commodity rather than a person. In addition, the participants in prostitution forums focused heavily on the costs associated with various sexual acts and the negotiation process between the client and provider (see **Box 7.4** for more detail on the actual thoughts of a hobbyist).

Finally, the subculture of client-centered prostitution forums focuses on sexuality and the way that sex is experienced. Many of the posts in these forums were dedicated to depicting the types of sex acts and services that certain prostitutes would provide in very graphic detail. The users commonly discussed the acts that providers would offer and whether or not they used condoms. There was also some discussion of the quality of the experience, as prostitutes who could make the experience feel like a consensual relationship with no money involved were said to provide **girlfriend experience**, or **GFE** (Blevins & Holt, 2009; Milrod & Monto, 2012; Sharp & Earle, 2003; Soothill & Sanders, 2005). Since there was no way to guarantee that the experience of one user would be consistent with others, some would use the term **your mileage may vary (YMMV)** in reference to the variation in encounters.

## Box 7.4 The Opinions of a Hobbyist in Canada

### We Spoke to a Sex Industry Hobbyist, the Worst Kind of John

[https://www.vice.com/en\\_ca/article/we-spoke-a-sex-industry-hobbyist-the-worst-kind-of-john](https://www.vice.com/en_ca/article/we-spoke-a-sex-industry-hobbyist-the-worst-kind-of-john)



I have been using the boards for about eight years. I use the review boards for one reason: to find out if there are any new girls in the hobby. Cheap whores you can find anywhere; in bars, massage parlours, strip clubs. But new girls, that still have a bit of authenticity to them, are rarer.

This article provides a unique interview with a frequent customer of sex workers who participates in multiple online forums to learn about the trade. His perspective validates some of the findings from researchers regarding the values and beliefs of the clients of sex workers in online communities.

## Dealing with Obscenity and Pornography Online

### Existing Legislation

The way that obscenity is defined varies by place and is heavily dependent on prevailing social standards. In the United States, legal definitions of **obscenity** have evolved over time through cases reviewed by the Supreme Court. In fact, the case of *Miller v. California* in 1973 established the definition of obscene content that is still in use today (US Department of Justice, 2020). A work can be deemed obscene and, therefore, not protected by the First Amendment right to free speech, if it meets one of these three criteria:

- 1 an average person who is capable of applying contemporary adult community standards finds that material appeals to prurient interests, defined as “an erotic, lascivious, abnormal, unhealthy, degrading, shameful, or morbid interest in nudity, sex, or excretion;”
- 2 an average person applying contemporary adult community standards determines that a work depicts or describes sexual conduct in a patently offensive way, defined as “ultimate sexual acts, normal or perverted, actual or

simulated, masturbation, excretory functions, lewd exhibition of the genitals, or sado-masochistic sexual abuse;” and

- 3 lacks serious literary, artistic, political, or scientific value (US Department of Justice, 2020).

This decision provides each community and state with the flexibility necessary to define what constitutes indecent or obscene materials (Tuman, 2003). In addition, it identified that there are differences between minors and adults, which require youth to be protected from obscene content. Because the government has the responsibility to protect youth from harmful or obscene content, the standard for what constitutes obscenity for minors is lower than that for adults. The three-pronged Miller standard still applies, though in the context of standards for “minors,” harmful materials constitute “any communication consisting of nudity, sex, or excretion” (US Department of Justice, 2020).

A number of federal statutes are present concerning obscene content. Under Title 18 U.S.C. 1460–1470, it is a crime to:

- 1 possess obscene material with the intent to distribute those materials on Federal property,
- 2 import or transport obscene materials across borders,
- 3 distribute or receive obscene material through a common carrier in interstate commerce, including postal mail, private carriers, or computer and Internet based services,
- 4 broadcast obscene, profane, or indecent language via television, radio, or cable and subscription television services,
- 5 knowingly produce, transport or engage in the sale of obscene, lewd, or filthy material through interstate commerce, and
- 6 transfer obscene materials to minors.

The punishments for these offenses vary based on the severity of the offense (US Department of Justice, 2020). Possession with intent to distribute obscene materials on federal property and broadcasting obscene content can lead to a fine and/or a two-year prison sentence. All other offenses, with the exception of transferring obscene content to minors, can be punishable by a five-year prison sentence, a fine, or both (see [Box 7.5](#) for a review of some of the obscenity cases prosecuted over the last two decades). Individuals who are found guilty of transferring obscene content to minors can receive a prison sentence of up to ten years and/or a fine (US Department of Justice, 2020).

## Box 7.5 The Vagaries of Prosecuting Obscene Content Online

### Why Can You Go to Prison for Making Scat Porn?

[https://www.vice.com/en\\_au/article/why-is-the-guy-who-made-2-girls-one-cup-going-to-jail](https://www.vice.com/en_au/article/why-is-the-guy-who-made-2-girls-one-cup-going-to-jail)



Ira Isaacs was in the same business as the creator of 2 Girls 1 Cup, and as a result, he's been sentenced to 48 months in jail for "producing and selling obscene videos and distributing obscene videos."

This article provides a plain spoken review of the range of pornography creators and distributors who have been prosecuted in the United States for making obscene content available online. It gives the reader a clear understanding of the situations and circumstances that are likely to lead to federal charges against pornographers.

It should be noted that there have been several attempts to legislate obscene content hosted online in the United States. Various Acts have been passed, such as the **Child Online Protection Act (COPA)**, though they were eventually overturned by the court system on the basis that they limit the potential for free speech (Brenner, 2011). Perhaps the most important of these laws was made to the **Communications Decency Act of 1996 (CDA)**, which regulated online indecent content, specifically pornography and other obscene materials. The language of the act criminalized the use of computer services to send or display content to anyone under the age of 18 that included "any comment, request, suggestion, proposal, image, or other communication that, in context, depicts or describes, in terms patently offensive as measured by contemporary community standards, sexual or excretory activities, or organs" (Brenner, 2011).

The broad scope of this language led the law to be overturned on the basis it limited all people's right to free speech, though one section of the law remained in place: Section 230 (Brenner, 2011). This section was actually an amendment to The Communications Act of 1934 which was created to limit and regulate the transmission of obscene content over the radio and television. Language was added to regulate online spaces via the CDA to create a degree of responsibility to content creators via web sites, service providers, and ISPs to minimize the exposure of obscene content through their platforms (Brenner, 2011). This

legislation also added a key provision that limited the legal liability of online service providers, Internet Service Providers, and users on the basis of third-party generated content. Known as a Good Samaritan provision, it states “No provider or user of an interactive computer service shall be treated as the publisher or speaker of any information provided by another information content provider.” As an example, YouTube is not responsible if obscene content is generated and uploaded to their site, as they simply host videos. This language provides ISPs and web sites with substantive protection from legal and civil actions (Brenner, 2011), though this provision was recently edited which is discussed later in this section.

In addition, the US criminalized the use of misleading domain names in order to draw Internet users to websites hosting sexually explicit or obscene content under the **Truth in Domain Names Act of 2003** (Brenner, 2011). One of the first individuals arrested under this law operated a range of websites using domain names that were misspelled versions of popular artists and intellectual property for kids. For instance, his site [www.dinseyland.com](http://www.dinseyland.com) featured hardcore pornography and was a direct misspelling of the legitimate website [www.disneyland.com](http://www.disneyland.com) (CNN, 2003). The operator of the site can be imprisoned for up to two years (or up to four if the domain name was selected to intentionally attract minors to the site) and may be fined up to \$250,000.

To demonstrate the variation in what is defined as obscene, the **Obscene Publications Act (OPA) of 1959** for England and Wales indicates any article may be obscene if its effect on the audience member who reads, views, or hears it is to “deprave and corrupt” (Crown Prosecution Service, 2019). The decision regarding what is obscene is to be determined by a jury without the assistance of an expert, which to a certain degree mirrors the US concept of community standards in establishing obscenity (Crown Prosecution Service, 2019). The law does specify that most depictions of sexual intercourse or fetish activities that are consensual are unsuitable for consideration as obscene, though more serious depictions of rape, torture, bondage, degrading sexual acts such as the consumption of excretion, and sex with animals are appropriate for prosecution (Crown Prosecution Service, 2019). This includes video, audio, and photographic images in physical print, such as magazines and DVDs, as well as content distributed over the Internet.

Individuals who publish or sell obscene articles for economic gain and are found guilty of violating this act can be fined and imprisoned for between three and five years, as a result of a recent enhancement of sentences through the **Criminal Justice and Immigration Act 2008** (Crown Prosecution Service, 2019). This act

also criminalized the possession of **extreme pornography**, defined as materials produced for the purpose of sexual arousal which depict acts that “threaten a person’s life; acts which result in or are likely to result in serious injury to a person’s anus, breasts or genitals; bestiality; or necrophilia” (Crown Prosecution Service, 2019). For instance, acts involving the insertion of sharp instruments (such as blades or needles) mutilation and cutting, choking, or serious blows to the head or body are all potentially illegal under this new law. This legislation also allows individuals who possess extreme pornography that threatens a person’s life or leads to serious injury to be fined or imprisoned for up to three years, while all other images, such as bestiality, can lead to a maximum sentence of two years in prison (Crown Prosecution Service, 2019).

An additional set of laws were passed and implemented in 2001, requiring the implementation of filtering and security protocols to protect youth. The **Children’s Internet Protection Act (CIPA)**, which covers all schools that teach students from kindergarten through 12th grade, and the **Neighborhood Children’s Internet Protection Act (NCIPA)** which encompasses public libraries, require Internet filters in these locations that block young people from accessing harmful content, including pornographic and obscene materials (Federal Communications Commission, 2013). Also, the law requires that a “technology protection measure” must be implemented on every computer within the facility that is connected to the Internet, and each institution must adopt and implement an Internet safety policy addressing most forms of cyber-crime (Federal Communications Commission, 2013). In the event that such filters are not put in place, the school or library may lose certain federal funding and grants.

As for the sending of sexual content by individuals using mobile technology and digital photography, teenage sexting is illegal in all 50 states within the United States (O’Connor et al., 2017). Half of US states (26 states) and Washington DC have specifically criminalized the act of someone sending sexual images of themselves to minors (Hinduja & Patchin, 2019). In the other states, child pornography statutes are used to prosecute teenage sexting cases (O’Connor et al., 2017). Interestingly, only nine states specifically use the phrase sexting in the language of their statutes. The criminal penalties associated with sexting range from community service and minor misdemeanors to felonies and being required to register as a sex offender, depending on whether the offender is convicted under a sexting or child pornography statute (O’Connor et al., 2017).

Sexting laws were intended to protect minors from adults sending sexually explicit content, not from teens sending images to other teens. Some

critics, however, argue they unfairly stigmatize youth for engaging in sexual behaviors that have become a somewhat normal feature of sexual relationships in the modern age. This may explain why there is no federal legislation to date involving sexting behaviors in the United States and in most other Western nations.

Much like sexting, the distribution of sexual images without permission from its creator presents a unique challenge for lawmakers. On one side, individuals argue that if a person creates the content herself or himself (but normally herself) and sends it to others, s/he loses ownership of those images and control of whether or where those images are posted. Others argue that it is a violation of trust and that the lack of consent from the person who took the image should keep the content from being posted elsewhere. There has been substantive public outcry over the need for criminal and civil remedies to combat this activity in nations across the globe.

Forty-eight states and the District of Columbia have developed laws criminalizing the nonconsensual disclosure of sexual images or content (Cyber Civil Rights Initiative, 2021). Some states, like Utah, have made the release of images a misdemeanor, while others such as Arizona have made it a felony. Additionally, some states have created civil statutes allowing victims to sue the individual involved in the release or threat to release content for damages, legal costs, and related fees.

The United States does not have a federal statute criminalizing IBSA. The House of Representatives in early 2021 passed the *Stopping Harmful Image Exploitation and Limiting Distribution Act of 2021* (the SHIELD Act) as an amendment to H.R. 1620, the Violence Against Women Reauthorization Act of 2021. The SHIELD Act would allow the Department of Justice to prosecute individuals who distributed private, sexually explicit images or nude images of individuals without their consent and who had expectations that the images would remain private. The offender could be punished with up to two years in prison for each person's images that are distributed. At the time of the writing of this textbook in early-2021, the US Senate had not yet voted on reauthorizing the Violence Against Women Act, including the SHIELD Act Amendment (Robertson, 2021).



**For more information on image-based sexual abuse legislation in the United States, go online to: <https://www.cybercivilrights.org/revenge-porn-laws/>**

Several nations have criminalized posting sexual content without the authorization of the creator. For instance, France has made it illegal for a person to transmit the picture of a person who is within a private place without their consent (Clarke-Billings, 2016). Canada and the United Kingdom have similar legislation, though the United Kingdom added language that the sender must have an intent to cause distress to the individual featured in the content. In the United Kingdom, individuals found guilty could be imprisoned for up to two years and face a fine. India's Information Technology Act 2000 also criminalizes capturing, transmitting, or publishing images of a person's private parts without their consent or knowledge. Violating this statute is punishable by up to three years in prison or a fine of up to 200,000 rupees. Israel may have the most severe sanctions associated with IBSA, as the offender can be classified as a sex offender and be subject to up to five years in prison (Clarke-Billings, 2016).

It is important to note that many nations have laws pertaining to prostitution at both the local and federal level. The sale of sex has been criminalized, though the extent to which it is enforced is highly inconsistent. Several Southeast Asian nations (e.g., Malaysia, the Philippines, and Thailand) do not strictly regulate prostitution, making them an ideal locale for individuals interested in sex tourism, particularly for sexual encounters with minors (Nair, 2008). Additionally, few nations have language in their criminal codes regarding the use of technology in order to acquire or solicit sexual services. As a result, Western nations have criminalized the act of sex tourism (Nair, 2008). For instance, the US federal criminal code (18 USC § 2423(c)) criminalizes the act of traveling to a foreign country to engage in paid sexual encounters with minors. This is true even if the activity is legal in the country where the act took place (Nair, 2008). Individuals found guilty under this statute can be fined and imprisoned for up to 30 years. Additionally, many Western nations have criminalized the act of paying for sex with minors in order to protect youth from commercial sexual exploitation (Brenner, 2011).

The United States also passed somewhat controversial laws designed to curb sex trafficking on and offline in 2018. The **Stop Enabling Sex Traffickers Act (SESTA)** and **Allow States and Victims to Fight Online Sex Trafficking Act (FOSTA)** were designed to make it illegal to knowingly assist, support, or facilitate sex trafficking, and specifically amended a key part of the CDA (Romano, 2018). The language of FOSTA changed section 230 of this CDA, making it possible for law enforcement actions to be taken against web sites and online service providers who are used in some way to facilitate sex trafficking and sexual exploitation of children (Romano, 2018). The clarification

did not eliminate this content from the web and rather appears to have moved many websites to be hosted in other countries so as to minimize legal exposure to site owners and users.

### ***Self-Regulation by the Pornography Industry***

Though most every other thematic chapter ends with a discussion of the law enforcement agencies responsible for dealing with investigating violations of existing statutes, this chapter will differ due to the overlapping duties of agencies regarding the crimes discussed in the next chapter. To avoid redundancy, this chapter will focus instead on the role of industry in regulating and policing the presence of obscene content online.

Currently, pornography producers are encouraged but not legally mandated to avoid exposing individuals under the age of 18 to obscene content. Prior laws that were specifically designed to minimize the likelihood that minors could access pornography have been overturned in the United States due to concerns over their effect on free speech rights (Procida & Simon, 2003). As a result, there are a range of techniques that pornographic websites hosted in the United States use to reduce the likelihood that young people access their content. In the 1990s and early 2000s, a number of websites worked with **Age Verification Services (AVS)**, which would, upon entry into the website, verify the age of an individual via a valid credit card or driver's license (Procida & Simon, 2003).

These services waned in popularity with changes in legislation and the increased availability of pornographic content via YouTube-style video sharing sites. Individuals no longer needed to pay to access pornographic content, as both users of content and producers began to see the popularity of video sharing sites that offered such media free of charge. Instead, many pornographic websites began to provide a warning page that pops up on screen prior to entering the actual website that requires individuals to certify that they are over the age of 18 and, therefore, legally able to access pornographic content and that they will not hold the site responsible for obscene content. There has been no legal ruling by federal courts as to whether this constitutes an acceptable attempt to keep minors from viewing pornography. In addition, a number of adult websites will also provide links at the bottom of the pop-up page to various parental monitoring software programs in order to encourage safe surfing habits for youth.

The technology and pornography industries have also found ways to improve their responses to the increasingly common problem of IBSA. For

instance, the search engine Google will now remove images and videos that were posted without the creator's consent if they are identified via their search results (Lee, 2015). Victims must contact the company, but they are responsive to requests and will take down the content largely claiming that the site is in violation of the Digital Millennium Copyright Act laws governing intellectual property (see [Chapter 5](#) regarding digital piracy laws; Lee, 2015). The Federal Trade Commission (see [Chapter 6](#)) also notes the importance of contacting service providers to assist in the takedown of content and has recently taken civil actions against websites hosting revenge porn to help minimize its spread (Leach, 2018). The major social media sites also honor requests to remove content, as do a number of porn sites that allow users to upload content. This step has been lauded by some as a positive move by the industry to police itself from illegal content, though it does not keep people from reposting illicit content on their own.

**For more discussion on the steps social media services like Facebook are taking to combat image-based sexual abuse, see: <https://www.nbcnews.com/tech/social-media/inside-facebook-s-efforts-stop-revenge-porn-it-spreads-n1083631>**



A final development in the way in which adult content is hosted online is the development of the **.xxx domain** (Matyszczyk, 2012). The creation of this top-level domain, similar to .com, .net, and .edu websites, provides a voluntary option for individuals to host pornographic content online. This domain was approved in March 2011 and implemented in April 2011 by the **Internet Corporation for Assigned Names and Numbers (ICANN)**, which is responsible for the coordination and stability of the Internet over time. It was thought that the use of a .xxx domain would enable parents and agencies to filter content with ease, though some were concerned that these sites could be blocked entirely, thereby limiting individuals' rights to free speech (Matyszczyk, 2012).

In 2012, there were 215,835 .xxx domains currently registered, though only 132,859 of these sites were actually adult oriented (Matyszczyk, 2012). A majority of the domains were registered by businesses and industries who did not want their brand or product associated with a pornographic website. At the advent of the creation of .xxx domains, it was not clear how these new spaces would be used or to what extent individuals were interested in actually

visiting .xxx spaces relative to those in the .com or .net space (Matyszczyk, 2012). Today, it appears that .xxx domains less common than they were a decade ago. As of early 2021, there appears to be only approximately 90,000 .xxx domains associated with 2,000 unique IPs and 49,000 active websites (Zonefiles, 2021).

### Summary

Taken as a whole, it is clear that any new technology that is made available to the general public will be incorporated into the pursuit of sexual encounters in some way. The extent to which that activity will lead to legal troubles varies, based on who is being affected and how. For instance, many nations may not take issue with the production of sexually explicit material featuring consenting adults, so long as it does not involve activities that push boundaries of taste or social standards. However, the use of technology to potentially embarrass or shame another who was featured in sexual content may be pursued. The constantly evolving state of technology, and its influence on social norms, makes it extremely difficult to develop laws related to its misuse in sexual situations. As a result, there is a need for constant inquiry into the nature of sexual offenses in online and offline environments to improve and adapt the criminal code to new offenses. Likewise, law enforcement must understand offender behaviors and enable successful prosecution of these cases.

### Key Terms

- .xxx domain
- Age Verification Services (AVS)
- Allow States and Victims to Fight Online Sex Trafficking Act (FOSTA)
- Bestiality
- Carnegie Mellon Report
- Celebgate
- Child Online Protection Act (COPA)
- Children's Internet Protection Act (CIPA)
- Commodity
- Communications Decency Act of 1996 (CDA)
- Criminal Justice and Immigration Act 2008
- Escort
- Extreme pornography

The Fappening  
French postcards  
Girlfriend experience (GFE)  
Image-based sexual abuse (IBSA)  
Internet Corporation for Assigned Names and Numbers (ICANN)  
Johns  
Massage parlor  
Mileage  
*Miller v. California*  
Necrophilia  
Neighborhood Children's Internet Protection Act (NCIPA)  
Obscene Publications Act (OPA) of 1857  
Obscene Publications Act (OPA) of 1959  
Obscenity  
Pornography  
Prostitution  
Revenge porn  
Rule 34  
Sexting  
Sexual fetishes  
Stop Enabling Sex Traffickers Act (SESTA)  
Street prostitution  
Streetwalker (SW)  
Tricks  
Truth in Domain Names Act of 2003  
Video cassette  
Video cassette recorders (VCRs)  
Wifey and Hubby  
Your mileage may vary (YMMV)

## Discussion Questions

1. How do you use your computer, tablet, and/or smartphone for dating and romantic assistance? Do you think that the use of technology makes it easier or harder for people to meet others?

2. How could the development of the Internet and CMCS help reduce the risk of harm for individuals interested in the sex trade? In what ways does the ability to communicate about sex workers and review their services make it a less dangerous activity?
3. Do you think it is appropriate to punish individuals who engage in sexting? What about individuals who post sexual images they receive from romantic partners online without the permission of the creator? Why or why not?

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# **CHILD SEXUAL EXPLOITATION MATERIAL OFFENSES**

## Chapter Goals

- Define the terms *child pornography* and *child sexual exploitation (CSE) material* and how it differs from adult pornography
- Understand the various ways technology may be used to facilitate CSE offenses
- Recognize the clinical definition of pedophilia and its relationship to child sex crimes
- Understand the various typologies used to classify child pornography and abuse activities
- Know the laws pertaining to CSE
- Recognize the agencies responsible for the investigation of child sexual abuse material offenses around the world

## Introduction

As noted in [Chapter 7](#), the rise of the Internet has had a substantial impact on the production of sexually explicit material and pornography. People can access content focusing on virtually any single element of an individual's sexual identity, from skin color to height to a performer's age. A segment of the population has always expressed an interest in and sexual attraction toward young people (see Green, 2002). Within adult pornography, there is a history of publications and materials focusing on "barely legal" men and women who have just reached the age of 18. Young celebrities have also become increasingly sexualized, as with Britney Spears and Jessica Simpson during the 1990s, Paris Hilton in the 2000s, and their current contemporaries Selena Gomez and Kylie Jenner.

While such content may appeal to the majority of individuals with an interest in young men and women, there is a smaller segment of the general population whose interests extend to those who are much younger than 18. Though it is unknown what proportion of the population may be attracted to individuals who are under age, there is historical evidence that sexual relationships between adults and children were considered perfectly acceptable, such as in ancient Greece and feudal Japan (Green, 2002; O'Donnell & Milner, 2007). Throughout the majority of the last century, individuals could find print publications and films featuring children engaging in sexual poses and

even penetrative intercourse with adults in various countries around the world up until the early 1980s (Tate, 1990). For instance, the United States only criminalized the production and commercial dissemination of sexual images of children in 1977.

The stigmatization of individuals who were attracted to children led to the formation of advocacy groups who wanted to eliminate any laws related to the age of consent to engage in sexual acts. One of the more notable of these groups was formed in 1978 and called itself the **North American Man-Boy Love Association**, or **NAMBLA**. The individuals who founded the group argued it is implausible that anyone under a certain age cannot understand or truly express their desire for an emotional or romantic relationship (Pearl, 2016). Similar groups could be found across the globe, such as the Australian Man/Boy Love Association and Vereniging Martijn in the Netherlands.

Many of these groups eventually disbanded either because of law enforcement crackdowns or social pressure, but their general ideas persisted due in part to the connective power of the Internet and computers. Despite the criminalization of pornographic content featuring children in some, but not all countries, anyone who is attracted to young people can find others who share their interests online (International Centre for Missing and Exploited Children, 2020a). The Internet became a hub for the distribution of sexual images of children, and public anxiety grew over the potential that children could be solicited online to engage in sexual acts in the real world. This issue was exemplified by the popularity of the show **To Catch a Predator**, where undercover police would pose as an underage girl in various chat rooms online and engage in conversations with individuals who wanted to have sex with them. Eventually, the “girl” would invite the person they chatted with to their home under the pretense of a physical meetup, only to be met by the show’s host, Chris Hansen, and police officers to arrest the individual (see **Box 8.1** for additional detail).

This chapter elaborates on both the role of the technology in the creation, distribution, and access to sexual content featuring children, as well as the nature of the communities that support or justify sexual attractions to young people. This chapter provides an overview of the ways that pornography featuring adults differs from that of children, as well as the various ways that individuals use **child sexual exploitation material (CSEM)** for not only personal use but to assist in developing sexual relationships with children online or offline. We also examine the laws used to prosecute CSE, and

## Box 8.1 The Practices of *To Catch a Predator*

### They're Still Showing Up



[http://www.nbcnews.com/id/14824427/ns/dateline\\_nbc/t/theyre-still-showing/#.UAUeSF2zm94](http://www.nbcnews.com/id/14824427/ns/dateline_nbc/t/theyre-still-showing/#.UAUeSF2zm94)

But his journey didn't begin that day—it began more than a week earlier when he entered a Yahoo Georgia chat room and decided to hit on a decoy, an adult posing as a 15-year-old. It didn't take long for the 23-year-old, screenname “scoobydooat101”, to steer the chat towards sex.

This article, written by Chris Hansen who was the host of *To Catch a Predator*, explains how the show was able to identify and draw in individuals who were interested in sexual relationships with young people. Readers will understand a bit more about the motivations of individuals who came into contact with the show's undercover operatives and how they worked with police to make arrests.

the organizations and law enforcement agencies that investigate these crimes across the globe.

## Defining and Differentiating Child Pornography and CSEM from Obscene Content

As noted in [Chapter 7](#), the Internet and digital media played a pivotal role in the production of pornography featuring consenting adults and created controversy around the ease of access to lewd or obscene content. This discussion pales in comparison to the social panic surrounding the availability and distribution of pornographic content featuring children via the Web (Lynch, 2002; Quinn et al., 2004). **Child pornography** is defined as the depicting of “the sexual or sexualized physical abuse of children under 16 years of age or who appear to be less than 16 that would offend a reasonable adult” (Krone, 2004, p. 1). Content can include both video and still photos, and in some countries, content featuring computer-generated or simulated depictions of children.

The fact that children are the focus of the sexual nature of these images, as both the subject of the work and a participant in the acts, makes this content different from traditional obscene content outlined in [Chapter 7](#). Though both forms of content may involve expressions of sexuality, they differ in the ways that participants come to engage in the acts depicted. For instance, participants in obscene images and pornography largely give their consent to engage in sexual acts and be photographed or videotaped doing so. Individuals under the age of 16 are unable to fully understand the implications of their actions, particularly infants, toddlers, and young children who may not be able to verbally communicate. Their naivety and inability to comprehend the nature of any act makes children unable to give their consent to engage in sexual acts, particularly with adults.

An additional difference lies in the fact that obscene content featuring adults is often produced with compensation provided to the participants. An adult participant may have circumstances that force them to engage in such acts, whether serious debt or personal hardships, but they receive some sort of benefit for their efforts. In addition, an adult will subvert the trust children have in order to force or convince them to engage in an act. When an adult, who is seen as a protector or mentor, manipulates a minor's trust in this manner, the loss of boundaries leads to psychological harm for the child (see Sinanan, 2015). For instance, some may attempt to convince a child that sexual acts with adults are perfectly natural in order to assuage concerns that they are doing something wrong. Some may prey upon fear, and tell children that they will tell their parents and get them in trouble for whatever activity they have engaged in. Others may simply force the child to engage in an act against their will. Overall, the production of child pornography results in both psychological and physical trauma to the victims.

These factors make the production and consumption of child pornography a particularly heinous crime unlike the production of obscene or pornographic content. Thus, while child pornography is the legal definition/term, there is a movement to redefine "child pornography" as the current term relates too closely to traditional forms of adult pornography which imply consent. The differences that underlie these materials have led some agencies to encourage the use of different terms to refer to images of children engaging in sexual acts. The preferred terminology that adequately reflects the horrendous nature of this crime are CSEM, [\*\*child sexual abuse material \(CSAM\)\*\*](#), and [\*\*child sexual abuse imagery \(CSAI\)\*\*](#); see Seigfried-Spellar & Soldino, 2019). These terms generally refer to any sexually explicit image or video of a minor (Stroebel & Jeleniewski, 2015).

CSE is a form of child sexual abuse that includes a wide-range of offenses. According to the Department for Education (2017), CSE:

occurs when an individual or group takes advantage of an imbalance of power to coerce, manipulate or deceive a child or young person under the age of 18 into sexual activity (a) in exchange for something the victim needs or wants, and/or (b) for the financial advantage or increased status of the perpetrator or facilitator (p. 5).

Examples of CSE include, but are not limited to, child sex trafficking, child sex tourism, sextortion, online enticement, child sexual solicitation, and CSEM.

Interpol and Europol use the term CSAM to refer to what is otherwise considered child pornography on the basis that since children are unable to give consent, and are being harmed physically and emotionally, the phrase pornography is reductive and unfair to the victims. The inclusion of the words “sexual abuse” clearly recognizes the harm and severity of the nature of the crimes depicted in images and videos and is essential to protect victims from further harm (Interpol, 2017).

It must be noted that child pornography is a legal definition that extends to certain images focusing on sexual acts or sexualized images of children. Individuals who actively seek out sexual images of children frequently access content that exists on a similar continuum of obscene content featuring adults. This was demonstrated through the development of the **COPINE (Combatting Paedophile Information Networks in Europe) Scale** to categorize sexual content on the basis of the harm involved in erotica and pornographic content involving children (Taylor et al., 2001). Initially, researchers developed this scale as a tool to assist in the delivery of therapeutic treatment, as there may be different cognitive therapies to employ based on the nature of the images an individual actively obtained. The model was eventually adapted as a tool for researchers and law enforcement to classify content on a scale from 1 to 10, with 1 being the least severe and 10 being the most severe (see **Box 8.2** for detail; Taylor et al., 2001). The COPINE scale categories were created after analyzing collections of child pornography images found on offender computers.

Images that fall in the first three categories of the COPINE scale are generally nonsexual and can include images of children swimming, changing clothes, or in various states of undress (Taylor et al., 2001). Such content could be produced surreptitiously by an offender, or acquired from parents,

## Box 8.2 The 10-Point COPINE Scale

Level – 1

Type – Indicative

Description – Nonerotic and non-sexualized pictures showing children in their underwear, swimming costumes from either commercial sources or family albums. Pictures of children playing in normal settings, in which the context or organization of pictures by the collector indicates inappropriateness.

Level – 2

Type – Nudist

Description – Pictures of naked or semi-naked children in appropriate nudist settings, and from legitimate sources.

Level – 3

Type – Erotica

Description – Surreptitiously taken photographs of children in play areas or other safe environments showing either underwear or varying degrees of nakedness.

Level – 4

Type – Posing

Description – Deliberately posed pictures of children fully clothed, partially clothed, or naked (where the amount, context, and organization suggest sexual interest).

Level – 5

Type – Erotic posing

Description – Deliberately posed pictures of fully, partially clothed, or naked children in sexualized or provocative poses.

Level – 6

Type – Explicit erotic posing

Description – Pictures emphasizing genital areas, where the child is either naked, partially clothed, or fully clothed.

Level – 7

Type – Explicit sexual activity

Description – Pictures that depict touching, mutual and self-masturbation, oral sex, and intercourse by a child, not involving an adult.

Level – 8

Type – Assault

Description – Pictures of children being subject to a sexual assault, involving digital touching, involving an adult.

Level – 9

Type – Gross assault

Description – Grossly obscene pictures of sexual assault, involving penetrative sex, masturbation, or oral sex, involving an adult.

Level – 10

Type – Sadistic/bestiality

- 1 Pictures showing a child being tied, bound, beaten, whipped, or otherwise subject to something that implies pain.
- 2 Pictures where an animal is involved in some form of sexual behavior with a child.

friends, family members, print media, advertisements, as well as social media sites online. Content that meets the legal definition for child pornography begins in category 4 and focuses more on sexual acts or sexualized images featuring children, including sexualized poses or masturbation (Taylor et al., 2001). The content that we may consider as the most extreme begins in category 8 and features overt sexual acts involving adults, other children, or even animals. This content also includes children being violently raped, abused, or tortured in a sexual fashion.

Though it may seem unconscionable to view such images, let alone create them, there is a demand for this content within the community of CSEM offenders (Seigfried-Spellar, 2013). In fact, a large-scale analysis of a historical collection of images of CSE supports the notion that more aggressive and hurtful content has been produced over time (NCMEC & Thorn Research Report, 2018). Similarly, a recent takedown of a group called The Dreamboard operated a forum where individuals could view and share images of child sexual abuse that was categorized by the nature of the content. The most depraved content on the site was listed under the title “Super Hardcore” and featured images of adults engaging in sexual acts which clearly caused the victims physical and emotional distress (see [Box 8.3](#) for more on the efforts to eliminate this group).

### Box 8.3 Detail on Operation Delego

#### Attorney General and DHS Secretary Announce Largest US Prosecution of International Criminal Network Organized to Sexually Exploit Children

[www.justice.gov/opa/pr/2011/August/11-ag-1001.html](http://www.justice.gov/opa/pr/2011/August/11-ag-1001.html)



The board rules also required members to organize postings based on the type of content. One particular category was entitled “Super Hardcore”... involving adults having violent sexual intercourse with “very young kids”... “in distress, and or crying.”

This press release details a massive investigation of an international child pornography distribution network operating online called The Dreamboard. Individuals participated in this community from around the world and were required to post content in order to remain active users. The scope of this group, the harm they caused, and the extent of content hosted demonstrate the variety of content that can be classified as child pornography.

### The Role of Technology in Child Sexual Exploitation Material

While CSEM existed well before the creation of the Internet, the globalization of technology has created an environment where Internet CSEM is readily available, accessible, and affordable, if not entirely free-of-charge (Cooper, 1998). In essence, viewing CSEM is an easy crime to commit and an easier crime to get away with. It is difficult to assess the total amount of CSEM that may be available at any given time online due to the existing laws regarding access to this content and the sheer quantity of platforms available for its distribution. For instance, there were 70 million images and videos reported to federal law enforcement in 2019 alone, with the majority being videos (Dance & Keller, 2020). Almost 60 million pieces of content were reported by Facebook alone, suggesting social media has become a major platform for the distribution of content.

In addition, it appears CSEM is a worldwide problem that allows individuals in multiple nations to acquire content from anywhere. The availability of digital

photography, webcams, high-speed Internet connections, editing software, and removable storage media makes it possible for individuals to create high-quality images and videos of deplorable acts of sexual abuse involving children for consumption around the world. In fact, evidence suggests that India has become a hub for CSEM distribution, with estimates suggesting Indian Internet users uploading 25,000 images during the last quarter of 2019 and the first quarter of 2020 alone (Acharjee, 2020). Similarly, the Philippines has become a hotbed of CSEM creation and distribution, particularly the livestreaming of abuse (Online Sexual Exploitation of Children in the Philippines, 2020). However, the global nature of the Internet enables virtually every nation to play a role in the spread of content.

Though social media is increasingly involved in CSEM distribution, a substantial proportion of CSEM currently circulating on the Internet still flows through peer-to-peer file-sharing programs, including BitTorrent (WCSC, 2013). This same software used to distribute pirated media (see [Chapter 5](#)) is a regular venue for sharing traditional pornographic videos and images, as well as images featuring children. Though the same tools are used to pirate media as they are to download CSEM, it is unlikely that the average person would identify and download CSEM files by accident. Individuals actively seeking CSEM use keyword searches that are used to label images, videos, and file sets that are distinct from other content (Internet Watch Foundation, 2020).

The growth of various voice over IP (VoIP), video-calling services and applications have engendered the growth of services to stream child sexual abuse as it happens. The same resources that are used by standard consumers for interpersonal communication, ranging from Skype to FaceTime to Periscope, can now be used to let individuals watch people engage in sexual acts with children. Even worse, these services often allow viewers to direct the action as it happens, suggesting certain sex acts occur or to comment on what they are seeing (see [Box 8.4](#) for example). Many of these streaming services appear to originate from and operate out of southeast Asian nations, in many cases involving parents and their children rather than some large-scale criminal organization (Online Sexual Exploitation of Children in the Philippines, 2020). One reason why these streams may have grown is that the operators can make individuals pay for access using online payment systems or cryptocurrencies. For instance, a woman was arrested in May 2020 for selling access to livestream video feeds of her three children and their cousin (Buan, 2020). The profits made from streaming may enable families

## Box 8.4 Livestreaming Sexual Abuse Content

### Delco Child Porn Suspect Used Twitch to Lure 50 Boys, Police Say

<https://www.nbcphiladelphia.com/news/local/delco-child-porn-suspect-used-twitch-to-lure-50-boys-police-say/2404326/>



A Delaware County child pornography suspect used the popular video life streaming service Twitch to get more than 50 underage boys to expose themselves, investigators said.

This article details the arrest of a Pennsylvania man who used the video game streaming service Twitch to connect with young boys and get them to engage in sexual activities through the application. This story highlights the complicated nature of online services targeted toward young audiences which could be misused to harm children.

to gain access to simple comforts and resources they were otherwise not able to afford. As a result, it may be difficult to deter the abusers who enable these behaviors.

Social media sites, like Facebook, also serve as a platform for the identification of images of children. Much of this content may be innocuous, featuring images of children playing, swimming, or taking baths. Such images could be acquired easily from friends, family, and associates with children who regularly share media. The rise of image-based messaging applications like Snapchat, Instagram, and TikTok also creates opportunities for individuals to actively solicit images from children as well. Interested individuals can use these applications as a platform to target youth based on information provided in their profile, and then begin to chat with them. The conversations are intended to build a rapport between the adult and child and enable the adult to actively solicit the youth to send them images of themselves in various poses and activities (see [Box 8.5](#) for an example). Some may even attempt to use their connection to eventually meet the child offline so that they may engage in sexual acts with them in person.

There is also a good deal of CSEM hosted on the [Dark Web](#), referencing the portion of the Internet operating on the specialized encrypted software platform Tor (Cox, 2016). One reason for the increased use of Tor is likely

## Box 8.5 Understanding Attempts to Solicit Youth into Documenting Sexual Acts

### Child Porn Suspect Accused of Convincing 10-Year Old to Send Nude Photos on Facebook, Detectives Say



<https://www.fox13news.com/news/child-porn-suspect-accused-of-convincing-10-year-old-to-send-nude-photos-on-facebook-detectives-say>

Polk County detectives arrested a 19-year-old man on child pornography charges, saying he manipulated a child into sending him nude images. On Tuesday, detectives arrested Simon Anderson. They said the Lake Wales man used Facebook to communicate with a 10-year-old and admitted that he knew her age.

This story details the investigation and arrest of a Florida man named for soliciting a child via social media into sharing images of themselves engaging in sexual acts. This report also explains he threatened to kill the victim if she did not provide this content, which makes the offense that much more heinous.

due to the difficulty that law enforcement agencies may initially have in identifying the location of content hosting services and users. Individuals can only access the Dark Web by downloading and using the free Tor browser, which anonymizes the IP address and location details of the user (Barratt, 2012). Individuals can host any content they want on Tor using homebrew servers operating out of their home, which conceals the physical location of the hosting site. In addition, Tor-based content is not indexed by Google or other search engines making it difficult to quantify the amount of material available online (Barratt, 2012).

As a result, some CSEM sharing communities have shifted to Tor in an attempt to conceal their actions from law enforcement. Federal agencies, such as the Federal Bureau of Investigation (FBI), however, are taking somewhat extreme steps to identify CSEM groups and their participants, including essentially hacking the Tor infrastructure in order to capture sensitive user information. Such steps may challenge the admissibility of evidence acquired and force investigators to be more transparent in how a takedown operation was performed (see Box 8.6 for detail).

## Box 8.6 The Scope of CSAM on the Dark Web

### Feds Take Down the World's "Largest Dark Web Child Porn Marketplace"

<https://www.nbcnews.com/news/crime-courts/feds-take-down-world-s-largest-dark-web-child-porn-n1066511>



The now-shuttered English-language site, called "Welcome to Video," contained *more than 200,000 unique videos* or almost 8 terabytes of data showing sex acts involving children, toddlers and infants, according to the 18-page criminal indictment unsealed here Wednesday, and processed 7,300 Bitcoin transactions worth more than \$730,000.

This article explains the multiagency, international investigation of a CSEM site operating on Tor that operated on a fee-for-service basis. The operator, Jong Woo Son, lived in South Korea and had participants around the world, including a former US law enforcement officer who is alleged to have downloaded over 50 hours of content from the site. The investigation took multiple years to complete and involved the FBI, the IRS, the UK's National Crime Agency (NCA), and the Korean National Police Agency.

## Explorations of the Pedophile Subculture Online

Computers have clearly become the preferred medium for those individuals with a sexual interest in children by allowing them a degree of anonymity and minimal fear of social stigma or legal ramifications for disclosing their preferences (Alexy et al., 2005; Durkin, 1997; Durkin & Hundesmarck, 2007; Holt et al., 2010; Rosenmann & Safir, 2006). These deviant subcultures take part in a variety of computer crimes involving children, ranging from using the Internet as a way to reach out and develop emotional and sexual relationships with children (Jenkins, 2001), to the distribution, trading, and production of CSEM (Durkin, 1997; Jenkins, 2001; Quayle & Taylor, 2002; Taylor et al., 2001).

Individuals interested in relationships with prepubescent or pubescent children may be classified as pedophiles or hebephiles, respectively, according to the diagnostic criteria established by the American Psychological Association's *Diagnostic and Statistical Manual of Mental Disorders – 5th edition* (DSM-5; APA,

2013). Specifically, the DSM-5 introduced the concept of pedophilic disorder, which is diagnosed using the following criteria:

- 1 Over a period of at least 6 months, recurrent, intense sexual arousing fantasies, sexual urges, or behaviors involving sexual activity with a prepubescent child or children (generally age 13 years or younger);
- 2 The person has acted on these sexual urges, or the sexual urges or fantasies cause marked distress or interpersonal difficulty; and
- 3 The person is at least age 16 years and at least five years older than the child or children in the first criterion (APA, 2013).

The individual must demonstrate all three criteria in order to be diagnosed as a **pedophile** in clinical settings. The DSM-5 also subdivides the pedophilia diagnosis into more specific categories: sexually attracted to males, females, or both sexes, exclusive (attracted only to children) or nonexclusive (attracted to both adults and children), or limited to incest (APA, 2013; O'Donohue et al., 2000).

The implementation of the term disorder in this edition of the DSM is important because it identifies that an individual has acted on their specific urges. Such a behavioral criterion was not present in previous editions which only identified pedophilia as a clinical paraphilia or condition. The APA was criticized for this inclusion criterion as it does not clearly delineate between those who have engaged in sexual acts with children and those who have sought out CSEM for masturbatory purposes (e.g., Berlin, 2014). This kind of vague language is insufficient for what is meant to be a diagnostic tool for clinicians.

Regardless of clinical classification, individuals who engage in either sexual activities with or fantasize about children are considered to be among the most hated deviants in society (Durkin, 1997; Durkin & Bryant, 1999; Holt et al., 2010; Jenkins, 2001; Rosenmann & Safir, 2006). Adults who show a strong sexual interest toward children are, therefore, stigmatized by society and retreat to the virtual world to express their true feelings since the Internet can offer almost complete anonymity. Those who share these taboo sexual feelings come together to form what is known as the “pedophile subculture” (Jenkins, 2001; Pittaro, 2008). It is here where members of the subculture feel they are part of a group that accepts them for their sexual interests. In fact, they can gain validation for their sexual beliefs.

In his 2001 book *Beyond Tolerance: Child Pornography On the Internet*, Philip Jenkins examined a BBS where individuals exchanged images of CSEM and found a subculture where individuals shared beliefs about the value of CSEM and the need to exchange these materials and socialized individuals into this activity. Jenkins (2001) wrote, “Joining the subculture marks less an entry into new activities

and interest than an escalation of pre-existing behaviors, supported by a new sense of community” (p. 106). These are individuals seeking acceptance; the anonymous nature of the Internet offers this. Users expressed fears of being detected by law enforcement, political reviews, and even a shared language. Jenkins observed, “one is likely to acquire gradually the peculiar language, mores, and thought patterns of this world and thus be inducted subtly into the subculture” (p. 108). In order to keep up with the language and the rapid change of discussion, users must visit and participate regularly if they hope to benefit from this subculture.

Support, justification, and/or rationalization are also common among pedophile subcultures (Durkin & Bryant, 1999; Holt et al., 2010; Jenkins, 2001; Mayer, 1985). Mayer (1985) wrote, “One striking characteristic of the pedophile is the ability to minimize or rationalize his activities” (p. 21). Most individuals belonging to such subcultures see nothing wrong with relationships between adults and children; in fact, they see many positive benefits from these interactions, such as being a positive role model in a child’s life (Jenkins, 2001). They often do not associate themselves with pedophiles or child molesters and even condemn these individuals themselves. These individuals justify this type of sexual orientation by using the term “**child love**” to describe what they perceive to be a perfectly normal relationship between adult and child, which does not always have to involve sexual activity (Holt et al., 2010; Jenkins, 2001).

Pedophiles will also use neutralization strategies in attempts to normalize their type of deviance. For example, they may attempt to deny whether a “victim” existed (“denial of the victim”) by rationalizing that the children were asking for or wanted sex. They may also use a technique called “denial of injury,” saying sexual encounters can be rewarding and even educational for children (Jenkins, 2001). Some groups have even gone so far as to compare themselves to the Jewish population being hunted down by the Nazis in Germany; they believe that sexual attraction to children is much more widespread than society cares to accept, and by persecuting them, society is preaching hypocrisy (Jenkins, 2001).

The idea that “child love” is different from being a pedophile in the eyes of these individuals is a topic that has more recently been examined by researchers (Holt et al., 2010; Jenkins, 2001). Many members of the CSEM discussion boards examined by Jenkins (2001) did not see themselves as pedophiles. In one thread, a user identified as “Humbert Humbert” wrote, “Am not a pedo, just like the beauty of pre-pubescent/adolescent girls. Therefore, I don’t think I am a perv. Just rational minded” (p. 119). They believe that those who actually abuse children represent just a small minority of their community and that most users are just looking, not acting (Jenkins, 2001).

It is hard to determine which members of these communities are or have actually been physically (sexually) involved with children, since the majority of users do not reveal any illegal behavior that may have occurred for fear of legal ramifications (Jenkins, 2001). However, the concept of sharing fantasies, urges, and nonsexual interactions with children is seen in most of the pedophile online communities (Holt et al., 2010; Jenkins, 2001). While most research and investigations have focused on targeting those who possess/trade CSEM and/or child molesters, few have considered the members of the online pedophile subculture, who do not consider themselves pedophiles or child molesters but “child lovers” (Holt et al., 2010).

### Typologies of CSEM Use and Consumption

Given the substantial concern over the rise of CSEM in online environments, researchers have examined characteristics of individuals who consume these materials. Although it may be counter-intuitive, Internet CSEM users are not necessarily pedophiles (i.e., sexually attracted to children) or child sex offenders (i.e., **hands-on contact offenders**; Babchishin et al., 2011; Klain et al., 2001;). Internet CSEM users may be motivated by curiosity, addiction, or financial profit rather than a sexual interest in children (Taylor & Quayle, 2003). In addition, research indicates that Internet CSEM uses are not more likely to cross over into contact offending (see Seto & Eke, 2005; Webb et al., 2007).

According to Seto et al. (2011) CSEM users (i.e., hands-off or Internet-only offenders) are significantly less likely to reoffend and have prior criminal histories of contact offenses compared to contact child sex offenders (i.e., hands-on). However, research suggests they are more likely to exhibit pedophilic characteristics compared to contact child sex offenders (Babchishin et al., 2015; Seto et al., 2006, 2012).

Researchers have used various data to further understand the dynamics between online and offline offender groups. In general, individuals who only consume CSEM appear to differ from those who either engage in real-world offenses only, or who engage in both offense types. Online-only offenders are more likely to be young, single, white males who are unemployed and who have greater empathy for sexual abuse victims (Babchishin et al., 2011). Their level of empathy may be key in keeping them from engaging in contact offenses in the real world, as it appears that individuals who view CSEM report higher pedophilic interests generally (Babchishin et al., 2015). People who engage in offenses online and offline report slightly higher pedophilic interest levels than those who only view CSEM, which may be an important behavioral driver (Babchishin et al., 2015).

Online offenders also demonstrate a greater range of sexual deviance which may be associated with their interest in various sexual contents (Babchishin et al., 2011). This may also be associated with the fact that online offenders are also more likely to report either having a homosexual or bisexual orientation (Babchishin et al., 2015). Importantly, both online and offline offenders are more likely to report sexual and physical abuse than men in the general population. This is sensible as there is a high correlation between some history of abuse and sexual offending behaviors generally (Jespersen et al., 2009).

Overall, not all CSEM users are pedophiles or contact child sex offenders, and CSEM users are not significantly more likely to cross over into contact child sex offenses. In addition, some research suggests they may exhibit more pedophilic characteristics than contact child sex offenders (Babchishin et al., 2015; Federal Bureau of Investigation, 2020a; Klain et al., 2001; Perrien et al., 2000; Quayle & Taylor, 2002; Seto & Eke, 2005; Seto et al., 2006). However, these previous studies sampled CSEM users from the clinical or forensic population. Other researchers have relied on self-report measures using anonymous surveys to assess the prevalence of CSEM use amongst general Internet users, with results suggesting anywhere between 6 and 10 percent of Internet users admit to intentionally consuming CSEM (Seigfried et al., 2008; Seigfried-Spellar, 2015, 2016).

Recognizing that CSEM users are not a homogeneous group, researchers also developed typologies to classify individuals based on their collecting behaviors (Alexy et al., 2005; Durkin, 1997; Krone, 2004; Quayle & Taylor, 2002; Rogers & Seigfried-Spellar, 2013; Taylor & Quayle, 2003). It is thought that viewing and collecting CSEM and associated materials can possibly lead to more serious offenses and may produce varied uses for this content, whether online or offline. One of the first such typologies was proposed by Durkin (1997, p. 16) with four categories based on individual misuse of the Internet and its role with offline activities: (1) trafficking CSEM (**traders**), (2) communicating and sharing ideas with like-minded persons (**networking**), (3) engaging in inappropriate communication with children (**grooming**), and (4) attempting to find children to molest (**travelers**).

An expanded model was proposed by Krone (2004) focusing on offender's use of technology to view, collect, share, and/or produce CSEM, as well as their level of technical competency, the nature of the images they seek, their social connectivity to others interested in CSEM, and the extent to which they attempt to hide their activities from law enforcement. In this respect, Krone's typology builds from Durkin but also provides greater depth and potential accuracy in assessing offender behavior. This nine-category typology recognizes the following types: (1) browser, (2) private fantasy, (3) trawler, (4) nonsecure

collector, (5) secure collector, (6) groomer, (7) physical abuser, (8) producer, and (9) distributor. It is not intended for use in clinical treatment or diagnostic purposes, but rather to classify misuse of technology and involvement in the production of CSEM and sexual abuse for law enforcement.

The first two categories involve individuals with no social connections to others and at the same time do not take steps to hide their activities from law enforcement. The **browser** views CSEM accidentally but saves the content deliberately for later use. The **private fantasy** user creates their own materials so that they can use it for personal reasons later. This content is not meant to be viewed by others or deliberately shared and may include stories, line drawings, or computer-generated images or video.

The next three categories involve individuals deliberately searching for CSEM and sexual content, though they may have generally lax security. The **trawler** actively searches for CSEM through various browsers as they have generally few connections to others to facilitate access to content and takes no steps to conceal their activities. The **nonsecure collector** is technologically savvy and uses peer-to-peer file-sharing programs and other more secured sources to access content. They have greater social connections that engender access to CSEM, though they take no real steps to protect whatever content they collect. The **secure collector**, however, only accesses CSEM via secured or private networks and deliberately categorizes and indexes their collections. They also exchange content with others in order to gain access to secured CSEM sharing groups and networks.

Though the previous categories involved no physical contact with child victims, the next three categories all involve attempted or successful direct contact offenses in the real world. These categories also have substantive overlap with categories from the Durkin (1997) typology, as with groomers who seek sexual relationships with children online. A **groomer** may not access CSEM, but if they do they are more likely to share it with their intended target to normalize the notion of a sexual activity. Groomers are also dependent on the steps their victims take in order to minimize their risk of getting caught.

The **physical abuser** has direct physical contact with children and is similar to groomers in that they may or may not access CSEM and may have cultivated a relationship with their victim online. **Producers** go one step beyond abusers as they document their abuse of a victim, or serve as a facilitator to document abuse others engage in. In both of these categories, the offenders are also dependent on their victims to minimize the likelihood of detection. The final category, **distributors**, are responsible for sharing the content that is used by offenders in any of the previous categories. They may be either poorly or well connected to others based on

the type of content they share, though they are much more careful to secure their activities from law enforcement. Distributors are also likely to not have direct contact with child victims, instead operating as a middleman to make content available.

An expansion of the Krone (2004) model was produced by Rogers and Seigfried-Spellar (2013) to provide specificity on the ways that individual offenders may store content or misuse their devices in the course of an offense. The authors retain the original nine categories proposed by Krone (2004) but provide additional context for the technical knowledge of the offender based on the file types, system locations, and software/hardware resources an individual may use to either access content or conceal their activities. As with Krone, this typology is designed to aid law enforcement in recognizing potential sources of forensic information to facilitate criminal investigations (see [Box 8.7](#) for detail).

### **Box 8.7 The Rogers Seigfried-Spellar Hybrid Model**

Category	Features	System artifacts
Browser	Response to spam, accidental hit on suspect site – material knowingly saved	Internet history logs Temporary files Web cache Cookies Default user account folders (e.g., pictures, movies) Thumbnails Deleted files Recycle bin
Private fantasy	Conscious creation of online text or digital images for private use	Internet history logs Temporary files Web cache Cookies Default user account folders (e.g., pictures, movies) Thumbnails P-2-P folders email Registry/Typed URLs Deleted files Recycle bin External storage devices Mobile phone

*(Continued)*

<b>Category</b>	<b>Features</b>	<b>System artifacts</b>
Trawler	Actively seeking CSEM using openly available browsers	Internet history logs Temporary files Web cache Cookies Default user account folders (e.g., pictures, movies) Non-default folders Thumbnails P-2-P folders email Registry/Typed URLs Deleted files Recycle bin IRC folders External storage devices Mobile Phone
Nonsecure collector	Actively seeking material often through peer-to-peer networks	Internet history logs Temporary files Web cache Cookies Default user account folders (e.g., pictures, movies) Non-default folders Thumbnails P-2-P folders email Registry/Typed URLs Deleted files Recycle bin IRC folders External storage devices Mobile phone

(Continued)

Category	Features	System artifacts
Secure collector	Actively seeking material but only through secure. Collector syndrome and exchange as an entry barrier	Internet history logs Temporary files Web cache Cookies Default user account folders (e.g., pictures, movies) Non-default folders Thumbnails P-2-P folders email Registry/Typed URLs Deleted files Recycle bin External storage devices Encrypted folders IRC folders Mobile phone
Groomer	Cultivating an online relationship with one or more children. The offender may or may not seek material in any of the above ways. Pornography may be used to facilitate abuse	Internet history logs Temporary files Web cache Cookies Default user account folders (e.g., pictures, movies) Non-default folders Thumbnails P-2-P folders email Registry/Typed URLs Deleted files Recycle bin External storage devices Mobile phone

*(Continued)*

Category	Features	System artifacts
Physical abuser	Abusing a child who may have been introduced to the offender online. The offender may or may not seek material in any of the above ways. Pornography may be used to facilitate abuse	Internet History logs Temporary files Web cache Cookies Default user account folders (e.g., pictures, movies) Non-default folders Thumbnails P-2-P folders email Registry/Typed URLs Deleted files Recycle bin External storage devices Digital cameras Mobile phone
Producer	Records own abuse or that of others (or induces children to submit images of themselves)	Internet history logs Temporary files Web cache Cookies Default user account folders (e.g., pictures, movies) Non-default folders Thumbnails P-2-P folders email Registry/Typed URLs Deleted files Recycle bin External storage devices IRC folders Digital cameras Mobile phone

(Continued)

Category	Features	System artifacts
Distributor	May distribute at any one of the above levels	Internet history logs Temporary files Web cache Cookies Default user account folders (e.g., pictures, movies) Non-default folders Thumbnails P-2-P folders email Registry/Typed URLs Deleted files Recycle bin External storage devices IRC folders Digital cameras Mobile phone

For instance, browsers are likely to have evidence of their activities in their browser histories and recycle bin, while a private fantasy user may also have evidence located in external hard drives and their phone due to the nature of the content they create. Trawlers and nonsecure collectors may have a greater range of software they use to attempt to access CSEM and store files in unusual system locations. The secure collector may, however, utilize file encryption in order to hide the file folders that store the content they acquire. The nature of the files and content used by the remaining categories are thought to vary based on their access to and use of CSEM as well as the nature of the abuse they engage in.

## The Legal Status of CSEM Around the Globe

Despite the variation in what constitutes obscene content, there is some consistency in laws regarding child exploitation. In the United States, there are multiple federal laws designed to protect youth from exploitation and punish

individuals who share or create CSEM. In fact, the first law criminalizing CSEM in the United States was enacted in 1977, called the **Protection of Children Against Sexual Exploitation Act**. This law made it illegal for anyone under the age of 16 to participate in the visual production of sexually explicit materials, though this definition was extended to the age of 18 in 1986 (Brenner, 2011).

Later legislation, though, has had the greatest impact on CSEM through the implementation of the **Child Pornography Prevention Act of 1996**. This Act extended the existing laws regarding CSEM by establishing a new definition for child pornography. Specifically, this Act amended the criminal code under Title 18 to define child pornography as “any visual depiction, including any photograph, film, video, picture, or computer or computer-generated image or picture of sexually explicit conduct” (Brenner, 2011, p. 51). The law also recognizes that the image (1) must have been produced involving an actual minor engaging in sexual acts, (2) involved or appeared to involve a minor, and/or (3) was created, adapted, or modified to appear that a minor is engaging in sexual acts. This definition was established in order to provide the needed flexibility to prosecute CSEM cases that may have been created using Photoshop or other computer programs and sent electronically. It can also, however, be applied to photos where a child is nude and alone but appears to be sexually suggestive in and of itself.

This act also made it illegal to engage in multiple activities associated with the production of CSEM. It is now illegal for anyone to persuade, entice, induce, or transport minors in order to engage in sexual acts for the purpose of producing images and/or video of the acts, and if they will be transported in foreign or interstate commerce (Brenner, 2011). Similarly, it is illegal for anyone to entice a minor to engage in sexual acts outside of the United States in order to produce visual depictions of the behavior. It is also illegal for anyone to print or publish advertisements associated with the sexual exploitation of children (Brenner, 2011). This law also makes it illegal to either conspire or attempt to commit any of these offenses.

The penalties for these offenses are severe and include a federal prison sentence between 15 and 30 years and/or a fine. If the offender has a prior charge of sexual exploitation on their record at either the state or federal level, they can receive between 25 and 50 years. If they have two or more charges, then they are eligible to receive a life sentence in prison (Brenner, 2011). In the event that a child dies in the course of the offenses above, then the offender is eligible for the death penalty.

Section 2252 of this same Act also made it illegal to knowingly:

- 1 mail, transport, or ship child pornography by any means, physically or electronically;
- 2 receive or distribute child porn or materials containing child pornography;
- 3 reproduce child porn for distribution through the mail or by computer;
- 4 sell or possess child porn with the intent to sell;
- 5 possess any “book, magazine, periodical, film, videotape, computer disk, or other material that contains an image of child porn” (Brenner, 2011, p. 54); and
- 6 distribute, offer, or send a visual depiction of a minor engaging in sexually explicit conduct to a minor.

The first, fourth, and sixth acts can lead an individual to be imprisoned between 5 and 20 years minimum, though if they have a prior conviction for child pornography, then they can receive a prison sentence of between 15 and 40 years. The fifth activity, possessing child pornography, can lead an individual to be fined and imprisoned for up to 10 years, though if they have a prior offense history, they can be imprisoned between 10 and 20 years (Brenner, 2011).

These statutes all apply to images of real children who have been victimized in some way. Some argued that the ability to create images of virtual children using computer software or line drawings does not create the same issue of victimization. As a result, these materials should not be treated as illicit material because of the protections afforded by the First Amendment right to free speech in the United States (Brenner, 2011). This challenge was struck down through the creation of the **Prosecutorial Remedies and Other Tools to end the Exploitation of Children Today Act (or PROTECT Act) of 2003**. This law criminalized virtual child pornography and extended the legal definition to include “a digital image, computer image, or computer-generated image that is, or is indistinguishable from, that of a minor engaged in sexually explicit conduct” (Brenner, 2011, p. 57). This Act remedied previous problems experienced by the prosecution when the defense argued that the individuals in the images were not actual, but computer-generated, victims. In this respect, an offender could claim their actions caused no harm to real children. Prosecutors would have to challenge such attempts and demonstrate how harm may have occurred. The revisions afforded by the Act of 2003 shifted the burden of proof to the defense so it is now their duty to prove that the child pornography images do not include actual victims.

Also, this Act included language criminalizing “obscene child pornography,” which involves any visual depiction, whether a sculpture, painting, cartoon, or drawing of minors engaging in sexually explicit conduct or obscene acts; or involves a minor engaging in bestiality, sadism, or masochistic abuse, sexual acts of any kind; and lacks serious literary, artistic, or scientific value (Brenner, 2011). The language related to the value of the image is critical because it is synonymous with that of the Miller test of obscene material in the Supreme Court. As a result, this helps to ensure that this standard is constitutional when applied to any criminal case.

In the United States, all states and the District of Columbia have criminalized the use, creation, possession, and distribution of child pornography and the sexual solicitation and exploitation of minors (Children’s Bureau, 2019). These offenses are treated as felonies, though the range of sanctions varies in terms of years in prison based on the individual’s prior record and the severity of the offense. Additionally, the Federal Child Abuse Prevention and Treatment Act (CAPTA) requires that all states have provisions or procedures requiring certain groups of individuals to report suspected or known cases of child abuse and neglect. Groups that are often required per state statutes to report child abuse are social workers, teachers, health-care workers, child care providers, counselors, and law enforcement officers. Other states include other groups that are required to report child abuse, including the creation of CSEM materials. Twelve states have established laws that require commercial film or photography processors to report any child abuse or neglect that they identify in the course of their work (Children’s Bureau, 2019). Six states (Alaska, California, Illinois, Missouri, Oklahoma, and South Carolina) also require computer technicians to report child abuse or neglect. These laws are not designed to require computer technicians to actively seek out or search for child sexual abuse content, but rather to ensure that such content is reported in the event it is uncovered in the course of normal operations. Reporting any child pornography identified provides the individual and their company with immunity from criminal or civil liability in most states (Children’s Bureau, 2019). In the event an individual does not report child pornography to law enforcement at the state and/or federal level, the individual can be charged with a misdemeanor and/or fined.

International laws regarding child pornography vary based in part on local standards for obscene content and their sanctions for use or possession of pornography (International Centre for Missing and Exploited Children, 2020a). In the United Kingdom, the **Protection of Children Act 1978 (PCA)** was the first attempt to legislate against this activity, making it illegal to obtain, make,

distribute, or possess an indecent photograph of someone under the age of 16 (later raised to 18) (Crown Prosecution Service, 2020). The law was extended in 1994 through the **Criminal Justice and Public Order Act** to include images that appear to be photos, so-called pseudo-photographs. Additional legislation in 2009 called the **Coroners and Justice Act** extended the law to include all sexual images depicting youth under the age of 18, whether real or created (Crown Prosecution Service, 2020). The current punishment structures enable an individual to be imprisoned up to 10 years, depending on the offense and the nature of the content the individual either acquired or viewed. In addition, the Serious Crime Act 2015 criminalized the possession of “any item that contains advice or guidance about abusing children sexually” which may be referred to as a pedophile manual (Crown Prosecution Service, 2020). Having such materials carries a maximum sentence of three years in prison.

Canada utilizes a similar definition to that of the United States, though they also include audio recordings of the sexual exploitation of children and written depictions of persons under the age of 18 engaging in sexual activities or those that actively induce or encourage sex with minors (Akendiz, 2008). In fact, Canadian courts can mandate that such content be deleted from the Internet if the materials are available on a computer system within the Canadian borders. Their sanctions for child pornography are also similar to the United States, in that the possession of child pornography is punishable by up to ten years in prison, while the production and/or distribution of child pornography can lead to a 14-year prison sentence (Seidman, 2013). Similarly, Australian law prohibits any sexual image, real or created, of children under the age of 18. Their sanctions regarding child pornography offenses are consistent regardless of the offense, whether the production or possession of child pornography, and include a fine of up to A\$275,000 and up to 10 years imprisonment (Krone, 2005). All of these nations also have laws that require Internet service providers (ISPs) to monitor and report the presence of child pornography on systems that they control. In the event that such materials are not reported, the ISP can be held liable for the distribution of this content and eligible for fines and other sanctions (Brenner, 2011).

In 2009, India criminalized sexual offenses involving a person under the age of 18 through an amendment to the **Information Technology Act of 2000**. Under statute 67B, it is illegal for any person to:

- 1 publish or transmit or cause to be published or transmit material in any electronic form which depicts children engaged in sexually explicit act or conduct,

- 2 create text or digital images, collect, seek, browse, download, advertise, promote, exchange or distribute material in any electronic form depicting children in obscene or indecent or sexually explicit manner,
- 3 cultivate, entice or induce children to engage in an online relationship with one or more children for a sexually explicit act or in a manner that may offend a reasonable adult,
- 4 facilitate abusing children online, or
- 5 record in any electronic form their own sexual abuse of a child or that of others.

This relatively comprehensive statute makes any of these offenses punishable by up to five years in prison and or a fine of 1 million Rupees for the first conviction, which increases to seven years in prison on the second conviction.

The [Convention on Cybercrime](#) deals with CSEM under Article 9, requiring member states to make it illegal to produce, distribute, offer, procure, or possess child pornography via computer or media storage device. The CoC encourages the use of a definition of child pornography that includes visual depictions of minors, people who appear to be minors, or realistic images of minors engaged in sexual acts (Brenner, 2011). Due to the complexity of national standards, the CoC also allows signatory nations to define minors as individuals under the age of 16 or 18, depending on their current standards, and may choose not to criminalize created images or those where participants only appear to be minors (Brenner, 2011).

Since April 2006, the [International Centre for Missing and Exploited Children \(ICMEC\)](#) has published nine reports comparing legislation on CSAMs across the INTERPOL member countries. The first report in 2006 reviewed 184 INTERPOL member countries with the most recent report (9th edition), including 196 countries (International Centre for Missing and Exploited Children, 2018). Since 2006, 150 nations have refined or implemented new legislation on CSAMs. In 2006, the ICMEC reported that 95 countries had no legislation at all specifically addressing CSAMs; this number has since dropped to 16 countries in 2018 (International Centre for Missing and Exploited Children, 2018). The 16 countries with no legislation addressing child pornography include Central African Republican, Equatorial Guinea, Somalia, Dominica, Saint Lucia, and Palau to name just a few. It should also be noted that some countries, such as Iran, Iraq, and Kuwait, do not have specific statutes on child pornography; however, all pornography is illegal in those countries, thereby making CSAM illegal as well even no specific statutes exist. In addition, 56 countries still do not criminalize simple CSAM possession although they

have CSAM legislation. Thus, CSAM legislation varies greatly around the world, particularly regarding the illegality of CSAM possession.

**For more information on the International Centre for Missing and Exploited Children's 9th edition of Child Sexual Abuse Material: Model Legislation & Global Review, go online to: <https://cdn.icmec.org/wp-content/uploads/2018/12/CSAM-Model-Law-9th-Ed-FINAL-12-3-18-1.pdf>**



## Nonprofit Organization Efforts

In the United Kingdom, the **Internet Watch Foundation (IWF)** is a charitable organization that is focused on reducing the amount of child pornography and exploitation materials hosted worldwide and criminally obscene adult content in the United Kingdom. The IWF receives financial support from ISPs, technology and financial service providers, and the European Union (Internet Watch Foundation, 2020). Beginning in 1996, the IWF was created to provide a hotline for the public and IT professionals to report criminal content found on the Internet. These reports are processed and used to distribute takedown notices to ISPs in the event that child pornography is identified. In fact, they estimate removing over 1,000 web pages each week since their inception. In fact, their efforts have led to a massive decrease in CSEM being hosted in the United Kingdom, from 18 percent of all child sexual abuse content being hosted on UK IP addresses in 1996 to only 0.1 percent in 2020 (Internet Watch Foundation, 2020). In addition, the IWF provides a block list to ISPs and industry so that individuals are unable to access content hosted online. They also provide assistance to UK law enforcement agencies to pursue the distributors and consumers of harmful content.

**For more on agencies and their efforts to combat child abuse and harm, go online to:**

1. **Internet Watch Foundation:** <https://www.iwf.org.uk/>
2. **National Center for Missing & Exploited Children:** [www.missingkids.com/home](http://www.missingkids.com/home)
3. **International Centre for Missing & Exploited Children:** [www.icmec.org](http://www.icmec.org)



The [National Center for Missing and Exploited Children \(NCMEC\)](#) is one of the key nonprofit organizations in the United States that deals with missing children and child exploitation. The Center began in 1984 under mandate from the US Congress and then-President Ronald Reagan as a clearinghouse for information and resources regarding these crimes (National Center for Missing and Exploited Children, 2020). Currently, the NCMEC is funded in part by the US Congress, as well as donations from the private sector and matching donors. As a result, the NCMEC is authorized by Congress under 42 USC 5773 and performs multiple roles to facilitate the investigation of crimes against children (CAC) (National Center for Missing and Exploited Children, 2020). Resulting from the PROTECT Our Children Act of 2008, the NCMEC operates a national toll-free hotline (1-800-THE-LOST) to collect information on runaway children, and the [CyberTipline](#), which provides an electronic resource for individuals to report suspected incidents of child abuse, child pornography, and sexual exploitation. In fact, the Tipline received 16.9 million reports in 2019 alone (National Center for Missing and Exploited Children, 2020).

The NCMEC offers training programs for youth and educators involving the threats children face online. The NCMEC also offers training and resources for law enforcement, including the [Child Victim Identification Program \(CVIP\)](#), which culls through images of child pornography in order to determine the identity and location of child victims (National Center for Missing and Exploited Children, 2020). This program has received requests to review more than 160 million images and videos from across the world (US Department of Justice, 2016). In addition, they support a joint operation with the US Marshals service to track sex offenders who violate the terms and conditions of their sentences.

The success of the NCMEC, and the recognition of a need for similar entities around the world, led to the formation of the [ICMEC](#) in 1999. The Centre is also a nonprofit agency with a similar mission to the NCMEC, though it is focused on building partnerships in a global context to better investigate child exploitation cases and build the legal capacity of nations so that there is consistency in laws to prosecute these offenses (International Centre for Missing and Exploited Children, 2020a). They not only focus on child abduction and harm but also have a substantive set of resources to support the investigation of child pornography and exploitation cases.

In particular, the ICMEC operates the [Financial Coalitions Against Child Sexual Exploitation \(FCACSE\)](#), which have a focus on the United States

and on the Asia-Pacific region (International Centre for Missing and Exploited Children, 2020b). These groups consist of financial institutions and ISPs who are jointly operating to take complaints of CSAM content operating on various platforms and disrupt the businesses that are engaged in the sale of or profit generation from this content (International Centre for Missing and Exploited Children, 2020b). They also offer training and assistance to law enforcement agencies internationally, along with legal consultations in order to develop model child exploitation law and harmonize legislation internationally. The ICMEC has national operational centers in Belarus, Belgium, Greece, Russia, the United States, and has new regional offices in Singapore, Greece, and Latin America to better service the nations of southeast Asia, southeastern Europe, and Central and South America, respectively (International Centre for Missing and Exploited Children, 2020b).

## Law Enforcement Efforts to Combat CSEM

At the federal level in the United States, there are a number of agencies involved in the investigation of sexual offenses. The **Federal Bureau of Investigation's (FBI) Crimes Against Children (CAC)** program investigates a range of sexual offenses and criminal activities that affect youth, ranging from CSEM to sex trafficking to kidnapping (Federal Bureau of Investigation, 2020a). This program became operational in October 2012 when two preexisting programs, called the Innocent Images Initiative under the Cyber Division and the CAC program, within the Criminal Investigative Division, were merged together. Each of these groups had a unique function: the Innocent Images program investigated child exploitation and pornography cases online, while the CAC program handled cases of child prostitution, abduction, and sex tourism (Federal Bureau of Investigation, 2020a). Combining these programs enabled a more effective approach to the investigation of these related crimes and helped to reduce the burden of pursuing the tremendous number of investigations of child exploitation that were tasked to the Cyber Division, which was already responsible for investigating hacking and fraud cases.

The CAC program now falls under the FBI's Criminal Investigative Division and develops investigative leads, which are pursued by field agents in each of the 56 field offices the Bureau operates across the United States (Federal Bureau of Investigation, 2020a). In each office, these cases are investigated by specialized **Child Exploitation and Human Trafficking Task Forces (CEHTTFs)**, which are joint operations of federal, state, and local law enforcement officers (Federal Bureau of Investigation, 2020a). This program is both reactive, in that

it actively investigates leads and tips provided by the general public and reports collected by NCMEC, and proactive, based on undercover investigations initiated by agents in chat rooms, social networking sites, website, and file-sharing communities (Federal Bureau of Investigation, 2020a).

The FBI also spearheads the **Violent Crimes Against Children International Task Force (VCACITF)**, which began in 2004 and is now the largest global task force in the world that investigates child exploitation cases (Federal Bureau of Investigation, 2020a). This program investigates cases of child sex tourism in southeast Asia and Latin America in order to develop practical evidence against US citizens who engage in such tourism so that they can be successfully prosecuted in the United States. There are over 45 nations that participate in this force, with 68 active members, all of whom share information in order to investigate child exploitation cases (Federal Bureau of Investigation, 2020a).

Additionally, the FBI operates the **Endangered Child Alert Program (ECAP)**, which seeks to identify the adults featured in some child exploitation content so they may be brought to justice (Federal Bureau of Investigation, 2020b). The faces and identifying characteristics of individuals are stripped from the media and published as Jane/John Does in order to obtain arrest warrants and actionable information about their real identities. A similar program, dubbed **Operation Rescue Me**, has been in operation since 2008 and is designed to identify the victims of child exploitation. Analysts sift through newly posted images and videos of child pornography in order to capture clues about the location and timeframe of when the media was made so that victim identities can be determined and saved. Thus far, the program has led to 45 youths being successfully identified and found from information available in these materials (Federal Bureau of Investigation, 2020b).

The **Immigration and Customs Enforcement (ICE) Agency** also plays an important role in the investigation of child exploitation cases (Immigration and Customs Enforcement Agency, 2020). Their role is often viewed in the context of managing the people and property that enter the United States, making the importation or distribution of child pornography and obscene content through its borders, electronic or otherwise, an investigative priority for ICE agents. As a result, ICE operates the Child Exploitation Investigations Unit to investigate myriad offenses online and offline. One of their key programs called **Operation Predator** is designed to facilitate the investigation of child exploitation, both in the United States and abroad (Immigration and Customs Enforcement Agency, 2020). This program has led to the arrest of more than

14,000 people for offenses, including child porn production and distribution as well as sex trafficking of minors (Immigration and Customs Enforcement Agency, 2020).

Not only do agents actively investigate these crimes, but they also work with state and local law enforcement agencies to provide intelligence and investigative resources to identify offenders and victims. They have also established a National Victim Identification Program to assist in the investigation of these offenses (Immigration and Customs Enforcement Agency, 2020). This agency is also the US representative to Interpol's working group on child sexual abuse online and is heavily involved in the **Virtual Global Taskforce (VGT)**, which is discussed later in this chapter (Immigration and Customs Enforcement Agency, 2020). Agents actively identify materials online and use these images and videos as the basis for investigative leads around the world (see **Box 8.8**; Immigration and Customs Enforcement Agency, 2020).

### **Box 8.8 Immigration and Customs Enforcement Operations in Action**

#### **29 Arrested in International Case Involving Live Online Webcam Child Abuse**

<https://www.ice.gov/news/releases/29-arrested-international-case-involving-live-online-webcam-child-abuse#:~:text=29%20arrested%20in%20international%20case%20involving%20live%20online%20webcam%20child%20abuse,-29%20arrested%20in&text=15%20children%20in%20the%20Philippines,children%20by%20the%20customer%20network.>



An organized crime group that facilitated the live streaming of on-demand child sexual abuse in the Philippines has been dismantled after a joint investigation by the U.K.'s National Crime Agency (NCA), the Australian Federal Police (AFP) and U.S. Immigration and Customs Enforcement (ICE).

This article provides an overview of a recent case investigated by a joint operation, including agents from the US Immigration and Customs Enforcement (ICE). The case spanned multiple nations, with victims across the globe.

The **US Postal Inspection Service** plays a role in the investigation of child exploitation cases as well, since CSEM was distributed directly via postal mail prior to the development of the Internet. The Postal Inspectors have investigated these offenses for more than 100 years as the law enforcement arm of the US Postal Service (US Postal Inspection Service, 2020). There are approximately 1,289 criminal investigators working within the office, as well as 581 armed uniformed officers (US Postal Inspection Service, 2020). They often work hand in hand with other law enforcement agencies to investigate a range of offenses, including identity crimes and drug offenses. This is particularly true for CSEM cases, as this content is still distributed in part from postal mail, and investigations of mailing behaviors can be used to help further investigations underway by other agencies (US Postal Inspection Service, 2020).



**For more information on the Postal Service's investigative role, go online to:** <https://www.uspis.gov/wp-content/uploads/2020/02/FY-2019-annual-report-508-web.pdf>

There are myriad specialized policing units at the federal or national level to investigate child pornography and exploitation cases around the world. The UK's **Child Exploitation and Online Protection (CEOP) Command** is a part of the **National Crime Agency (NCA)**, which became operational in October 2013. The CEOP takes reports of exploitation, abuse, and missing youth and will directly investigate threats and coordinate responses, depending on the scope of harm across multiple areas (CEOP, 2020). The CEOP also serves as the point of contact for multinational investigations in order to coordinate responses within the United Kingdom while working in concert with other agencies around the world. They also track registered sex offenders and pursue those who have failed to comply with any community notification requirements they may face as a result of their release from prison. Local police agencies can also request computer forensic assistance or covert investigation resources from the CEOP to facilitate a case against child predators. In addition to enforcement and investigative responsibilities, the CEOP also operates the **ThinkUKnow** program, designed to educate children and adults about threats to youth safety (CEOP, 2020).

In Australia, the Federal Police has a special subgroup called the **Child Protections Operations (CPO) team** that investigates and coordinates the response to child exploitation cases both domestically and internationally (Australian

Federal Police, 2021). The Royal Canadian Mounted Police (RCMP) serve as a key investigative mechanism in Canada and offer training and investigative support for local agencies. They also serve as a key partner in the **Canadian National Child Exploitation Coordination Centre (NCECC)**, the focal point of contact for online exploitation cases that cross jurisdictional boundaries within Canada or internationally (Royal Canadian Mounted Police, 2020). All of these agencies also take online reports and tips concerning child porn and exploitation to serve as a basis for investigation.

In the United States, **Internet Crimes Against Children (ICAC)** task forces provide a mechanism for coordination between local, state, and federal law enforcement, as well as prosecutors (ICAC, 2020). The ICAC program currently comprises 61 task forces, with a presence in every state. Some states with larger populations and geography have multiple ICACs, such as Florida, California, and Texas (ICAC, 2020). The program began in 1998 under mandate from the Office of Juvenile Justice and Delinquency Prevention (OJJDP) in order to improve the resources available to combat youth victimization at all levels of law enforcement, including investigative resources, forensic and technological assistance, and prosecutorial guidance. In fact, there is now a regular schedule of digital forensic and investigative training for ICAC investigators offered across the country, which are supported by various federal agencies (ICAC, 2020).

Though this may seem like a complex organizational hierarchy to understand, the response to child pornography and exploitation cases requires multiple points of coordination and response. A successful investigation requires that arrests and takedowns occur as close together as possible to avoid offenders realizing that they may be caught and attempting to flee or destroy evidence that may implicate them in criminal activity. Investigations that begin at the local level may also lead to evidence of criminal activity in other nations, which may increase the scope of agencies that may need to become involved in order for arrests and prosecutions to be both legal and successful.

This is evident in the recent series of arrests that took place around the world as part of Operation Spade (Ha, 2014). This investigation began in Canada in 2010 and implicated a child pornographer operating out of Romania under the name Azov Films, who produced content that was generated by individuals living in the United States, the United Kingdom, and Australia, among other nations (Ha, 2014). Agencies within each country investigated domestic incidents, shared this information with their partner agencies abroad, and timed arrests and takedowns to occur in such a way as to have the widest possible

impact on content generators and users. As a result, hundreds of people were arrested around the world in 2013 and 2014.



**For more information on Operation Spade, go online to:** <https://www.sott.net/article/268763-Nearly-400-children-rescued-and-348-adults-arrested-in-Canadian-child-pornography-bust>

Given that child exploitation cases can be international in scope, there is the VGT in order to coordinate responses to multinational investigations. The VGT was established in 2003 and is an alliance of agencies and private industry that work together in order to identify, investigate, and respond to incidents of child exploitation (VGT, n.d.). The team comprises federal law enforcement agencies in Australia, Canada, Columbia, the Netherlands, New Zealand, the Philippines, South Korea, Switzerland, the United Arab Emirates, the United Kingdom, and the United States, as well as Europol and Interpol (VGT, n.d.). The VGT takes complaints of child exploitation, coordinates multinational investigations, and provides resources for children and adults to protect themselves online. They have been tremendously successful in investigating child pornography and abuse cases, leading to arrests of individuals around the globe, as in the recent Operation Globe case (see **Box 8.9** for detail).

### Box 8.9 The Virtual Global Taskforce in Action

#### VGT Announce 20 Arrests in 6 Months from Operation Globe



<http://virtualglobaltaskforce.com/2016/vgt-announce-20-arrests-in-6-months-from-operation-globe/>

The VGT released the results of ‘Operation Globe’... which resulted in the arrest of 20 offenders, and the identification of approximately 30 victims in 18 cases, some of which are still ongoing.

This study provides an overview of a recent case investigated and pursued by members of the Virtual Global Taskforce to combat child exploitation cases.

## Summary

Taken as a whole, it is clear that any new technology or application will likely become a platform that individuals use in order to facilitate a sexual attraction to children. There is no immediate or easy solution to the challenge of eliminating child sexual abuse and victimization. This is also one of the few crimes that lead to substantive international investigations and cooperative working agreements between agencies. Given that technology changes so frequently and may be subverted by offenders in distinct ways, there will be a need for constant inquiry into the nature of sexual offenses in online and offline environments to improve and adapt the criminal code to new offenses. Likewise, law enforcement must understand offender behaviors so as to better collect evidence that can support the investigation and prosecution of sex offenders.

## Key Terms

Browser  
Canadian National Child Exploitation Coordination Center (NCECC)  
Child Exploitation and Online Protection (CEOP) Command  
Child Exploitation and Human Trafficking Task Forces (CEHTTFs)  
Child love  
Child pornography  
Child Pornography Protection Act of 1996  
Child Protections Operations (CPO) Team  
Child sexual abuse imagery (CSAI)  
Child sexual abuse material (CSAM)  
Child sexual exploitation material (CSEM)  
Child Victim Identification Program (CVIP)  
COPINE Scale (Combatting Paedophile Information Networks In Europe)  
Convention on Cybercrime  
Coroners and Justice Act  
Criminal Justice and Public Order Act  
CyberTipline  
Dark Web  
Distributor  
Endangered Child Alert Program (ECAP)

Federal Bureau of Investigation's (FBI) Crimes Against Children (CAC)  
Financial Coalition Against Child Sexual Exploitation (FCACSE)  
Groomer  
Grooming  
Hands-on contact offenders  
Immigration and Customs Enforcement (ICE) Agency  
Information Technology Act of 2000  
International Centre for Missing and Exploited Children (ICMEC)  
Internet Crimes Against Children (ICAC)  
Internet Watch Foundation (IWF)  
National Center for Missing and Exploited Children (NCMEC)  
National Crime Agency (NCA)  
Networking  
Nonsecure collector  
North American Man-Boy Love Association (NAMBLA)  
Operation Predator  
Operation Rescue Me  
Pedophile  
Physical abuser  
Producer  
Prosecutorial Remedies and Other Tools to end the Exploitation of Children Today Act (or PROTECT Act) of 2003  
Protection of Children Act 1978 (PCA)  
Protection of Children Against Sexual Exploitation Act  
Private fantasy  
Secure collector  
ThinkUKnow  
*To Catch a Predator*  
Traders  
Travelers  
Trawlers  
US Postal Inspection Service  
Violent Crimes Against Children International Task Force (VCACITF)  
Virtual Global Taskforce (VGT)

## Discussion Questions

1. Since technology constantly evolves, what applications or devices do you think may be misused in the future as a platform for individuals to engage in the production or distribution of child sexual exploitation material (CSEM)?
2. In what ways does the ability to communicate about sexual interests with children help make it possible for individuals to justify their actions and offend over time?
3. Why do you think we sanction individuals who possess or access CSEM with more severity than we do hackers or data thieves? Why would there be such differential sanction use?

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# CYBERBULLYING, ONLINE HARASSMENT, AND CYBERSTALKING

### Chapter Goals

- Understand the difficulty in separating the term “bullying” from harassment and stalking
- Identify the prevalence and correlates of cyberbullying
- Identify the correlates of cyberstalking
- Examine where and how cyberbullying is a crime
- Explore the laws designed to prosecute cyberstalking at the national and state levels
- Explain why local law enforcement is more likely to investigate these forms of cyber-violence
- Discuss the extralegal agencies that investigate these activities

### Introduction

The development of email and other forms of computer-mediated communications, or CMC, has completely changed the way in which we engage socially with others. Instagram, Twitter, Snapchat, and other social media platforms make it easy for us to tell friends and the whole world what we are up to, when, and with whom, around the clock. Geotagged posts on social media sites like Snapchat and Twitter also allow other users to know where others were in physical space at certain times. The ability to livestream our lives also allows us to share virtually every facet of our days with whoever is interested.

The relatively open nature in which people can now lead their lives is unparalleled and limited only by an individual’s willingness to share. While it may seem that technology engenders users to be truthful about themselves and their lives, there is increasing evidence that people are very willing to say and post whatever they can to either become popular or to connect with individuals with whom they are interested to meet.

In fact, the creation and development of relationships through social media predicated on false information has gained prominent attention in the last decade. This act has been referred to as “**catfishing**” after the documentary movie and television show of the same name (Peterson, 2013). Both the film and show follow individuals as they attempt to disentangle and identify who is actually behind the social networking profile with whom they have built an emotional, though nonphysical, relationship.

**For more on how to identify a catfish, go online to:** <https://www.cybersmile.org/what-we-do/advice-help/catfishing>



While catfishing is not illegal, individuals can be emotionally hurt as a result of discovering a relationship they developed is predicated on lies. In addition, catfishing is just one of many problematic behaviors that can emerge from the Internet and CMCs. When relationships dissolve and couples break up, there is some evidence that the individual who was dumped may turn to email, Facebook, or even YouTube in order to post comments about his or her ex that are disparaging or hurtful. The increasing ability that we have to take video and images and send them to others has led some to post intimate or candid materials in online public places in order to embarrass or shame their ex.

At the same time, young people are increasingly using technology as a means to send bullying or harassing emails to classmates or people that they do not like. Such messages may be readily ignored, but if the sender is persistent, or if others begin to “like” or repost the messages, it may lead the victim to feel ashamed, frightened, or depressed. A number of youth have tragically committed suicide over their experiences, though this is an extreme outcome.

The most notable of these incidents occurred in 2006 with the suicide of a young girl named **Megan Meier**. She befriended who she thought was a young boy about the same age named Josh Evans through the social networking site MySpace (Morphy, 2008). Their conversations became frequent, and eventually she became emotionally attached to him. That is, until he began to send her mean and hurtful messages and told her that the world would be a better place without her. Shortly thereafter, Megan hanged herself and was found by her parents. It was subsequently discovered that the boy she was talking with did not actually exist. The account was an early instance of catfishing; it was actually created by **Lori Drew**, the mother of one of Megan’s former friends. The two younger girls had a falling out, and Drew opened the account to embarrass Megan. Though the outcome was not at all what Drew had intended (Morphy, 2008), it did not change the fact that Megan died.

**For more on the Megan Meier story, go online to:** [www.youtube.com/watch?v=fGYVHFYop9E](https://www.youtube.com/watch?v=fGYVHFYop9E)



The Megan Meier case quickly became a lightning rod, drawing national attention to the problem of cyberbullying. Unfortunately, multiple instances of suicides stemming from cyberbullying have occurred worldwide. For instance, a 14-year-old girl named Hannah Smith in Lancashire, England, killed herself after receiving hundreds of harassing comments on the website Last.fm (Fricker, 2013). Similarly, a 16-year-old girl in Singapore was thought to have committed suicide as a result of a former boyfriend posting mean and hurtful comments on Facebook and via email (Chen, 2011).

All of these instances demonstrate that the use of technology can cause real-world harm, which David Wall would classify as cyber-violence (see [Chapter 1](#) for further discussion). What we know about these issues, however, is challenged by the overlapping definitions of bullying, harassment, and stalking, as well as our limited knowledge of the prevalence of victimization. This chapter will explore these issues, beginning with the common definitions used for these offenses, estimates of both victimization and offending, and the impact that they have on victims in general. We will also discuss the inherent legal challenges that have developed and the existing statutes that can be used to prosecute these offenses. Finally, we will explore the agencies and groups involved in the investigation of these offenses. In turn, readers should be able to have a greatly expanded appreciation for the overlap of these events and the general threats these forms of online harm can pose to all Internet users.

### Defining Cyberbullying

One of the most prominent concerns of the last decade is the issue of bullying, particularly cyberbullying, due to the increasing prominence of technology and its use among young people. In the physical world, bullying is typically defined as the use of intentional and repeated use of aggressive or negative behaviors based on an imbalance of power between individuals, most typically a weaker victim (Klomek et al., 2008; Nansel et al., 2001; Olweus, 1993). Bullying may take multiple forms, ranging from verbal threats or insults (like name-calling or teasing) to more serious physical harm (such as being hit or kicked). These behaviors may produce negative emotional reactions from the victim due to embarrassment, shame, intimidation, anger, sadness, or frustration (Klomek et al., 2008; Nansel et al., 2001).

Many of these characteristics are evident when considering bullying in virtual environments as well. In fact, **cyberbullying** can be defined as any

intentional, aggressive behavior performed through electronic means (Hinduja & Patchin, 2008). Though a bully cannot physically injure an individual through CMCs, they can cause emotional harm and social embarrassment by sending threatening, mean, or hurtful messages via instant messaging, email, posts on social media, and text messages via cell phones (Hinduja & Patchin, 2008).

**For more on cyberbullying, go online to:**

1. [www.cyberbullying.us](http://www.cyberbullying.us)
2. [www.bullying.co.uk/cyberbullying/](http://www.bullying.co.uk/cyberbullying/)



Similar to traditional bullying, cyberbullying can also take multiple forms. Willard (2007) proposed an eight-category typology of cyberbullying to characterize the activities of bullies and the experience of victims:

- 1 **Flaming:** engaging in online fighting where users directly target one another with angry or irritated messages, often featuring vulgar language;
- 2 **Denigration:** making comments about individuals' characters or behaviors that are designed to harm their reputation, friendships, or social positions, such as saying that someone is homosexual or making fun of that person;
- 3 **Impersonation:** falsely posting as other people to harm their reputation or social status by logging into their existing accounts to post messages or by creating fake accounts to masquerade as that person;
- 4 **Outing:** posting real personal information about individuals to embarrass them, such as sending images of them in states of undress, posting who they are attracted to, or information about homosexual preferences which may not be known to the general public;
- 5 **Trickery:** convincing individuals to provide personal information about themselves in what they think is a personal conversation, which is then revealed to the general public;
- 6 **Exclusion:** intentionally keeping others from joining an online group, such as a network on Facebook or some other site online;
- 7 **Harassment:** the repeated distribution of cruel or mean messages to a person in order to embarrass or annoy them;
- 8 **Stalking:** the use of repeated and intense harassing messages that involve threats or cause the recipient to feel fear for their personal safety.

The typology proposed by Willard (2007) recognizes the substantive variation in harm that can occur online. In addition, it recognizes that bullying does not require repeated harm. Posting personal information online that was shared in confidence *one time* is cyberbullying. Messages, however, can also be sent repeatedly and nearly instantaneously to a prospective victim throughout the day (Jones et al., 2012). The constant exposure to hurtful messages can cause persistent and pervasive emotional and psychological harm for a victim. In addition, a message can be posted in multiple environments, such as Facebook, Twitter, and YouTube, within a short amount of time. As a result, multiple individuals may engage in a bullying experience by reposting content or “liking” what someone posts. This can cause significant harm for a victim by making them feel as though the whole world is laughing at them and they cannot escape it. Thus, cyberbullying may be just as harmful for the victim as real-world bullying – sometimes more.

As a final point of concern, bullying could also be viewed as harassment or stalking. Many typically associate bullying, on or offline, with juvenile populations where power differentials are common. One researcher even went so far as to argue that cyberbullying can only occur between minors, whereas any other involvement with adults should be viewed as harassment or stalking (Aftab, 2006). Others have suggested that adults can be bullied, particularly in the workplace where there is greater potential for individuals to intimidate or otherwise affect those with less power (Kowalski et al., 2008). This has some salience in school environments, where students may attempt to harass their teachers online or make fun of them for certain activities. However, the degree to which teachers are harassed or bullied by students has been given relatively little focus. Most researchers instead focus only on the issue of bullying in juvenile populations (see Kowalski et al., 2014). As a result, we will only discuss the issue of bullying in juveniles and discuss potential age variations later in the chapter.

### The Prevalence of Cyberbullying

Rates of cyberbullying vary substantially based on the group of youth sampled, the time the data were collected, and the way in which bullying was defined, or operationalized, by the authors. These issues make it quite difficult to accurately document the scope of cyberbullying within a single place over time, let alone cross-nationally. Initial estimates of cyberbullying within the United States varied in the early 2000s with rates between 6 percent (Thorp, 2004) and 7 percent

in a 12-month period (Ybarra & Mitchell, 2004). Recent estimates from the United States suggest that rates of cyberbullying have increased, which may be a reflection of greater access to technology at early ages. Kowalski and Limber (2007) found that 18 percent of a sample of middle school youth reported being cyberbullied over a 12-month period. Recent data collected by Hinduja and Patchin (2020) found that 14.5 percent of a sample of over 1,000 children of age 9–12 years in the United States reported having been cyberbullied. A separate sample collected by the same authors (Patchin, 2019) of almost 5,000 youth aged 12–17 years reported a much higher rate of victimization: 25 percent reported receiving mean or hurtful comments online in the past 30 days. These rates, however, may be a result of distinctive student samples, as results from the nationally representative **National Crime Victimization Survey-Supplemental Survey** on bullying and cyberbullying found that approximately 15.3 percent of students aged 12–18 years were cyberbullied during the 2016–2017 academic year (US Department of Education, 2019).

Cyberbullying victimization rates may be similar or lower than bullying rates depending on the study. The World Health Organization (WHO) recently reported that on average, 14 percent of 11-year-old boys and 11 percent of 11 year old girls experience various forms of bullying across 42 nations (World Health Organization, 2016). Payne and Hutzell (2017), however, found that interpersonal bullying victimization (28.2 percent) occurred much more often than cyberbullying victimization (9.1 percent). As Payne and Hutzell (2017) note, negative online behaviors have become more normalized, and students may simply not acknowledge these behaviors as cyberbullying.

**For more information and statistics on cyberbullying, go online  
to: <https://cyberbullying.org/teen-statistics>**



It is also important to note that there is some variation in cyberbullying victimization rates and those of youth engaging in cyberbullying behaviors. Ybarra and Mitchell (2004) found 18 percent of a sample of youth engaged in cyberbullying offending in a one-year period. More recently, Patchin (2019) found that in a sample of 4,972 youth from 2019, 15 percent of kids engaged in cyberbullying behavior at some point in their lifetime. Only 11 percent of youth engaged in cyberbullying behaviors over the last 30 days when the survey was administered (Patchin, 2019). Rates among younger populations may be lower, as Hinduja and Patchin (2020) found that 3.2 percent of a sample of 1,034

youths aged 9–12 engaged in cyberbullying. Thus, there are some differences evident in the rates of cyberbullying offending and victimization.

When examined internationally, the rates of cyberbullying victimization reported vary dramatically across place. A recent meta-analysis of international studies of cyberbullying victimization found that the average reported rate of victimization was lower in Canada (13.99 percent) and South Korea (14.6 percent) (Zhu et al., 2021). The rate was highest in Spain (57.5 percent), Malaysia (52.2 percent), Israel (45 percent), and China (44.5 percent), respectively (Zhu et al., 2021). These estimates are, however, substantially variable, as studies from China have shown rates of victimization to be as low as 6 percent to as high as 46.3 percent depending (Zhu et al., 2021). Much of this variability depends on the ways the researchers measured cyberbullying, how large the sample of youth was, and when it was collected.



**For more information and statistics on cyberbullying, go online to:**  
<https://www.ijitee.org/wp-content/uploads/papers/v8i8s/H10200688S19.pdf>

### Predictors of Bullying Online and Offline

Taken as a whole, these statistics suggest cyberbullying is a problem that at least one out of every six youth may experience in his or her life. It is not clear how this will change as smartphone adoption and social networking applications expand across the world. Despite the lack of clarity on this issue, there are specific factors that may increase the risk of cyberbullying victimization for youth.

First, studies generally find that females may be more likely to report cyberbullying victimization than males (Baldry et al., 2015; Kowalski et al., 2014; Lee et al., 2018; Smith et al., 2019; Zych et al., 2015). This may be based on the way that females and males differ in their expression of aggression and harmful behaviors. Boys generally report higher levels of physical bullying and aggressive behavior; females appear to use more indirect tactics focused on causing emotional harm through behaviors like spreading gossip (Boulton & Underwood, 1992; Klomek et al., 2008; Nabuzoka, 2003; Smith et al., 2019). Meta-analyses and reviews of cyberbullying research have found mixed results regarding the relationship between gender and bullying, however, suggesting that there may be minimal gender differences in the risk of cyberbullying victimization and offending (Kowalski et al., 2014; Lee et al., 2018; Smith et al., 2019; Zych et al., 2015).

Second, there is also a link between age and cyberbullying victimization. While most research suggests that younger children are more likely to experience bullying in the real world (Borg, 1999; Olweus, 1993), cyberbullying is more likely to be reported by older youth (Sbarbaro & Smith, 2011; Tokunaga, 2010; Zych et al., 2015). The age variations noted may stem from differential access to technology since the very young may have limited access to computer and mobile phone technology (Alvarez-Garcia et al., 2018; Smith et al., 2008). As kids reach their early teens, they are more likely to receive access to computers and phones, thereby increasing their exposure to bullying (Kowalski et al., 2014). This issue may, however, exacerbate over time with increasingly early exposure to mobile devices.

Third, in keeping with access to technology, the use of certain technologies may increase the risk of cyberbullying victimization. Spending time online in social networks, chat rooms, and email can increase one's risk of experiencing electronic bullying or harassment (Berson et al., 2002; Hinduja & Patchin, 2008; Holt & Bossler, 2009; Leukfeldt & Yar, 2016; Twyman et al., 2010; Ybarra & Mitchell, 2004). Many studies, however, do not find significant relationships between general Internet usage and online harassment victimization (e.g., Bossler et al., 2012; Ngo & Paternoster, 2011).

Fourth, risky technology behaviors and the methods through which individuals share information in online environments are also related to victimization because it decreases personal guardianship, or the ability to protect oneself from harm (Chen et al., 2017). Individuals who provide sensitive information about themselves in public places, like a social network profile, have an increased risk of bullying victimization (Mitchell et al., 2007). Posting school schedules, home addresses, or images and stories of themselves in compromising situations provides offenders fodder for attack (Hinduja & Patchin, 2009). The increased emphasis on photo and video-based social media applications like Instagram and Snapchat also create opportunities for individuals to target someone based on their gender or appearance. As a consequence, individuals who do not carefully manage personal or sensitive information may increase their risk of victimization.

Fifth, being bullied in the real world is also unfortunately a strong predictor for being bullied in the virtual world as well. The relationship between bullying across both environments appears consistently, regardless of where the sample was generated (Erdur-Baker, 2010; Hinduja & Patchin, 2008; Kowalski et al., 2014; Wolke et al., 2017; Ybarra & Mitchell, 2004; Zych et al., 2015). This may be due to the fact that being bullied in the real world could immediately make someone a target for bullying in virtual spaces. In addition, the difficulty in escaping the

bullying experience when it operates both on and offline may have a greater impact on the victim, making them more likely to report negative psychological and emotional outcomes (Holt et al., 2013; Olweus, 1993; Tokunaga, 2010).

To understand the predictors of bullying, we must also examine it from the offender's point of view in order to provide insight into which youth are more likely to bully others. Studies generally find that boys are more likely than girls to cyberbully (Baldry et al., 2017; Lianos & McGrath, 2018). Youth who bully others appear to have a temper and may be easily frustrated (Camodeca & Goossens, 2005; Holt et al., 2012). They are also more likely to report lower levels of self-control and display behaviors indicating that as well (e.g., Lianos & McGrath, 2018). For example, they report greater problem behaviors at school (Hinduja & Patchin, 2008). At the same time, they also have low compassion and empathy toward others, making it difficult for them to understand how their actions affect other people (Camodeca & Goossens, 2005).

Individuals who engage in cyberbullying also tend to engage in assaultive behaviors offline, including bullying behaviors (Hinduja & Patchin, 2008; Kowalski et al., 2014). Cyberbullies also appear to spend more time online and engage in various online activities ranging from checking email to spending time in social networking sites, which is sensible given the mechanisms needed in order to bully others online (Hinduja & Patchin, 2008). As a result, it is important that we consider how the behavioral and attitudinal correlates of bullying may be used to better understand and intervene in bullying encounters to reduce the negative outcomes kids may experience.

### Differentiating Online Harassment and Stalking

As identified earlier, some categorize harassment and stalking under the definition of cyberbullying. These definitional issues make it difficult to truly differentiate harassment and stalking. In fact, Sinclair and Frieze (2000) argue that there is no way to identify what behaviors should be classified as harassment or stalking, and thus, the terms should be used interchangeably. There are, however, a few salient points that could be used in order to identify when an incident may be defined as **online harassment** or as **cyberstalking**. While both behaviors involve the constant use of email, text, or some other form of CMC, the effects these messages have on the victim are pertinent. Instances of harassment may be viewed as bothersome, annoying, or unwanted by the recipient, but these communications do not necessarily portray a threat (Turmanis & Brown, 2006). By contrast, **cyberstalking** may lead a victim to feel fear for

their personal safety and/or experience emotional distress (Bocij, 2004; Reyns & Fissel, 2020). In both cases, the recipient should indicate to the sender that they want the messages to stop. Such an indication is important in order to help law enforcement pursue a criminal case against the sender.

It is also important to recognize that cyberstalking is related to, but not equivalent to, traditional stalking activities (Bocij, 2004; Bocij & McFarlane, 2002; Reyns & Fisher 2018). In cases of real-world stalking, the actor may track his victim and show up unannounced and unwelcome in various places, which may intimidate or cause fear in the victim (Bocij, 2004). Cyberstalking may involve a variety of online activities that produce similar results, such as monitoring a person's online behaviors, gathering personal information about that individual through various outlets, and sending hostile or threatening messages that imply they will cause bodily harm to the victim or to their property (see **Box 9.1** for an example; Bocij, 2004).

The range of cyberstalking does not simply end with virtual threats. A few cyberstalkers have sent malicious software, like keylogging programs, in order to monitor all aspects of their victims' behaviors (Bocij, 2004). Other cyberstalkers make false posts in various sites impersonating their victims in order to embarrass them or cause them physical harm (Bocij, 2004). For instance, a convicted cyberstalker in the United States named Shawn Sayer posted sexually explicit videos of his ex-fiancé to porn sites under her actual name, along with a

### **Box 9.1 Vickie Newton and Negative Outcomes of Cyberstalking**

#### **Cyberstalking: Woman Sentenced for Harassing Victim on Social Media**

<https://www.fbi.gov/news/stories/woman-sentenced-for-cyberstalking>



The messages were relentless. A California woman couldn't escape the barrage of malicious texts, phone calls, and social media posts originating from a mysterious individual with whom she had no previous connection.

This article provides insights into the experiences of an obsession-based stalker who went from being a criminal justice student in University to a convicted felon because of her fixation on a woman.

Facebook account that reposted the videos (Hoey, 2012). He would then contact individuals who liked the content and arranged meetings with the men at her home in order to have sex. The various men who showed up at the victim's home were then confused when she had no idea why they were there and made her fear that she would be raped or otherwise hurt.

A cyberstalker, however, does not have to engage in real-world stalking and vice versa (Bocij, 2004; Nobles et al., 2014). The anonymity afforded by the Internet coupled with the volume of information available about individuals via social network sites and other self-generated content allows people to engage in stalking behaviors with ease. In addition, cyberstalkers need not know their victims, which is in contrast to real-world stalking. Instead, a prospective stalker can identify any random target through Google searches or simple online interactions. For instance, a California-based security operations supervisor for eBay, named Philip Cooke, was arrested and is on trial at the federal level for cyber-stalking a couple in Natick, Massachusetts (Hook, 2020). The couple published an online newsletter that was critical of eBay's practices, and Cooke took it upon himself to send threatening messages and packages to the couple, including a fetal pig and books on surviving the loss of a spouse. As a result, the threats posed by cyberstalkers can be just as serious as those in the real world and can produce the same response in victims as those found in traditional stalking activities offline (Bocij, 2004; Worsley et al., 2017).



**For an example of a stranger-driven case of cyberstalking, go online to:** <https://www.masslive.com/boston/2020/10/former-police-captain-philip-cooke-pleads-guilty-to-cyberstalking-massachusetts-couple-employees-sent-victims-bloody-pig-mask-insects-and-porn.html>

### Rates of Harassment and Stalking

In light of the challenges inherent in differentiating between harassment and stalking, it is important to attempt to identify the rates of these offenses in the general population. One of the best estimates of online harassment in the United States comes from the **Youth Internet Safety Survey (YISS)** sponsored by the National Center for Missing and Exploited Children (Jones et al., 2012). This study of youths aged 10–17 years who regularly used the Internet was administered in three waves, the first in 2000, the second in 2005, and the third in 2010. There was an increase in online harassment victimization across

the three time periods. First, the proportion of youth who reported online harassment, as defined by receiving threats or offensive comments either sent to them or posted about them online for others to see, grew from 6 percent in 2000 to 9 percent in 2005 to 11 percent in 2010. Within these samples, the number of youths who reported distress, as measured by fear or being upset because of the harassment, increased from 3 percent in 2000 and 2005 to 5 percent in 2010. In addition, the proportion of youths who experienced repeated harassment increased from 2 percent in 2000 to 4 percent in 2005 to 5 percent in 2010 (Jones et al., 2012).

The YISS also captures youth engaging in harassment against other children. These figures showed an increase in the proportion of youth engaging in harassment within each wave (Jones et al., 2012). Specifically, those kids making rude or nasty comments online increased from 14 percent in 2000 to 28 percent in 2005 to 40 percent in 2010. A similar increase was evident in youths who used online spaces to embarrass or harass someone out of anger or spite. This rate increased from 1 percent in 2000 to 9 percent in 2005 to 10 percent in 2010. These figures illustrate that the prevalence of harassment has increased for modern youth.

Similar responses are noted in populations of college students using assessments of their experiences over a 12-month period, though it again depends largely on the population sampled. In a study of New Hampshire college students, Finn (2004) found that 10–15 percent of students reported receiving harassing messages via email or instant messaging, and more than half received unsolicited pornography. Similarly, Holt and Bossler (2009) found that 18.9 percent of a convenience sample of college students at a southeastern university received unwanted emails or instant messages. Also, in a random sample of students from a single university, Marcum et al. (2010) found that harassment victimization ranged from 6.5 to 34.9 percent, depending on the type of harassment reported.

There are also a small number of sources available to understand the scope of cyberstalking. One of the few truly nationally representative studies assessing cyberstalking in the United States comes from the **National Crime Victimization Survey-Supplemental Survey (NCVS-SS)**; Catalano, 2012). Using a population of 65,270 people collected in 2008, the survey found that 26.1 percent of those who reported being stalked were sent emails that made them feel fear. The Measuring Cyberabuse Survey administered by Data and Society found that 8 percent of US Internet users 15 years or older had been contacted online in a way that made them feel unsafe or afraid at some point in their lives

(Lenhart et al., 2016). Similarly, the Pew Research Center found recently that 7 percent of adults have been stalked online (Duggan, 2017). When examining college students, Reyns et al. (2012) found that up to 40 percent of college students have been cyberstalked at some point over their lives, if the definition of cyberstalking did not include feeling fear. If fear needed to be experienced for it to be considered cyberstalking, Reyns and Fisher (2018) found that only 2 percent of students were cyberstalked over the previous academic year.



**For more on the NCVS study, go online to:** [www.bjs.gov/content/pub/pdf/svus\\_rev.pdf](http://www.bjs.gov/content/pub/pdf/svus_rev.pdf)

In Canada, statistics suggest that 7 percent of all adults received threatening or aggressive emails and instant messages (Perreault, 2013). The majority of these messages come from strangers (46 percent of male victims; 34 percent of female victims), or acquaintances (21 percent of male victims; 15 percent of female victims; Perreault, 2013). A recent survey conducted by the **National Centre for Cyberstalking Research** (2011) in the United Kingdom found that approximately 75 percent of a sample of 353 people experienced some form of online harassment. The majority of messages were sent via social networking sites (62.1 percent males; 63.1 percent female) or through personal email accounts (55.8 percent males/56.4 percent females). There are, however, no current national statistics collected within the United Kingdom to assess arrest rates or victim reports of cyberstalking victimization (National Centre for Cyberstalking Research, 2011).

### Understanding Victims' Experiences of Cyber-Violence

It is clear that many aggressive and hurtful comments can be sent through CMCS and that many people are victimized as a result. The responses that victims have to bullying, harassment, and stalking, however, are quite varied. A proportion of individuals are able to brush off their experience and move forward without taking the comments of their harasser or stalker to heart. However, some experience emotional or physical harm, and a very small proportion even go so far as to seriously contemplate suicide (Baiden & Tadeo, 2020; Ybarra & Mitchell, 2004). To better understand the victim response, we will examine each form of cyber-violence in turn.

Cyberbullying produces effects often mirroring reactions to physical bullying. Victims of cyberbullying often exhibit symptoms of depression, stress, and anxiety (US Department of Education, 2019; Ybarra & Mitchell, 2004). Social withdrawal and school failure can also occur, with 19.4 percent of youth in the United States reporting negative impacts on their school work as a result of bullying (US Department of Education, 2019). These responses are more likely if cyberbullying incidents occur in tandem with offline bullying. Young people may begin to skip school, or be **truant**, in order to try to avoid persistent or repeated victimization (Katzer et al., 2009; Ybarra et al., 2007). In fact, data from a nationally representative survey of youth suggests that 15.2 percent of kids who were bullied avoided certain places in their school, while 4.5 percent avoided school activities and 4.8 percent skipped school entirely (US Department of Education, 2019). Truancy may also occur because the victim feels that school is no longer a safe place to be, particularly, when they experience substantive bullying both online and offline (Varjas et al., 2009).

Some youth may also skip school to avoid shame, embarrassment, and stigma associated with their bullying experiences on or offline. In fact, Kowalski et al. (2008) argue that the negative impact of cyberbullying can even be worse than physical bullying experiences, due to the persistent nature of their victimization. A youth may be shoved, hit, or called names in the hallways at school, but they can escape that experience once they leave the campus. In contrast, cyberbullying is much more difficult to avoid, as bullying messages can be sent continuously to the victim, be reposted by others, and can also reappear, making the victim feel helpless (Baiden & Tadeo, 2020; Campbell, 2005; Li, 2006).

One of the most noteworthy examples of the impact of cyberbullying on youth depression and behavior is the experience of Ghyslain Raza, also known as the **"Star Wars Kid."** The 15-year-old Raza, a high school student in Trois-Rivieres, Quebec, Canada, made a video of himself swinging a golf ball retriever (Wei, 2010). His movements were similar to the style of Darth Maul, the dual-lightsaber-wielding Sith Lord from *Star Wars: Episode 1*. Raza had set up a camcorder to make a tape of himself for a school project in the fall of 2002 and filmed himself with no intention of others seeing his "lightsaber" strikes. However, one of his classmates found the tape in April 2003 and showed it to a friend, who then converted the tape to a digital format. The two boys then distributed the video via email to friends, and it began to spread across the student body. One student even posted the video to a peer-to-peer file sharing site with the title *Jackass\_starwars\_funny.wmv*, where it became a viral phenomenon.

The mental anguish young Raza experienced was quite severe because so many people saw the video and constantly made fun of him for his activities. He became severely depressed, dropped out of school, and was institutionalized for psychological treatment by the end of 2003 (Wei, 2010). Raza's family sued the families of four of the boys who discovered the video and posted it online for damages and emotional harm, which led to an out-of-court settlement for an undisclosed amount. The video, however, has been seen over 1 billion times on various online media outlets since it was first posted. Thus, the global spread of hurtful content can have substantial impact on a victim's emotional well-being.

In addition to school absences and emotional harm, some victims of cyberbullying report having suicidal thoughts, or suicidal ideation, as a result of their experiences (Baiden & Tadeo, 2020; Hinduja & Patchin, 2008; Klomek et al., 2008; Li, 2006). Individuals who experience suicidal ideation often have negative attitudes generally, which may be a long-term consequence of bullying experiences on and offline (Arseneault et al., 2006; Baiden & Tadeo, 2020; Beran & Li, 2007; Nansel et al., 2001). Over the last few years, there has been a substantial amount of media attention around cyberbullying and suicide. Much of this stems from the seminal Megan Meier case discussed earlier and the multiple incidents of cyberbullying victimization leading to suicides around the world (see [Box 9.2](#) for details on the Audrie Pott suicide case). Thus, the connection between virtual and real experiences must be considered further.

### **Box 9.2 The Unfortunate Suicides Resulting from Bullying**

#### **Suicide Has Only Gotten Younger. These Two Families, Bonded by Loss, Are Taking Action**



<https://www.usatoday.com/story/news/health/2020/03/07/youth-teenage-suicide-after-deaths-reno-nevada-parents-fight/4955635002/>

The evidence from cross-sectional, longitudinal and empirical studies implicates smartphone and social media use in the increase in mental distress, self-injurious behaviour and suicidality among youth.

This article provides an overview of the harm that can result from smartphone use and cyberbullying incidents broadly.

Victims of cyberstalking and online harassment may report similar experiences to those of bullying because of the persistent messages and threats they receive. In particular, victims typically report feeling powerless, shamed, and socially isolated from others (Ashcroft, 2001; Blauuw et al., 2002; Reyns & Fissel, 2020). Anxiety and depression may also be a common outcome due to concerns about actualizations of threats or the worry over receiving more messages.

Some victims of bullying, stalking, and harassment may begin to change their behaviors as a response to their victimization, deciding to either take steps to defend themselves or reduce their risk of further victimization. For instance, evidence from the NCVS supplemental study on bullying found that 3.9 percent of youths who were bullied carried a weapon to school, and 12 percent engaged in fights with others over their experiences (US Department of Education, 2019). A comparative analysis by Sheridan and Grant (2007) found no differences in the behavioral patterns of victims of either traditional or cyberstalking. Victims of traditional stalking report changing their behavior patterns in order to reduce the risk of victimization. Some also change their address, phone number, or email address in order to help reduce their ability to be identified (Baum et al., 2009; Nobles et al., 2012).

A small proportion of victims also begin to carry a defense weapon, like pepper spray (Nobles et al., 2012; Wilcox et al., 2007). Approximately 10–15 percent of victims either stop spending time around friends or family in order to minimize their risk of exposure, or they begin to stay with loved ones in order to increase their feelings of personal safety and protection (Nobles et al., 2012). Victims who felt higher degrees of fear were more likely to engage in a higher number of these self-protective behaviors (Nobles et al., 2012).

## Reporting Online Bullying, Harassment, and Stalking

Though there are substantive psychological and behavioral consequences for victims of bullying, harassment, and stalking, it appears that very few report these incidents to agencies or individuals who can help them. While many researchers examine the prevalence of cyberbullying or traditional bullying, few have considered how often these behaviors are reported. One of the only studies to look at reporting with a nationally representative sample suggests that approximately 75 percent of kids harassed told someone about the incident, though they primarily told friends rather than parents (Priebe et al., 2013). Similarly, the NCVS supplemental survey on bullying found that 45.6 percent of

youths contacted a teacher or school official about their experience (US Department of Education, 2019).

The lack of reporting to parents or authority figures may be a consequence of concerns among youth that they may lose access to the technology that enables cyberbullying (Hinduja & Patchin, 2009; Marcum, 2010). In fact, youth who experience cyberbullying were likely to have had a conversation with their parent(s) about harassment and the risks associated with online communication, though it did not affect their likelihood of reporting the incident (Priebe et al., 2013). A logical parental response may be to take away their child's cell phone or perhaps limit the amount of time that they can spend online. Such a response may be undesirable, especially for a teenager who only recently acquired a cell phone or is used to having unrestricted access to technology.

Instead, many youths who are cyberbullied tend to simply delete the messages they receive, ignore it when possible, or block the sender in order to reduce their exposure (Parris et al., 2012; Priebe et al., 2013). In fact, most youth only report the incident if they feel it is severe (Holtfeld & Grabe, 2012; Slonje et al., 2013), such as if it lasts for several days or produces a severe emotional response (Priebe et al., 2013). Limited research on the topic suggests that reporting cyberbullying experiences to parents decreases as youths age (McQuade et al., 2009; Slonje et al., 2013). Instead, teens are more likely to report cyberbullying experiences to their peers as a coping strategy. In addition, parents do not appear to report instances of cyberbullying to police due to perceptions that they will not be able to handle the case due to limited laws (Hinduja & Patchin, 2009; McQuade et al., 2009). Similarly, there is some evidence that school administrators may not want to contact police due to concerns over how the incident will impact the school's reputation (McQuade et al., 2009).

Similar issues are evident in the number of cyberstalking or harassment cases reported to law enforcement agencies. Statistics on victim-reporting from the NCVS suggest that approximately 42 percent of female stalking victims and 14 percent of female harassment victims contacted police (Catalano, 2012). The data reported for this study were amended recently due to errors in the way in which some acts of stalking and harassment were coded. As a result, it is not clear how many cases were actually made known to police (Catalano, 2012). Using information from a nationally representative sample of female college students, Fisher and her colleagues (2000) found that less than 4 percent of women sought a restraining order against their stalker and less than 2 percent filed criminal charges. More recently, Fissel (2021) found that only 18 percent of cyberstalking victims reported their victimization to

law enforcement. Though there is less information available on cyberstalking and harassment victim-reporting internationally, evidence from the Canadian Uniform Crime Reporting (UCR) Survey found that the majority (70 percent) of victims reporting intimidation or harassment online were female (Perreault, 2013).

Victims are more likely to report their cyberstalking victimization to law enforcement when the cyberstalking lasted longer and when the victim felt threatened, lost time at work or school, or suffered financial consequences (Fissel 2021; Reyns & Englebrecht, 2010). The lack of reporting for most stalking and harassment cases may be due to a perception among victims that their case will not be taken seriously by law enforcement (Nobles et al., 2012). Victims of crimes like sexual assault or domestic violence often feel that their experience is not serious enough to report to police or will not be viewed as real by officers. In much the same way, victims of stalking and harassment cases, online or offline, may assume that officers will not be inclined to make a report or investigate. As a result, victims may feel abandoned by the criminal justice system and may proactively change behaviors that are perceived to put them at risk for further harassment. In fact, research suggests that victims who feel greater levels of fear because of the incident and perceive that they are being stalked are more likely to engage in multiple self-protective behaviors (Nobles et al., 2012).

## Regulating Cyberbullying

The prevalence of these various person-based online crimes requires substantive criminal laws in order to prosecute individuals who choose to engage in these behaviors. The amounts of legislative effort placed on these crimes, however, are mixed, depending on the offense. For instance, there are no federal statutes in the United States concerning bullying or cyberbullying. This is not a substantial issue given that most instances of cyberbullying involve people living in close physical proximity to one another.

Some advocates called for the development of new federal laws after the death of Megan Meier and the subsequent failure to successfully prosecute this case. Specifically, Lori Drew, one of the two women responsible for the creation of the false MySpace page and comments that led to Meier's suicide, was charged in federal court for violations of the Computer Fraud and Abuse Act (Steinhauer, 2008; see [Box 9.3](#) for detail on the applicability of these statutes). She was charged with three felony counts of computer fraud and one

### Box 9.3 The Computer Fraud and Abuse Act Applied to Megan Meier's Death



#### The Computer Fraud Act: Bending a Law to Fit a Notorious Case

[www.ecommercetimes.com/story/65424.html](http://www.ecommercetimes.com/story/65424.html)

Officials were determined to punish Lori Drew for something – the suicide of young Megan Meier seemed a direct consequence of her actions ... Drew ultimately was convicted of three misdemeanors, but prosecutors had to stretch a law beyond its original intent in order to win that outcome.

This article explains how Lori Drew was prosecuted under CFA statutes in the United States, and why the case was fraught with difficulty. The case demonstrates why cybercrime law must be developed with flexibility and prospective application as technologies change.

conspiracy count under the assumption that she violated MySpace's terms of service, which included the stipulation that users could not create fictitious accounts. The jury found Drew guilty on these three charges, though they were reduced to misdemeanor counts, and the conspiracy charge was thrown out (Steinhauer, 2008). The three charges of computer fraud, however, were also thrown out and Drew was fully acquitted in July 2009 after the judge argued against the use of this statute, which is normally reserved to prosecute computer hackers and data thieves (see [Chapters 3 and 6](#) for details on the statutes; Zetter, 2009).

In the wake of the failed prosecution and debate over the utility of existing legislation, the Meier family began to pursue the creation of new laws to protect victims and seek justice against offenders at the federal level. This led to the development of US HR1966, called the [\*\*Megan Meier Cyberbullying Prevention Act\*\*](#), which was proposed in 2009. This legislation would have made it illegal for anyone to use CMC “to coerce, intimidate, harass or cause substantial emotional distress to a person,” or use electronic resources to “support severe, repeated, and hostile behavior” (Hinduja & Patchin, 2013, p. 17). The proposed legislation would have allowed for either fines or a two-year prison sentence.

## Box 9.4 The Failure of the Megan Meier Bullying Legislation

### Cyberbullying Bill Gets Chilly Reception

[www.wired.com/threatlevel/2009/09/cyberbullyingbill/](http://www.wired.com/threatlevel/2009/09/cyberbullyingbill/)



Proposed legislation demanding up to two years in prison for electronic speech meant to “coerce, intimidate, harass or cause substantial emotional distress to a person” was met with little enthusiasm by a House subcommittee on Wednesday.

This article provides an overview of the failures in creating legislation to outlaw cyberbullying at the federal level in the United States. The political and legal challenges that affect the adoption of legislation are both interesting and divisive and are further elaborated in this work.

This resolution was not successfully passed into law (see Box 9.4 for details on the failure of this legislation).

Though the lack of federal legislation on bullying is bothersome, 49 states (with Montana as the sole hold-out) and the District of Columbia have laws in place concerning bullying and require that schools have policies in place concerning bullying behaviors (Hinduja & Patchin, 2016). In addition, 48 states have language in their legislation recognizing the term cyberbullying or online harassment (Hinduja & Patchin, 2016). Forty-four states and the District of Columbia provide criminal sanctions for bullying behaviors (Hinduja & Patchin, 2016). Virtually all states (45) require schools to provide some sort of punishment for bullying so as to affect the behaviors of the bully and give some retribution for victims.

Seventeen states and the District of Columbia also include language indicating that bullying can occur off-campus and can still be sanctioned (Hinduja & Patchin, 2016). Some argue that it may be inappropriate to extend school jurisdictions past the school grounds, as parents should be responsible for managing youth behavior. Given the impact that bullying victimization can have on students’ academic performance, attendance, and mental health generally, some argue it is necessary for schools to extend protection to students and sanction bullies who engage in harmful communications while off-campus.

The complexities inherent in legislating against bullying are also evident around the world. Singapore recently criminalized online harassment and bullying behaviors under the Protection From Harassment Act of 2014, which includes the (1) use of any threatening, abusive, or insulting words or behavior, or (2) making threats, abusive, or insulting communication that can be seen, heard, or perceived by another person to cause harassment, alarm or distress. There is, however, no legislation at the national level in Canada, Australia, or the United Kingdom. These offenses may be prosecuted under other existing laws, though nations may choose to develop cyberbullying-specific legislation in the near future as public outcry increases.

### Regulating Online Harassment and Stalking

Unlike cyberbullying, many nations have statutes that may be applied to instances of threatening or harassing communications. Under Title 47 of the US Criminal Code, Section 223(A) defines six acts involving a telecommunications device in interstate or foreign communications as illegal, including:

- 1 Making, creating, soliciting, or initiating, the transmission of requests or proposals that are obscene or involve child pornography with the intent to annoy, threaten, abuse, or harass;
- 2 Doing these same activities knowing that the recipient is under the age of 18 years;
- 3 Using a telecommunications device without disclosing your identity with the intent to annoy, abuse, threaten, or harass an individual at the called number;
- 4 Causing another person's phone to ring continuously to harass or annoy that person;
- 5 Making repeated calls designed solely to harass that person;
- 6 Knowingly permitting a telecommunications device or facility to be used for any of these activities.

While some of these behaviors may not seem criminal, it is important to recognize that a stalker or harasser can easily automate the process of calling a phone number over and over again in order to annoy the recipient. As a result, the outcome of the contact is just as pertinent as the behavior itself. In addition, the phrase "telecommunications device" can be applied to a cellular phone or even voice over IP (VOIP) telephony. Thus, this law does not pertain solely to landline phones. The punishment for these activities includes fines and/or imprisonment for up to two years.

In addition, Section 875 of Title 18 of federal code makes it a crime to transmit any of the following four communications via interstate or foreign commerce methods, including postal mail, telephone, or the Internet:

- 1 A demand for a ransom for the release of a kidnapped person
- 2 A message with the intent to extort money
- 3 A threat to injure a person
- 4 A threat to damage property

The punishments for these offenses vary, including a fine and two years in prison for threats to property or extortion, as well as up to 20 years in prison for threats of kidnapping and physical injury.

Additionally, Code 18 Section 2261A of the federal law makes it illegal for any person to use an interactive computer service or any facility of interstate or foreign commerce in order to engage in activities that cause a person to feel substantial emotional distress or place that person in reasonable fear of death or serious bodily injury to themselves or their family (Brenner, 2011). In addition, this statute makes it illegal to travel across state lines with the intent to kill, injure, harass, or intimidate another person and place them or their family in fear of death or serious bodily injury (Brenner, 2011).

The penalties for these behaviors involve a fine and/or five years in prison if the individual simply makes the threat. If serious bodily injury resulted from the offender using a weapon, they may receive up to ten years in prison. Should a victim be permanently disfigured or receive a life-threatening injury, then the offender may receive up to 20 years in prison. Finally, should the victim die as a result of the offender's actions in relation to threats made, they may receive up to a life sentence for their actions (Brenner, 2011).

It is important to note that these two statutes require that a *credible threat* is made to either a person or property. The need for a so-called true threat stems from the case of *United States v. Alkhabaz*, involving a student at the University of Michigan named Abraham Jacob Alkhabaz, or Jake Baker (Brenner, 2011). He wrote graphic stories describing acts of rape, torture, and murder and posted them to a Usenet group starting in October 1994. In one of these stories, he described performing acts of rape and eventually killing a woman who had the same name as one of his female classmates. His posts led the subject of the story to complain to the University of Michigan police, who investigated and brought in the Federal Bureau of Investigation (FBI) due to the interstate nature of online communications. Baker was arrested on six counts of communicating

threats to kidnap or injure a person, though only one of those counts involved the woman who was the subject of the story. The case was dismissed by the judge due to a lack of evidence that Baker would actually act out the fantasies described in his writings. The government appealed the case to a higher court, but the decision was upheld as the lack of evidence that Baker would act on the threat demonstrated a lack of a “**true threat**” to any individual (Brenner, 2011). Thus, this case established the need for the communications to generate actual fear or concern for safety.



**For more on the Alkhabaz case, go online to:** [www.casebriefs.com/blog/law/criminal-law/criminal-law-keyed-to-dressler/inchoate-offenses/united-states-v-alkhabaz/](http://www.casebriefs.com/blog/law/criminal-law/criminal-law-keyed-to-dressler/inchoate-offenses/united-states-v-alkhabaz/)

At the state level, virtually all states have legislation pertaining to either cyberstalking or harassment. There is some variation as to the type of laws in place, as some states have legislation against both offenses (Brenner, 2011). Since the passage of California’s 1990 anti-stalking statute, every state has passed anti-stalking statutes that can be used to prosecute cases of cyberstalking (Reyns & Fissel, 2020). The statutes recognize the use of CMCs to annoy, harass, or torment the victim and are differentially located with state criminal codes. For instance, Arizona, Utah, and Virginia place online harassment under its own statute, while Delaware, Missouri, and New York incorporate these crimes under existing harassment and stalking legislation (Brenner, 2011). The punishments for both cyberstalking and harassing communications range from misdemeanors to felonies, depending on the severity of the offense.

It is important to note that most nations do not technically define cyberstalking in their actual legislation. In fact, there is no language in the European Convention of Cybercrime pertaining to stalking or harassment (Brenner, 2011). Instead, cyberstalking behaviors are subsumed under existing legislation regarding stalking generally. Australia, for instance, criminalized cyberstalking through the Stalking Amendment Act of 1999 (Bocij, 2004). This statute recognizes that contacting a person in any way, including phone, fax, email, or “through the use of any technology,” to cause the victim apprehension or fear to their detriment constitutes unlawful stalking. Canadian law allows for prosecutions under Section 264 of the Criminal

Code for stalking offenses involving repeated communications directly or indirectly with the victim or anyone that they know and/or engaging in threatening conduct toward their victim or family members (Department of Justice Canada, 2012). The punishment for such a violation is up to ten years in prison if convicted.

**For more on the growth of cross-national cyberstalking and harassment cases, go online to:** <http://www.newsweek.com/2014/08/22/how-law-standing-cyberstalking-264251.html>



Similarly, England and Wales have multiple laws related to stalking and harassing communications that can all be extended to online environments. First is the **Protection from Harassment Act 1997 (c40)**, which criminalized stalking and bullying in professional settings. This act prohibits conduct that constitutes harassment of others, assuming that a reasonable person would believe the behavior to be harassing (Crown Prosecution Service, 2013). Violations of this statute can be punishable by up to six months of incarceration and fines when considered appropriate by a judge.

Section 4 of the Act criminalizes the act of putting others in fear of violence, defined as any course of conduct that would cause “another to fear, on at least two occasions, that violence will be used against him is guilty of an offence if he knows or ought to know that his course of conduct will cause the other so to fear on each of those occasions” (Crown Prosecution Service, 2013). In addition, the offender must know that their actions will cause their prospective victim to fear that they will experience violence. Thus, the offender must know that they are actively affecting the behavior and demeanor of their victim. Anyone found guilty of such an act could receive up to five years in prison and receive fines based on judicial discretion.

This Act was revised through the introduction of the **Protection of Freedoms Act 2012** to include language specifically related to stalking and incorporate aspects of technology into law (Crown Prosecution Service, 2013). Specifically, it added new language to Section 2 (regarding stalking to harass) and Section 4 (about stalking to cause fear). In Section 2, stalking is defined as harassment of a person or behaviors associated with stalking, including following a person, contacting them by any means, monitoring their victim through any form of electronic communications or the Internet, and publishing materials or

statements about a person or claiming a comment originates from another person (Crown Prosecution Service, 2013). Anyone found guilty of such an offense can be imprisoned for no more than one year and/or receive a fine. Section 4 now defines stalking where the victim feels fear as any act that leads the target to fear they will be violently victimized or cause that person fear or distress that affects their day-to-day behaviors on at least two occasions (Crown Prosecution Service, 2013). Individuals found guilty of this activity can be imprisoned for up to five years and/or receive a fine.

In addition, the **Malicious Communications Act 1988** enables individuals to be prosecuted for sending messages to another person for the purpose of causing fear or anxiety (Crown Prosecution Service, 2013). This Act was revised in 2001 to include electronic communications of any kind that convey a threat, indecent or offensive content, or information that is false. Any violation of this Act is punishable by no more than six months imprisonment and a fine.

India also criminalized stalking and cyberstalking under the Criminal Amendment Ordinance, 2013, under Section 354D, recognizing any attempt to (1) follow, (2) contact, or (3) attempt to contact a person despite their clear indications of disinterest, or (4) monitor a person's Internet, email or electronic communication, or (5) physically watch or spy on a person (Halder, 2013). These actions must lead a person to feeling fear of violence, serious alarm or distress, or affects their mental state. Individuals found guilty of stalking can be fined and may be imprisoned for one to three years (Halder, 2013).

### Enforcing Cyber-Violence Laws and Norms

As noted earlier in the chapter, cases of cyberbullying, harassment, and stalking are not necessarily reported to law enforcement agencies either due to embarrassment on the part of victims or because the victim feels that the case may not be investigated or taken seriously by police. The lack of federal laws in the United States that can be used to pursue legal action means that the various federal agencies discussed throughout the book are not normally involved with these types of crime. The FBI, however, may investigate cases of threats or stalking, but only if it involves a substantive threat that crosses state lines.

Instead, most incidents of bullying, stalking, and harassment in the United States and elsewhere are handled by local or state law enforcement agencies due to the potential for offenders and victims to live in close proximity to one another. In fact, a sample of 358 state and local law enforcement agencies

indicated that 71.8 percent of them investigated harassment cases (Holt et al., 2010). Despite the preference for local agencies to investigate, there are no immediate statistics available for the reported rates of cyberbullying, harassment, or stalking in official statistics provided by law enforcement agencies.

This is largely the result of the fact that these items are not currently included in the existing reporting resources provided in the **Uniform Crime Report (UCR)**. Though there is some potential information available concerning the incidence of intimidation involving computers in the **National Incident-Based Reporting System (NIBRS)** (Addington, 2013), the data is limited due to the fact that only 32 states currently provide information to NIBRS, which is much lower than that of the UCR. As a result, it is unclear how frequently these offenses are reported to the police or cleared by arrest (Addington, 2013).

Though local law enforcement can serve as a critical investigative resource for the investigation of certain offenses, some victims may not choose to contact police because they are not sure if what they are experiencing may even be legally defined as stalking or harassment. To that end, there are several not-for-profit groups that operate to assist victims online. In the United Kingdom and United States, the group **Cybersmile** is well known for its role in educating and assisting victims of cyberbullying. This charitable organization was founded in 2010 to educate the public on the harm caused by cyberbullying through service programs in schools and neighborhoods (Cybersmile, n.d.). Cybersmile offers educational workshops for the public on cybersecurity and cyberbullying that are provided by community outreach workers affiliated with the group. In addition, they offer a helpline for bullying victims to help connect them with pertinent community services and counseling providers in their area. The group also advertises unique academic research publications related to cyberbullying victimization in order to communicate these issues to the public. Finally, Cybersmile organizes an annual Stop Cyberbullying Day designed to draw attention to the problem through community outreach events and fundraising to aid the organization (Cybersmile, n.d.).

**For more information on organizations that aid victims, go online to:**

1. [www.cybersmile.org/](http://www.cybersmile.org/),
2. [https://www.stalkingawareness.org/](http://www.stalkingawareness.org/)



The Stalking Prevention, Awareness, and Resource Center (SPARC) serves a similar role in the United States, as they offer education and resources to assist stalking victims (SPARC, 2020). The Center is supported by funding from the Office on Violence Against Women (OVW) and provides trainings for police, prosecutors, probation, and parole officers regarding the unique dynamics that drive stalking victimization and offending. SPARC also offers tools for victim service agencies to improve their capacity to aid stalking victims (SPARC, 2020). They also offer resources for trainings for the general public to improve their understanding of the risks of stalking, such as webinars, printable brochures, and other materials to improve people's general knowledge of this crime.

As a result of the problems that law enforcement and nonprofit organizations have in helping individuals after they have been victimized, researchers, advocacy groups, and even schools emphasize the need for individuals to take control of managing their personal safety as a key tool in reducing their risk of bullying, stalking, and harassment. This may be due to the overwhelming role of individual choice in online spaces. For instance, no one is required to have an account on a social networking site like Facebook, Instagram, TikTok, or Twitter. There are also myriad options for encrypted applications and services that connect people into hidden networks.

Certainly, people are able to stay current with their friends and keep abreast of current events through these sites, but it is not a necessity. If they establish an account, they decide how much information to post about themselves and in what way they accept or maintain friends. Should that person feel dissatisfied with a post or an exchange with another person, they have the power to delete those messages. In fact, one of the top “tools” both Facebook and Instagram provides for users to maintain their security is the ability to unfriend someone, block individuals, and use the “Report” button in order to bring that content to the attention of their internal security teams. It is not clear how many reported incidents are investigated. For example, Instagram notes (Instagram, n. d.):

If you have an Instagram account, you can report abuse, spam or anything else that doesn't follow our Community Guidelines. Keep in mind that your report is anonymous, except if you're reporting an intellectual property infringement. The account you reported won't see who reported them.

Since various tools are readily available, it makes sense to argue that personal responsibility and accountability for safety should be encouraged. The challenge

lies in clearly communicating these issues to young people and those with less computer skill and online experience. An excellent example of security in action can be seen in the creation and use of email accounts. Various services provide free email accounts, such as Hotmail, Yahoo, and Gmail. When a person sets up their account, it is important to avoid using either their real name or a gendered term in the address. It may be easier to determine a person's identity if their email address or social media name is Janelovesmovies4419 than if it were something more neutral, like moviefan. Similarly, the use of sexual or explicit language in your email address or social networking profile may also increase the potential to receive unsolicited emails.

In order to curb instances of bullying and harassment among youth, many security experts recommend that parents place computers in public spaces within their home, like the kitchen or living room, and require kids to have some parental supervision while online. The ability to quickly observe the kinds of websites kids visit and periodically monitor their online activities could help to reduce the number of questionable websites to which they are exposed. However, cheap access to lightweight portable Internet-enabled devices, like iPods, iPads, Kindles, and laptops, makes it difficult to ensure that kids are using devices in close proximity to parents. Some also argue that parents should install filtering software to manage the kinds of websites their kids can visit. These devices can, however, be difficult for parents with little technological skill to set up or properly configure to ensure maximum effectiveness. Recent research suggests kids are able to easily circumvent these protective software programs or use other wireless Internet access points in order to avoid these devices altogether (Bossler et al., 2012; Jones et al., 2012). Even if a parent is able to properly configure software at home, it does not matter once their child goes to school or to a friend's house, where they have less control over their children's Internet activities and access.

Because of the inherent difficulty in managing the online experiences of young people, one of the most important steps that parents and schools can take is to begin a frank and honest conversation about Internet use (see [Box 9.5](#) for Facebook's suggestions for parents). Understanding how and why young people are using technology is vital to keep pace with their changing online habits. Furthermore, it is important to recognize that adults can and should play a role in the socialization of youth into acceptable online behaviors. Parents and guardians teach kids what is right and wrong in the physical world, and that same experience must play out in online spaces. Admittedly, young people are exposed to millions of people around the world through

### Box 9.5 Facebook Security Suggestions for Parents



#### Parenting Tips

<https://www.facebook.com/safety/parents/tips>

Let your child know that the same rules apply online as apply offline. If it's not something you want others to do to you, don't do it to others. Just as you might tell your child to look both ways before crossing the street or to wear a helmet while riding their bike, teach them to think before they share online.

This article provides Facebook's suggestions on how parents and teens should work together to be safe while online. Many of these ideas are not novel but require a clear line of communication between adults and children and an ability to respect one another's privacy and responsibilities.

the Internet, and not all of those people will be on their best behavior at all times. Thus, it is critical that someone be able to explain and give context to why certain activities may happen but should not be performed by their child. For instance, just because friends post their class schedule or where they will be at a specific time of day on Facebook does not mean that they have to do it as well.

### Summary

In reviewing our knowledge of bullying, harassment, and stalking, it is clear that this problem will not go away. Technology has made it incredibly easy for individuals to send hurtful or threatening communications online, and the perception that victims may not be able to report their experiences means that incidents may go unacknowledged. As a result, it is hard to combat this problem because of confusion over who has the appropriate jurisdiction to investigate the offense and whether or not it is a crime based on existing statutes. The increasing public attention drawn to the serious consequences of

cyberbullying and stalking cases, however, may force a change in the policy and social response over the following years. The attempts to develop national laws around cyberbullying are an excellent demonstration of the ways that society is attempting to respond to these acts. Thus, the way that we deal with bullying and stalking will no doubt change over the next ten years as perceptions of these behaviors change.

## Key Terms

Catfishing  
Cyberbullying  
Cybersmile  
Cyberstalking  
Denigration  
Exclusion  
Flaming  
Harassment  
Impersonation  
Lori Drew  
Malicious Communications Act 1998  
Megan Meier  
Megan Meier Cyberbullying Prevention Act  
National Centre for Cyberstalking Research  
National Crime Victimization Survey-Supplemental Survey (NCVS-SS)  
National Incident-Based Reporting System (NIBRS)  
Online harassment  
Outing  
Protection from Harassment Act 1997 (c40)  
Protection of Freedoms Act 2012  
Stalking  
Star Wars Kid  
Trickery  
Truant  
True threat  
Uniform Crime Report (UCR)  
*United States v. Alkhabaz*  
Youth Internet Safety Survey (YISS)

## Discussion Questions

1. Should we define youth who make harassing or disparaging comments about their teachers in online spaces as engaging in cyberbullying, or is it harassment? Simply put, why should we define an act differently on the basis of the ages of the victim and offender?
2. How do we communicate what is acceptable online behavior to youth in a way that is accepted and clear? Furthermore, how do we limit the effects of “peer pressure” on technology use and acceptance, where friends post sensitive information about themselves or personal pictures that could be abused by others?
3. How easy is it to find the reporting tools and links for harassing language on the social networking sites you use most often? Look on the sites and see how long it takes you to find it on YouTube, Instagram, Snapchat, and Twitter. Are they easy to find? Are they in obvious places?
4. Should schools be able to punish students for online activities that take place outside of the campus and after or before school hours if it directly affects the behavior of other students? Why?

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Chapter **10**

**ONLINE  
EXTREMISM  
AND  
CYBERTERROR**

## Chapter Goals

- Define terror and differentiate it from cyberterror
- Identify hacktivism and examine how it differs from both traditional acts of hacking and cyberterror
- Recognize the value of the Internet as a vehicle for recruitment and communications
- Understand the different ways that extremist groups and non-nation-state-sponsored actors use the Internet
- Discuss the various laws used to secure the United States and other countries from the threat of terror
- Recognize the agencies responsible for the investigation of terror in online spaces

## Introduction

Terror attacks have been a substantial problem around the world, driven in large part by regional interests and issues. For instance, members of various Irish Republican Army (IRA) groups engaged in terror attacks against English targets from the mid-1970s through the early 2000s. Similarly, domestic extremist groups within the United States have engaged in a number of attacks over the last few decades, such as Timothy McVeigh's 1995 bombing of a federal building in Oklahoma City, Oklahoma (Schmid & Jongman, 2005).

The terror attacks of September 11, 2001 in the United States demonstrated the substantial threat posed by international terror groups who operate around the globe, though their agendas and interests may not be directly caused by their target (Schmid & Jongman, 2005). Major terror incidents have occurred worldwide, including attacks against commuter trains in Madrid, Spain in 2004, various targets in Mumbai, India in 2008, as well as more recent attacks such as the Bataclan Theater in Paris France in 2015 and the Ataturk Airport attack in Istanbul, Turkey in 2016.

Though these incidents were perpetrated by radical Islamist extremist groups such as the **Islamic State of Iraq and Syria (ISIS)**, ideological actors of all stripes have attempted or succeeded in committing all manner of violence. In fact, domestic extremist and radical groups in the United States are responsible for more combined deaths than that of Islamic radicals generally (Caspi et al., 2012). Some acts of violence are not even clearly linked to an ideology, making it

all the more complicated to understand. For instance, a 64-year-old man named Stephen Paddock opened fire on a music festival in Las Vegas, Nevada on October 1, 2017 (Campbell, 2019). He killed 60 people and wounded 411 more and killed himself before he could be arrested. Paddock's motives remain unknown, though ISIS initially claimed he was their soldier, and far right misinformation groups attempted to tie his actions to the far left group Antifa (Campbell, 2019).

As a consequence, physical security measures have been implemented in order to increase the successful identification and disruption of further attacks. The United States has radically changed their airport screening procedures to identify dangerous materials prior to entering flight terminals. Physical barriers have been erected at various government buildings, power plants, and sensitive infrastructure to make it harder to enter the spaces by force. Additionally, many governments have recalibrated their law enforcement and intelligence gathering agencies to focus on the prevention of terror and increased collaborative information-sharing programs.

Though the focus on real-world terrorist attacks and extremist violence is a necessity due to the potential for civilian casualties and property damage, there has been less attention paid to the prospective threat of attacks performed through cyberspace. This is surprising, since virtually all industrialized nations are dependent on technology in order to engage in commerce and manage utilities, like water and power, as well as communications. A carefully targeted attack against any critical infrastructure resource could cause serious harm to the security of the network and potentially cause harm in the real world. Such a scenario has become increasingly popular in media and films, as in the movies *Live Free or Die Hard* and *Skyfall*, where groups of cyberterrorists compromise traffic control systems, government computers, utilities, and financial systems through a series of coordinated hacks.

The sensationalized appearance of cyberattacks in film has led to significant debate over the realities of virtual attacks against critical infrastructure. In the mid-1990s, when the World Wide Web and computer technologies were being rapidly adopted by industrialized nations, individuals in government and computer security theorized that such attacks were possible (Drogin, 1999; Verton, 2003). For instance, Deputy Secretary of Defense John Hamre and Richard Clark, an advisor on cybersecurity, used the term **electronic Pearl Harbor** to refer to a cyberattack against the United States that would take the nation by surprise and cause crippling harm (Verton, 2003). The lack of concrete evidence that such attacks were happening led some to dismiss these claims.

These issues raise complex questions on the very nature of how these threats should be viewed and who has the responsibility to respond. For instance, should

cyberterror be treated differently from traditional acts of terror? This chapter will address these questions in a systematic fashion. First, we will define crime, terror, and cyberterror. In addition, the ways in which extremist groups and terror organizations utilize the Internet in order to support their activities or engage in attacks will be explored in detail. Finally, the legislative efforts in place to deal with terrorism as well as coordinate the response will be discussed in depth.



**For more debate on the controversies of an electronic Pearl Harbor, go online to:**

1. <http://blog.radware.com/security/2013/12/electronic-pearl-harbor/>
2. [www.washingtonpost.com/blogs/innovations/post/digital-deterrants-preventing-a-pearl-harbor-of-cyberspace/2010/12/20/gIQASNKyoL\\_blog.html](http://www.washingtonpost.com/blogs/innovations/post/digital-deterrants-preventing-a-pearl-harbor-of-cyberspace/2010/12/20/gIQASNKyoL_blog.html)

### Defining Terror, Hacktivism, and Cyberterror

In order to understand the problem of terror, online or offline, we must first understand its relationship to crime. Both criminals and ideologically driven extremist or terror groups may use the same skills or behaviors in the course of an activity. Many nations charge terrorists under criminal statutes (Brenner, 2008). One way that we might be able to discern the differences between these behaviors is to consider both the motive of the actor and the number of people harmed. Criminals often target single individuals in order to increase their likelihood of success and are often driven by economic or emotional desires. For instance, an individual may assault another individual in order to get money in the course of a robbery or kill a person in retribution or cold blood. A terrorist or extremist group, however, tends to target large groups of people or physical locations that can cause massive collateral damage while at the same time drawing attention to a specific ideological, political, or religious agenda. In addition, many acts of terror are designed to target innocent people in order to cause general panic and fear among the larger populace, rather than simple economic gain (Brenner, 2008).

Recognizing the role of motivation is necessary to identify an act of terror. There are, however, a wide range of activities that people engage in that express their political or ideological beliefs. Thus, it is necessary to situate acts of terror within the spectrum of political behaviors on and offline, ranging from non-violent expression to serious physical violence (Holt & Kilger, 2012; Schmid,

1988, 2004). There are myriad forms of non-violent resistance that individuals engage in on a day-to-day basis. Prior to the emergence of the World Wide Web, individuals could express their dissent with political positions through letter-writing campaigns to print media outlets as well as their legislative representatives. Freedom of speech throughout the industrialized world also enables individuals to express their opinion in public settings, regardless of how negative they may be. The web has extended this capability, as individuals regularly post messages about their views on politics and social issues on Facebook, Twitter, and other social media (Martin, 2006; Schmid, 1988, 2004). In fact, individuals now contact politicians and representatives through the Internet at the same rate as postal mail and telephone (Best & Krueger, 2005).

The development of social media has had a substantive impact on the acceptance and growth of social movements across the globe (see [Box 10.1](#)). Individuals posting messages on Facebook, YouTube, or web forums can have their message viewed by others who share their point of view, or who may come to support their cause through convincing stories (Ayers, 1999; Chadwick, 2007; Jennings & Zeitner, 2003; Stepanova, 2011). The use of social media to develop networks of social support is crucial in the formation of a collective identity that can move into real spaces in order to affect social change.

This was demonstrated by protesters in the United States opposing the Dakota Access Pipeline, a major oil pipeline that would be built near Native

### **Box 10.1 The Use of Technology in Protest Activities**

#### **How Social Media Has Changed Civil Rights Protests**

<https://www.nytimes.com/2020/06/18/technology/social-media-protests.html>



Omar Wasow is steeped in both social media and the civil rights movement of the 1960s. And he marvels at how the two have melded in the current demonstrations against racial injustice and police brutality.

This article presents an interview with a Princeton University researcher and his investigations into the role of social media as a facilitator for real world organization. He also discusses the negative consequences that can result from exposure to concepts on and offline in the United States.

American tribal lands (Dreyfuss, 2017). Similar organization strategies have been employed by Black Lives Matter protesters across the United States during 2020 in the wake of various acts of brutality performed by police against racial minorities (Biddle, 2020). The value of social media lies in its capacity as a tool to covertly organize large groups across wide disparate spaces to converge in one place at the same time. Furthermore, organizers can make videos and messages about real world events, and then post them online to generate additional attention to their causes. Thus, organized forms of non-violent expression can be enabled by virtual experiences and communication (Chadwick, 2007; Earl & Schussman, 2003; Jennings & Zeitner, 2003; Stepanova, 2011; Van Laer, 2010).

Unfortunately, these same tools can be used to organize real world protests that are intended to promote or cause violence. For example, a series of protests were held in Charlottesville, Virginia during August 11 and 12, 2017 called Unite the Right (Corera, 2019). This event brought various far right extremist groups together, including neo-Nazis and members of the Klu Klux Klan, over the removal of a Confederate War memorial from a public park. The protests drew widespread condemnation and counterprotests, culminating in the state police declaring the rally to be an unlawful assembly requiring all participants to disperse (Corera, 2019). Shortly after that action, a white nationalist intentionally drove his car into a crowd of counter-protesters killing one and injuring 28. The events were organized online in large part through the participants in a website called The Daily Stormer, as well as communications apps like Discord (Corera, 2019).

Political expression in the real world can also include the use of destruction or vandalism in order to express dissent (Brenner, 2008; Denning, 2010; Holt & Kilger, 2012). For instance, individuals may deface images of politicians or burn flags in order to express their dissent over a nation's positions toward an event. In virtual spaces, individuals may engage in similar forms of vandalism against websites or specific resources in order to express their disagreement with a policy or practice (Denning, 2010; Woo et al., 2004). One such example is an individual claiming to belong to the Animal Liberation Front (ALF) who defaced the website of a fur and leather retailer. The hacker also added the following message to the content of the site:

To the owners of “The twisted pine fur and leather company” you have no excuse to sale [sic] the flesh, skin and fur of another creature. Your website lacks security. To the customers, you have no right to buy the flesh, skin or fur of another creature. You deserve this. You’re lucky this is the only data we dumped. Exploiters, you’ve been warned. Expect us.

Can you really put that much faith into the security of a company that sales [sic] the fur, skin and flesh of dead animals to make a profit?

We are Anonymous.

We are Legion.

We do not forgive.

We do not forget.

We are antise.

We are operation liberate.

Expect us.

This simple message quickly expressed their point of view and disagreement with the company's practices. In addition, the hackers indicated that they were able to view the customer database information maintained by the company, and that they could potentially steal the credit and debit card information of individuals who had purchased goods through the site.

This sort of attack is what some researchers refer to as **hacktivism**, in that the actors use hacking techniques to promote an activist agenda or express their opinion (Denning, 2010; Jordan & Taylor, 2004; Taylor, 1999). Such an attack may be illegal, but it does not create a high degree of fear or concern among the larger community (Jordan & Taylor, 2004). As a result, hacktivism provides a way to classify criminal acts of protest involving hacking techniques that are in some way analogous to offline political action (Denning, 2010). The use of this term, however, does not help to refine our understanding of cybercrime or terror as it is a more nebulous concept than anything else.

**For more on hacktivism, go online to:**

1. <https://opinionator.blogs.nytimes.com/2013/01/13/what-is-a-hacktivist/>
2. [www.thenation.com/article/154780/wikileaks-and-hacktivist-culture](http://www.thenation.com/article/154780/wikileaks-and-hacktivist-culture)



At the most extreme end of political expression are planned acts of violence in support of a social agenda, typically referred to as **terror** (Schmid, 2004). This may include the creation of major explosions, such as the Oklahoma City bombings of the early 1990s in the United States, or the 9/11 attacks on the World Trade Center. These incidents can cause massive harm to both people

and property and generate fear of future attacks (Martin, 2006; Schmid, 2004; Schmid & Jongman, 2005). Though there is no single agreed upon definition for what constitutes an act of physical terror, these elements are present in almost all of the existing frameworks used (Schmid & Jongman, 2005).

The definitional issues present for physical terror are exacerbated when attempting to define what constitutes **cyberterror**. In fact, the term cyber-terror developed in the mid-1990s as technology was increasingly adopted by consumers and industry alike (Foltz, 2004). As increasing focus was placed on defining physical terror through the use of violence to promote fear; this challenged the notion of cyberterror since there have been few instances where individuals in the real world experienced any physical harm from a cyberattack (Britz, 2010; Denning, 2010; Foltz, 2004; Martin, 2006; Pollitt, 1998).

An attack against the electronic infrastructure supporting financial institutions or power grids, however, could produce a catastrophic loss of service that results in economic harm or disruption of vital services (Brenner, 2008; Britz, 2010; Brodscky & Radvanovsky, 2010; Denning, 2010). For instance, if an attacker was able to knock out power to a major city, it could potentially result in significant dollar losses for corporations and potentially lead to physical death if outages affected hospitals or medical services. The unexpected nature of such an attack would also, no doubt, generate panic over the prospect of future attacks occurring with almost no warning. Such fear and concern over cyber-attacks may rival that of a physical terror incident (Britz, 2010; Denning, 2010; Kilger, 2010). As a result, physical harm may be less relevant in the definition of cyberterrorism compared to the fear that may stem from such an attack.

As an example, a series of Distributed Denial of Service (DDoS) attacks were targeted against US financial institutions beginning in the fall of 2012 by the group Izz ad-Din al-Qassam Cyber Fighters (Gonsalves, 2013). Major financial institutions were targeted, including US Bancorp, JP Morgan Chase & Co., Bank of America, PNC Financial Services Group, SunTrust, and other institutions. The group utilized compromised web servers located in the United States as a launch point and caused some interruptions of service for the banks. It is not clear how successful the attacks were, though one estimate suggests at least seven banks were taken down for minutes to hours, depending on the institution (Gonsalves, 2013).

The group indicated in posts on the website Pastebin that they were engaging in the attacks because of the treatment of the Islamic faith by the West and the US government's refusal to remove clips of a movie that disparages the prophet Mohammed from YouTube (see **Box 10.2** for details). They claimed

## Box 10.2 Ultimatum for DDoS Attacks Against US Banks

### Qassam Cyber Fighters's Pastebin

<https://pastebin.com/u/QassamCyberFighters>



Operation Ababil, AlQASSAM ULTIMATUM ... We, the Cyber Fighters of Izz ad-Din al-Qassam, had previously warned multiple times that, if the insulting movies not be removed from the Internet we will resume the Operation Ababil.

This link provides readers with the full campaign of posts made by the Cyber Fighters' during their attacks against various financial institutions in the United States beginning in February 2013 as retaliation for the publication of a video on YouTube that insulted the image of the Prophet Mohammed. The announcements include their targets, demands, and status updates.

that they would engage in attacks against banks as retribution for these videos and base the duration of their attacks on the perceived damages that will result against these institutions relative to the number of times these videos have been viewed and the length of time they have been posted. While some of these institutions used mitigation services to reduce the effectiveness of the DDoS attacks, there was evidence of service losses for some customers. As a result, these attacks are a possible example of cyberterror.

It is also important to recognize that some terror or extremist groups may not attempt to use the Internet as an attack vehicle. Instead, they may simply find value in using online communications in order to contact others, spread their message globally, and engage in fundraising activities to support their cause (Britz, 2010; Foltz, 2004). For instance, there has been substantial concern over ISIS using various encrypted applications such as WhatsApp and Telegram to communicate (Rotella, 2016). The use of various instant messaging protocols makes it difficult to track actor networks and validate threats (see Box 10.3 for details).

With that in mind, a truly expansive definition of cyberterror must recognize the variations that may be evident in the way an organization uses technology to further its agenda. Criminologist Marjie Britz (2010) has developed an inclusive definition for cyberterror that recognizes both of these issues:

### **Box 10.3 The Use of Encrypted Chat Applications by Terrorists**

#### **Proud Boys Channels Are Exploding on Telegram**



<https://www.rollingstone.com/culture/culture-news/proud-boys-telegram-far-right-extremists-1114201/>

In light of mass deplatforming on big tech social platforms like Twitter... far-right militants are flocking to alternative social networks such as the encrypted messaging apps Telegram and Signal.

This article provides an overview of the reasons why extremist groups in the United States, are moving to encrypted apps like Telegram, which are also being used by protestors and others interested in hiding their communications from government agencies, investigators, and the media more broadly. The article also explains how crackdowns on other social media platforms may engender a switch to encrypted applications for planning and recruitment efforts.

The premeditated, methodological, ideologically motivated dissemination of information, facilitation of communication, or attack against physical targets, digital information, computer systems, and/or computer programs which is intended to cause social, financial, physical, or psychological harm to non-combatant targets and audiences for the purpose of affecting ideological, political, or social change; or any utilization of digital communication or information which facilitates such actions directly or indirectly. (p. 197)

We will use this definition in order to frame the remainder of this chapter so as to recognize the various ways that extremists and terrorists use technology to further their agendas on and offline.

### **The Use of the Internet in the Indoctrination and Recruitment of Extremist Groups**

Due to the prospective variations in the behavior and motives of actors, it is necessary to consider how technology may be used and to what ends. First and foremost, the Internet has tremendous value as a communications vehicle

for extremists, terror entities, and nation-state actors. The easy and immediate access to technology, coupled with the anonymity and scale afforded by computers and the Internet, make email, forums, instant messaging, and virtually all other forms of computer-mediated communication (CMCs) ideal for interpersonal communications. Almost every nation on earth now has some form of Internet connectivity, whether through cellular service providers, high-speed fiber optic connectivity, or even dial-up Internet access. Groups can maintain contact and reach out to others, no matter where they may be located, through plain text messages, email, or forums.

The ability to regularly communicate with others from diverse backgrounds ensures that individuals can be slowly, but steadily, introduced to the core principles of a movement (Gerstenfeld et al., 2003; Gruen, 2005; Weimann, 2004). Constant exposure and reinforcement of an ideology allows individuals to become accepting of an otherwise unusual perspective, and it may eventually enable the acceptance of an extremist ideology or identity (Gerstenfeld et al., 2003). There are myriad web forums operating to support various white nationalist and neo-Nazi ideologies, including The Daily Stormer, National Socialist Movement (NSM), and even portions of the relatively broad Reddit, 8chan, and 8kun communities.

One of the oldest of these forums is Stormfront.org, which was extremely popular among neo-Nazis to discuss all facets of their movement and even day-to-day activities through a white-power perspective (Castle, 2011; Gerstenfeld et al., 2003; Weimann, 2004). The site serves as a venue for individuals to engage in conversations and connect with others virtually and through the real world via localized subforums by nation, state, and city. There are also multiple sections devoted to politics, technology, philosophy, and entertainment. Over the last few years, the site has become destabilized and inconsistently available as technology companies are increasingly unwilling to host the site after the deadly Charlottesville protests (discussed above).

**For more information on the global role of Stormfront in spreading hate, go online to:**

1. <https://www.infomigrants.net/en/post/22714/rome-sentences-24-for-hate-comments-on-stormfront-forum>
2. <https://www.sciencemag.org/news/2018/05/it-s-toxic-place-how-online-world-white-nationalists-distorts-population-genetics>



In addition to direct communications, the Internet also allows groups to directly communicate their beliefs and ideologies to the world without the need for mass-media marketing or news media coverage. Any terror or extremist group can post messages on blogs or websites in order to directly control the delivery of their message to the media and the public at large (Forest, 2009). For instance, members of the hacker group Anonymous regularly use Twitter, YouTube, and even written letters posted on websites in order to explain their actions or notify prospective targets that they may be attacked (see [Box 10.4](#) for details).

#### **Box 10.4 Anonymous Open Letter Example**

Greetings Citizens of the World, We are Anonymous

This is an open call to establish travel bans on United States citizens, boycott US-made products, divest of US- or Trump-related business interests, and apply sanctions on the Trump regime and all of its associates. Until the danger the United States today possesses against the world is resolved. Reciprocity measures must be enacted against the United States to challenge its shameless actions under the Trump regime. Global response must also come in the form of economic sanctions on products directly associated with the Trump corporate brand.

As citizens of the world we must unite against tyranny wherever it emerges and challenge it. As Trump reveals himself to be a danger not just for the United States but the rest of the international community it is our right to protect and defend ourselves from the madness of rogue entity with no regard for international law, human rights, or common decency.

We call on the international community from all backgrounds and ideologies, across social stratas and religions, to resist the madness leaking out of the United States. We call for the creation of global boycotts against US-made products, we call on you to contact your representatives and members of parliament and congress to apply sanctions on the Trump regime, we call on you to take part in divestment of US shares. BDS (Boycott, Divestment, and Sanction) the United States until the malevolent Trump regime is brought to justice.

To the citizens of the United States, this is not an attack on you but firm and necessary action against the rising tyranny that today

befalls you. Participate in your own liberation from the Trump regime by applying economic and political pressure on your house and senate representatives to push the impeachment of the Trump regime. The Trump regime will not listen to protests in the streets, but it will crumble under protests in the work force & sanctions, divestment, and boycotts abroad. We call on you, the citizens of the United States, to organize rolling work strikes nation-wide. Remove your labor from the pockets of the tyrants, disrupt the markets they are so proud of, and take the reins of your governance back by building society and mass collaboration. Forget making America great again, together we can make humanity great again.

We are Anonymous.  
We are everywhere.  
We are legion.  
We are those you have left without a home.  
We are those you have murdered.  
We are voiceless no more.  
The world will change. We'll change it.  
Tyrants of the World,  
Expect Us!

The Islamic State also uses Twitter and Facebook as a key platform for messaging and radicalization (Corera, 2020). The relatively limited territories ISIS controls off-line in Iraq and Syria demand they find ways to attract individuals to their ideology, making social media an essential tool in promoting their message to recruit participants globally (see Box 10.5). Social media sites are particularly useful as a resource as individuals can create accounts easily and use them from very basic mobile phones. The use of hashtags in social media messaging also allows ISIS to find ways to connect to other users on the basis of shared interests, or uncommon phrases that may pull in specific audiences (Berger & Morgan, 2015). These practices, however, also make it possible for social media providers to identify and suspend accounts engaged in ISIS or jihadi related posts (Corera, 2020).

Computers and software suites for multimedia creation like Photoshop also allow groups to create and manipulate videos, photos, and stylized text. This

## Box 10.5 The Role of Social Media in Recruitment and Radicalization

### ISIS and the Lonely Young American



<https://www.nytimes.com/2015/06/28/world/americas/isis-online-recruiting-american.html>

She kept teaching at her church, but her truck's radio was no longer tuned to the Christian hits on K-LOVE. Instead, she hummed along with the ISIS anthems blasting out of her turquoise iPhone, and began daydreaming about what life with the militants might be like.

This article details one young woman's experience engaging with, and eventually accepting, the radical ideology promoted by ISIS. She engaged in discussions with members of ISIS via various social media feeds, eventually engaging in regular conversations and even converting to Islam. Her story provides an excellent example of the types of individuals ISIS and other radical movements seek out, and the processes they employ to indoctrinate them.

enables extremist groups to develop more media-friendly materials or misrepresent facts in support of their own ideologies. In turn, they can promote their ideas and images to a larger audience in a subtle and convincing way that may instill anger and hostility toward groups that are perceived as oppressors or socially unacceptable (Forest, 2009; Gruen, 2005).

This is evident in the heavy use of meme content created by far right groups to be shared on various social media platforms (De Cristofaro, 2018). Memes involve a combination of well-known images and text to express humor and sarcasm in an easily digestible and highly sharable way, as well as express political and ideological sentiment. To that end, far right memes often feature pro-Nazi and anti-Semitic visuals with text that can express hate or encourage violence (De Cristofaro, 2018). Viewers may not realize this at first, and instead simply like and share the content on the basis that the message is amusing or clever. The subtle nature of the messaging may, however, be sufficient to invite further scrutiny and investigation by the viewer and help lead them to accept such beliefs over time (De Cristofaro, 2018).

**For more information on the meanings and use of far right and extremist memes, go online to:**

1. <https://www.motherjones.com/politics/2019/04/right-wing-groups-are-training-young-conservatives-to-win-the-next-meme-war/>
2. <https://www.wired.com/story/boogaloo-movement-protests/>



There are other forms of media manipulation, as evident in the publication of lifestyle magazines by terrorist groups. The terrorist group **Al Qaeda in the Arabian Peninsula's (AQAP)** published their own English-language magazine called *Inspire* which provides information on the perspectives of the group and the jihadist movement generally. An issue from March 2013 featured an article on the 11 public figures from the West who it feels should be wanted dead or alive for crimes against Islam (Watson, 2013). It also features regular details on techniques to engage in terrorism, ranging from simple bomb-making to how to handle firearms. Similarly, Al-Qaeda began to publish their own English-language magazine called **One Ummah** on September 11, 2019 (Gardner, 2020).

The glossy magazine format allows authors to promote their agenda in a way that is both attractive and appealing to readers. At the same time, the writing style may be more engaging and promote the jihadist agenda to those who may never have considered this point of view (Gardner, 2020; Watson, 2013). In fact, the Tsarnaev brothers who performed the Boston Marathon bombing frequently sought and read extremist websites and the magazine *Inspire* which served as the basis for their method of attack. The brothers acquired the information needed to build improvised explosive devices from pressure cookers, nails, ball bearings, and explosive materials via articles published in the magazine (Cooper et al., 2013).

**For more information on the importance of jihadi magazines in radicalization, go online to:**

1. [www.dailymail.co.uk/news/article-2287003/Al-Qaeda-releases-guide-torch-cars-make-bombs-naming-11-public-figures-wants-dead-alive-latest-edition-glossy-magazine.html](http://www.dailymail.co.uk/news/article-2287003/Al-Qaeda-releases-guide-torch-cars-make-bombs-naming-11-public-figures-wants-dead-alive-latest-edition-glossy-magazine.html)
2. <https://www.njhomelandsecurity.gov/analysis/al-qaidas-online-magazine-vilifies-us-values>



In much the same way, far right extremist ideologies are often proffered through a lens of legitimacy via think tanks and lobbying groups in the United States. As an example, the **National Policy Institute (NPI)** was formed in 2005 and operated by individuals who espoused white nationalist ideologies. In fact, it is currently run by Richard Spencer, who has openly used Nazi salutes and propaganda from Hitler in public speeches. The NPI also operates a website which began as a platform for its Radix Journal, described as “a periodical on culture, race, metapolitics, critical theory, and society.” The name radix was selected intentionally as a means to shield their views in a search for the “truth,” as they state:

Radix is a Latin word meaning “root” or “stem.” It is the basis of a number of familiar words in English, including “radical” and “race.” The “extremist” – that is, he who takes things too far- is merely excessive. The “radical,” in the true sense of the word, seeks to uncover the heart and source of the matter.

The site content, however, presents far right views such as the notion that science and those who conduct research are unable to be neutral, and that white Europeans need feel no guilt for the way that other races were subjugated through slavery in the United States and elsewhere. The site also operates a podcast and video series with the same far right views presented through a quasi-intellectual lens in an attempt to justify their views. Such efforts help far right groups to indoctrinate others into their ideological or political worldview through discourse that appears far more acceptable on the surface.

In addition, cell phone cameras and web cams allow individuals to create training videos and share these resources with others through video sharing sites like YouTube (Gruen, 2005). Posting videos and news stories through social media also provides a mechanism to publicly refute claims made by media and governments to ensure the group is presented in a positive light (Forest, 2009; Gruen, 2005). For instance, participants in the recent Arab Spring created videos on camera phones to show violent repression by government and police agencies, as it happened, to news agencies around the world (Stepanova, 2011). Similarly, ISIS members have posted videos of the conflict in the city of Mosul, Iraq and other parts of the country where they have attempted to take control of the population. Their videos are intended to validate or refute claims by the US military and coalition forces regarding their attempts to retake cities where ISIS has dug in (Tawfeeq et al., 2016). Such “on the ground” reporting allows individuals to provide evidence of their experiences.

This same capability, however, can be abused by extremist groups in support of their ideologies. One of the most extreme examples of such an act was a video posted by members of Al Qaeda in Pakistan on February 21, 2002. In the video, members of the group executed a journalist named Daniel Pearl who was kidnapped while he was traveling to conduct an interview (Levy, 2003). He stated his name for the camera, described his Jewish family heritage, and then condemned America's foreign policy strategies in the Middle East. Following these statements, his captors then slit his throat and cut off his head, ending the video with a statement demanding the release of all Guantanamo Bay detainees or otherwise more deaths would result (Levy, 2003). The gruesome video became a key piece of propaganda for the group and the jihadist movement generally, while inciting massive outrage in the United States. Such a chilling example demonstrates the value of interactive media and the Internet in the promotion of extremist movements generally (see [Box 10.6](#) for an additional example).

In addition to video, social movements on the fringes of society have successfully utilized music and video games as a means to expose individuals to

## **Box 10.6 An Example of Facebook Live Being Used for Terrorism**

### **How the Christchurch Terrorist Attack Was Made for Social Media**

<https://www.cnn.com/2019/03/15/tech/christchurch-internet-radicalization-intl/index.html>



It seems that the video was filmed by a perpetrator of the mass shootings at two mosques in the city of Christchurch, New Zealand, in which dozens of people were killed and injured. In a sickening angle to an already horrific story, it was live-streamed online.

This article explains the way that the Christchurch, New Zealand mosque shooter livestreamed the violent attack he performed on Facebook. Additionally, the attack and the attacker's manifesto were shared on various social media and online sites in order to spread his racist, nationalist beliefs broadly. The article also details the challenge of policing such content on the Internet and reducing the threat of terror are discussed in detail.

their perspectives in socially acceptable and engaging ways (Britz, 2010; Weimann, 2004). For instance, Resistance Records is a record label that produces and distributes music by bands that feature white power and right-wing extremist messages in a direct-downloadable format (Jipson, 2007). The label is owned and run by the National Alliance, a white power group, which gains a profit from album sales. Music allows what are otherwise extreme or socially unacceptable positions to be heard in ways that may appeal to younger generations or the general public.

Video games have also become a key resource for extremist groups to promote their beliefs in a socially acceptable, approachable, and extremely engaging way to younger audiences. The rewards and reinforcement individuals can receive through successfully completing the objectives of a game, coupled with the underlying themes of the content, can promote an extremist view in a very digestible format. One of the most well-known of these games is called *Ethnic Cleansing* and was developed and released through Resistance Records using no-cost open-source software. This is a so-called “first person shooter,” wherein the game is played from the point of view of a skinhead or Klansman who kills blacks, Jews, and Latinos in various urban and subway environments (Anti-Defamation League, 2002). This game, and its sequel “White Law,” costs \$14.99 and can be downloaded directly through the Resistance Records website (Anti-Defamation League, 2002). Similarly, Islamic extremists have released several video games that place the player in the role of a jihadist fighting against Jews, Westerners, and the US military (Gruen, 2005). The content utilizes pro-Islamic imagery, rap and popular music, as well as various images of and messages from Osama Bin Laden and the 9/11 terror attacks. The game has been posted and reposted across various websites online ensuring its spread to various interested groups (Weimann, 2004).

In addition, far right groups have recently begun to recruit and radicalize players in traditional online games like Fortnite (see **Box 10.7** for detail). Such a move is sensible given that these platforms are often populated by young males who are unsupervised. Players can easily discuss any idea at length, and the violent nature of some games engenders discussions of violence that can be couched in real world terms. As a result, there is growing concern over how to reduce the spread of extremist ideologies through online games.

Finally, there are a number of training and support manuals that are distributed online. In fact, the open nature of the World Wide Web allows individuals to post information that could be used to engage in violence or cause physical

## Box 10.7 Online Gaming as A Flash Point for Far Right Indoctrination

### White Supremacy Is Metastasizing – In Video Games

<https://www.wbur.org/cognoscenti/2019/04/23/video-games-white-supremacy-rich-barlow>



She [Professor Megan Condis] says video game culture has become infested with white supremacists trawling for converts. Casually chatting up young male players about race, alt-right types probe for “those who exhibit curiosity about white nationalist talking points,” she writes.

This article explains the basic processes white nationalists and other far right extremists communicate with youth through online game environments to recruit and radicalize others. The piece also notes that individuals who have engaged in real world violence, like the 2019 New Zealand mosque shooter, emphasized the importance of online gaming in helping them prepare for their actions.

harm in the real world. There are a number of training manuals and detailed tutorials for bomb-making, gunplay, and improvised weapons use on the Internet, many of which have been available online for years (Wall, 2001). This is because individuals can easily post a text file or word processor document and repost it in repositories, send via email, or share via social networks in different formats and languages. For example, the *Mujahideen Poisons Handbook* from Hamas and the *Encyclopedia of Jihad* published by Al Qaeda are available in various online outlets (Weimann, 2004). Even the Earth Liberation Front and ALF have tutorials on how to engage in civil disobedience and protests against logging companies, construction sites, and animal testing facilities (Holt, 2012). These resources engender planning and tactical strategy development, regardless of the expertise of the individuals in a given area.

For an example of a tactical manual, go online to: [www.direkte-aktie.net/osh/](http://www.direkte-aktie.net/osh/)



## Electronic Attacks by Extremist Groups

Though the communications capability afforded by the Internet is unparalleled, it is also important to consider how these technologies could serve as a target for attacks by extremists and terror groups. The range of interconnected computer systems and sensitive data that could be compromised online presents a diverse range of high-value targets for attackers (Britz, 2010; Denning, 2010; Holt, 2012; Kilger, 2010). For instance, individuals could immediately target financial institutions in order to limit the functionality of online banking systems or harm databases of consumer information in order to cause chaos. Alternatively, attackers may target the computer systems that support the processes within nuclear power plants, hydroelectric dams, or sewage treatment plants. These systems, called **Supervisory Control and Data Acquisition (SCADA)** systems, are vital to the management and processing of critical infrastructure and are often connected to the Internet in some fashion (Brodsky & Radvanovsky, 2010). As a result, an attacker who can affect the functionality of these computers may cause substantial physical harm in the real world along with fear over future attacks (see [Box 10.8](#) for details; Brenner, 2011; Denning, 2010).

### Box 10.8 Examples of Cyberattacks Against SCADA Systems in Water Treatment

#### ICS Cybersecurity: Water, Water Everywhere



[www.infosecisland.com/blogview/18281-ICS-Cybersecurity-Water-Water-Everywhere.html](http://www.infosecisland.com/blogview/18281-ICS-Cybersecurity-Water-Water-Everywhere.html)

Since then there have been numerous articles and events that have driven the public conversation about the security of the cyber systems at American water treatment facilities. The question at hand is whether this moment of attention will result in any improvements in cybersecurity of the nation's water supply.

This article provides a timeline of the cybersecurity incidents that have occurred over the last two decades that specifically target water management systems. The piece is invaluable in understanding the ways that systems have been compromised and what this may mean for the future.

The use of cyberattacks by extremist groups are facilitated in part by the nature of information sharing in the hacker subculture (see [Chapter 3](#); Britz, 2010; Denning, 2010). Hackers regularly provide information on vulnerabilities present in the software and hardware of systems across the world (Taylor, 1999). This information can be leveraged by anyone with the time or inclination to identify systems with this vulnerability and attempt to attack them. As a result, open disclosure may do more to facilitate attacks than to provide public awareness of weaknesses. In fact, hackers in support of Al Qaeda have posted various resources to facilitate cyberattacks, such as Youni Tsoulis, who published a hacker tutorial titled “The Encyclopedia of Hacking the Zionist and Crusader Websites” (Denning, 2010). This guide provided detailed information on vulnerabilities in US cyber infrastructure, as well as techniques to engage in data theft and malware infections. In addition, the ability to obtain free attack tools or malware and hacking resources through open markets (see [Chapters 3 and 4](#)) reduces the amount of resource development needed to successfully complete an attack. Thus, the modern hacker subculture facilitates both legitimate and illegitimate hacking behaviors, which can be used by any motivated actor.

One of the most common types of attack used in support of extremist or terror agendas is the denial-of-service attack (DDoS) (Denning, 2010; Kilger, 2010). These attacks may not cause significant system damage, though the fact that they keep users from accessing resources can cause massive dollar losses. In addition, they can be relatively easy to perform and are enabled in part by downloadable tools that will complete the attack at the click of a mouse.

The history of downloadable DDoS tools stems from the hacker group the Electronic Disturbance Theater (EDT; Denning, 2010). The group developed a program called **FloodNet** that could be downloaded directly from their website to be utilized by individuals who shared their perspectives on the use of the Internet as a space for social activism. It was first used in an attack against the Mexican government because of their treatment of Zapatista separatists who were fighting against what they perceived to be governmental repression (Denning, 2010). The EDT first used FloodNet against the Mexican President Zedillo’s website, and then attacked US President Clinton’s website because of his support of Mexico. A third, and even larger, attack was then launched against Zedillo, the Pentagon, and the Frankfurt Stock Exchange for its role in supporting globalization (Denning, 2010).

**For more on the EDT, go online to:** [www.youtube.com/watch?v=O-U-he8LN3k](https://www.youtube.com/watch?v=O-U-he8LN3k)



The success of FloodNet led to its adoption by other activist groups to engage in DDoS attacks, such as an attack by animal rights protesters in Sweden and a British group called the Electrohippies Collective (Denning, 2010). In more recent years, additional DDoS tools have been developed by groups with diverse interests. For instance, a tool called Electronic Jihad was released through the Arabic language forum al-Jinan for use against various Western targets (Denning, 2010).

Anonymous also uses a DDoS tool called the **Low Orbit Ion Cannon (LOIC)** in support of attacks against personal, industrial, and government targets around the world (Correll, 2010). This simple tool allows individuals to simply select a website to target and give parameters for the duration of the attack, then click the ready button. LOIC requires no technical knowledge to successfully complete an attack; the interest in targeting a specific entity is all that is necessary.



**For more on the Low Orbit Ion Cannon, go online to:** <http://sourceforge.net/projects/loic/>

Another useful tool in the arsenal of hackers seeking to express their opinion are web defacements, where the normal HTML code of a web-page is replaced by images, text, and content of the attacker's choosing (see [Chapter 3](#); Denning, 2010; Woo et al., 2004). Web defacements began as a vehicle for hackers to call out system administrators who used poor security protocols and generate a reputation in the hacker community for their actions (Woo et al., 2004). As hackers increasingly recognized the value of web defacements as a means to express their political or ideological motives, the nature and targets for defacements began to change.

Specifically, web defacements increasingly appear to be triggered in response to real-world events. For instance, an Iranian general named Qassem Soleimani was killed by a targeted US drone strike on January 3, 2020 (O'Donnell, 2020). Shortly after this attack, a series of web defacements occurred affecting various public and private websites in the United States with messages featuring phrases such as "Down with America" and images of the Iranian flag (O'Donnell, 2020). One of these defacements affected the US Federal Depository Library Program website, and featured an image of the Iranian general and a picture of then president Trump with a bloodied face being punched by pro-Iran messages

(O'Donnell, 2020). As a consequence, the US Department of Justice indicted two men, one a 19-year-old Iranian and the other a 25-year-old Palestinian, for the attack against this government website. They face two counts of violating the federal Computer Fraud and Abuse Act (CFAA; see Chapter 3), and have yet to be arrested. To further explore the ways that extremists use technology in order to affect action or cause harm, we will now explore the online activities of two different extremist group subcultures: (1) the Radical Far Right movement and (2) the e-jihad.

## The Radical Far Right Online

The term “the **Radical Far Right**” is often associated with white supremacist groups like the Ku Klux Klan, though it can actually be applied as an umbrella term to capture the collective of groups with overlapping perspectives, such as neo-Nazi groups, white nationalists, Aryan skinheads, and other Christian separatist movements. In addition, the term **Alt-Right** or **Alternative Right** has been used to characterize aspects of these movements in an attempt to rebrand these ideologies. Though they have different individual views, they generally share a framework that the white race has been sublimated by non-white racial and ethnic groups, Jews, and Catholics. These groups operate around the world and take various forms. The Southern Poverty Law Center (SPLC) (2020) suggested that there were 940 active hate groups operating in the United States in 2019. Though they are spread across the country, the white power movement is most prominent in the South, upper Midwest, and Southwestern United States. Similar groups are evident in Europe and Asia, including the NSM, which has offshoots in England and the Philippines (National Socialist Movement, 2014).

**For more information on the different types of hate groups in the United States and where they are located, go online to: <https://www.splcenter.org/hate-map>**



The value of the Internet for the radical far right movement cannot be understated. Technology allows individuals from marginalized communities across the world to become indoctrinated into the culture and find social support for their attitudes and beliefs over time. Donald Black, former KKK

member and the founder of the website Stormfront, stated that “whereas we previously could only reach people with pamphlets and by sending out tabloid papers to a limited number of people or holding rallies with no more than a few hundred people – now we can reach potentially millions of people” (Faulk, 1997). Considering he made this statement in 1997, the white power movement has had a long history of Internet use.



**For more information on the Alt-Right, go online to:** <https://www.splcenter.org/fighting-hate/extremist-files/ideology/alternative-right>

Some of the most common tools used by the radical far right movement are websites, forums, chatrooms, blogs, encrypted chat apps, and other forms of CMC. Individuals who find these sites may be first directed to them through Google searches (McNamee et al., 2010), or more recently through social media sites. Spending time reading the content and getting to know users may increase their willingness to accept their point of view. In fact, continuous involvement in these sites may help individuals to accept extremist perspectives, even if their peers or family do not agree with these positions. In addition, the ability to make multiple friends and associates online in addition to their real-world social relationships can help to insulate their perceptions.

It is important to note that CMCs used by these movements do not necessarily encourage violence. Some do and are overtly inflammatory in their language about the need to rise up in armed conflict or engage in a “race war” (McNamee et al., 2010). In fact, a group called the **Boogaloo movement** or **Boogaloo Bois** have emerged over the last few years as a loose collective of actors who show up at protests typically wearing Hawaiian shirts and carrying AR-15s and other firearms (Goggin & Greenspan, 2020). Though they have no central organization, participants generally emphasize the need to incite a second US civil war and shatter the US government. In fact, their name references the 1984 film called “Breakin’ 2: Electric Boogaloo,” which was a sequel to the original film “Breakin.” (Goggin & Greenspan, 2020).

Other groups are more focused on the need to develop a strong white race which retains its power in the United States and Europe. In fact, many users in forums and other sites communicate their interpretation of historical events and scientific findings as a way to justify their actions (McNamee et al., 2010). They may also promote the idea that the white race has been appointed by

God or by natural right to dominate the world over other races and ethnic groups (McNamee et al., 2010). Constant exposure to these messages will help to encourage an individual to believe them and be drawn into the movement as a whole.

At the same time, the Internet allows users to regularly access cultural currency and modes of expression related to far right movements. For example, music became an important tool in the indoctrination of individuals through heavy metal bands and other musical styles in the mid-1990s (Simi & Futrell, 2006). Large concert venues became an important rallying point, drawing multiple acts to play at day-long festivals. The development of e-commerce sites and music sharing services aided the spread of white power and neo-Nazi music. In turn, the movement began to use music as a key resource to communicate their message through accessible media that may be more engaging to youth culture (Simi & Futrell, 2006).

The ability to access the Web has also enabled individuals to develop life-style-related content that incorporates their racial attitudes (Simi & Futrell, 2006). Images of tattoos, concerts, organized meetings, video games, music, and clothing are all easily identified via the Web. There are now even streaming-music services available for those interested in white power bands. In addition, the group “Women for Aryan Unity” (WAU) publishes a magazine called *Home Front* on parenting issues, home schooling, and ways to socialize children into the movement. There are also child-specific materials available to download, such as coloring pages, crosswords, and stories that are “age appropriate” (Simi & Futrell, 2006). They can also get positive reinforcement from peers and ask questions about how to stay loyal to the movement despite the problems that they may face from other parents. Thus, the web is a key resource in the communication of subcultural values within radical movements as a whole.

In the last few years, far right groups and actors have also begun to use the Internet as a tool to not only recruit others, but incite fear among sensitive populations. For instance, a hacker named **Andrew “weev” Auernheimer** engaged in a series of targeted hacks of wireless printers on college campuses in 2016 (SPLC, 2020). He was able to make printers run off copies of violent and radical messages, ranging from: “WHITE MAN are you sick and tired of THE JEWS destroying your country through mass immigration and degeneracy?” to the much more violent text:

I believe that our enemies need such a level of atrocity inflicted on them and their homes that they are afraid to ever threaten the white man with

genocide again. ... We will not relent until far after their daughters are raped in front of them. We will not relent until far after the eyes of their sons are gouged out before them. We will not relent until the cries of their infants are silenced by boots stomping on their brains out onto the pavement.

White nationalists, including Auernheimer, have also engaged in so-called **Zoombombing** campaigns against various groups during the COVID-19 pandemic (Hayden, 2020). This involving joining a Zoom meeting in order to disrupt the proceedings and flash racist and violent messages to participants. Such efforts may also serve as a form of harassment and intimidation against participants on the basis of their race or religion (Hayden, 2020). These actions highlight that far right groups are diversifying their actions in online spaces to cause harm on and offline.

## The E-Jihad

Over the last ten years, academic researchers and popular media have focused heavily on Al Qaeda, and more recently ISIS, and their role in global terror activities (Forest, 2009; Martin, 2006). Much of this work has helped inform our knowledge of the real-world threat that these groups pose, though there has generally been little evidence demonstrating their role in successful cyber-attacks (Denning, 2010; Ulph, 2006). There is, however, some evidence that loose associations of hacker groups are interested in and attempting to engage in cyberattacks against the West. This so-called **e-jihad** has ties to Al Qaeda, ISIS, and other Islamic extremist groups across the Middle East and Africa and depends on technology for communications infrastructure and as an attack platform (Denning, 2010; Ulph, 2006).

The use of the Internet as a platform for e-jihad has been supported by a variety of individuals tied to Muslim extremist groups. For instance, Mohammad Bin Ahmad As-Sālim wrote a book titled *39 Ways to Serve and Participate in Jihād*, which was designed to promote discussion about the issue of war with the West and jihad generally (Denning, 2010; Leyden, 2003). The book discussed the issue of electronic jihad as the 34th principal way to engage in jihad. He identifies the need for both discussion forums for media campaigns and more specific applications of hacking techniques in order to harm the West. Specifically, he wrote: “He [anyone with knowledge of hacking] should concentrate his efforts on destroying any American websites, as well as any sites that are anti-*Jihād* and *Mujāhidīn*, Jewish websites, modernist and secular

websites” (As-Sālim, 2003). Thus, terror groups realize that Western nations’ dependence on the Internet for both commerce and communications is a major vulnerability that can be exploited to cause economic harm and fear in the general populace.

**For more information on US citizens being radicalized, go online to:** <http://www.cnn.com/2017/03/03/politics/homeland-security-assessment-radicalization/index.html>



To that end, the first hacker group that emerged with specific ties to Al Qaeda was the “al-Qaeda Alliance Online,” an offshoot of the hacker group “GForce Pakistan.” Members of the Alliance defaced a web server operated by the National Oceanic and Atmospheric Administration (NOAA) on October 17, 2001 (McWilliams, 2001). The defacement contained interesting, if not contradictory, information by condemning the September 11 attacks, stating: “bin Laden is a holy fighter, and whatever he says makes sense” (McWilliams, 2001). They went on to say that they would attack major websites in the United States and Britain, though “we will not hurt any data as its [sic] unethical” (McWilliams, 2001).

A subsequent defacement occurred ten days later on October 27th, though that was the last attack attributed to the group (Denning, 2010). It is not clear what happened to the Alliance, but it was replaced by a variety of forums and hacker groups actively engaged in the promotion of attacks against the West and others who disparaged the Islamic faith. For instance, the al-Farouq forum established a section encouraging electronic jihad, along with a downloadable library of tools and tutorials for engaging in attacks (Denning, 2010; Pool, 2005). Similarly, the al-Jinan forum created and offered a free download of a DoS tool called Electronic Jihad and gave awards and electronic medals to those who were the most effective attackers against sites that harmed Islam (Bakier, 2007).

One of the most well-known examples of information sharing was from a hacker named Youni Tsoulis, who used the handle **Irhabi007**. He developed multiple web forums and sites supporting Al Qaeda and even set up hidden links to propaganda websites on various forums (Corera, 2008). He also promoted hacking and gave multiple tutorials on hacker sites with substantial detail on methods of attack and tactics to compromise websites (Jamestown, 2008). Due

to the degree to which he actively engaged and shared information about cyber-attack techniques with others in the e-jihad movement, Tsouli came to the attention of law enforcement and military agencies around the world. In fact, his name was found on a laptop belonging to a member of an Al Qaeda cell in Bosnia who was arrested after making threatening videos against various European nations. Tsouli was arrested by the London Metropolitan Police during a raid in 2005 and was found guilty of charges under the Terrorism Act of 2000 (Corera, 2008). He received a 16-year sentence; he was 23-year-old at the time.

More recently, **Ardit Ferizi** was detained in Malaysia in October 2015 based on allegations that he compromised US computer systems on behalf of ISIS (Perez et al., 2015). Ferizi used the handle Th3Dir3ctorY, and admitted to compromising a server hosting a US company, enabling him to gain access to a database containing the personally identifiable information (PII) of almost 1,300 military and government personnel (Department of Justice, 2016). He then gave these data to Junaid Hussain, an ISIS recruiter, and discussed using the data to produce a hit-list based on the victim's PII. The data then appeared in a tweet posted by the Islamic State Hacking Division (ISHD), claiming that they would pass the “personal information to the soldiers of the khilafah, who soon with the permission of Allah will strike at your necks in your own lands!” (Department of Justice, 2016). He was extradited to the United States for prosecution, and was eventually found guilty and sentenced to 20 years in federal prison on charges related to violations of the Computer Fraud and Abuse act, as well as providing material support to a terrorist organization.

More recently, the Al-Qaeda magazine One Ummah featured an article which stated that jihadists should engage in “e-jihad” and attempt to hack power grids, financial systems, “emergency response systems and the like” (Johnson, 2020). In doing so, jihadi actors can engage in “creative ways of dismantling the enemy’s electronic and cyber defenses” (Johnson, 2020). These comments highlight the clear recognition that cyberspace continues to be a target-rich environment for attacks against the West.

At the same time, there are generally few successes in the broader landscape of known cyberattacks by jihadists. For instance, individuals attempted to engage in a DoS attack against the Vatican website after Pope Benedict made comments about the Prophet Mohammad and Islam which were viewed as critical of their faith (Denning, 2010). Individuals involved in the e-jihad also planned a coordinated series of attacks against US financial institutions and the stock exchange in 2006. All of these attacks failed to materialize, calling into question the skill of the attackers relative to the preparations taken to defend

against such attacks (Alshech, 2007; Denning, 2010; Gross & McMillan, 2006). This should not be taken as an indication that Al Qaeda, ISIS, and the e-jihad should not be taken seriously, but rather that they recognize the value of the Internet and are searching for ways to leverage it toward effective attacks.

This chapter provides substantive detail on the role of the Internet in facilitating communications, fundraising, and planning for terror groups. There is, however, scant evidence of actual cyberattacks performed by terrorist groups. Pundits and politicians have heralded this potential for almost two decades since the coining of the phrase “digital Pearl Harbor.”

As a result, some scholars argue that the absence of actual evidence of attacks coupled with the expansion of the information collection and security apparatus of governments leads to a distinct conclusion: cyberterror is a social construction (Furedi, 2005; Yar, 2013). Specifically, the threat posed by terrorism is built up by media and seized upon by claims makers. The resulting public support can be used as a means to gain greater control over resources like the Internet and impose restrictions and surveillance on user activity. This position is supported by the recent revelations regarding the US National Security Agency’s (NSA’s) access to email and phone records, as well as a larger global surveillance mechanism (discussed later in this chapter).

This is a challenging position as the general public does not gain access to information on attacks against government systems and critical infrastructure. The classification of information makes it difficult to know the reality of terrorist group capabilities or their use of cyberattacks (Denning, 2010). At the same time, there has been a massive build-up in security spending and resource allocation to government agencies for what are otherwise extremely rare events (Yar, 2013). In the end, it is necessary to consider this position and ask, “What is the correct balance between national security and citizens’ rights?”

## Legislating Extremism and Cyberterror

The Internet and CMCs clearly provide a mechanism for individuals to spread hurtful messages and ideas based on prejudice, racism, and other ideological and political stances. There is some tension in how to sanction hate speech, as nations like the United States protect freedom of speech under the First Amendment to the Constitution. The only real way that speech is limited in this country is through the “imminent danger” test, where one’s comments are unprotected if the speaker attempts to incite dangerous or illegal activities (Abrams, 2012). Recognizing that the Internet dramatically increases the risk of exposure to

hurtful ideas and prospective radicalization of individuals toward violence, the Obama administration began to take steps to combat the problem of domestic and foreign terror and extremist groups without changing existing protections to free speech.

The White House released a policy and strategy document in August 2011 titled “Empowering Local Partners to Prevent Violent Extremism in the United States.” This document detailed their desire to use a community-based approach to reduce the problem of extremist groups and violent behavior through the integration of law enforcement and public private partnerships with stakeholders in local communities (White House, 2011). It was argued that religious leaders in mosques and Islamic centers of worship, as well as schools and community groups, should be brought together in order to foster trust between community residents, law enforcement, and the federal government. In fact, this strategy involved multiple federal agencies ranging from the Treasury, Department of Defense, Department of Justice, Department of Homeland Security (DHS), and the Federal Bureau of Investigation (FBI) (White House, 2011). The hope was that these inter-agency and community partnerships could better improve the scope of engagement with communities on issues that they were concerned about, and develop better partnerships that would make communities resilient to radicalization, whether from online groups or those in the real world.

The United States is an isolate with regard to its equal protection of free speech, as many nations around the world have criminalized hate speech in some form. The United Kingdom’s Public Order Act 1986 criminalized expressions of threats, abusive, or insulting behavior to any group of persons based on their race, color, ethnicity, nationality, or ethnic origin with a punishment of up to seven years in prison and/or a fine (Mendel, 2012). This law was amended in 2006 to include religious hatred and again in 2008 for protection of sexual orientations (Mendel, 2012). Similar legislation is present in Australia, Canada, Denmark, France, Germany, the Netherlands, Singapore, and South Africa (Mendel, 2012). Though these statutes do not primarily identify the Internet as a venue for the communication of hate speech, the laws can be extended to these environments.

The European Convention on Cybercrime (CoC) also includes language criminalizing the use of the Internet in order to disseminate hate speech. Specifically, the CoC identifies “racist and xenophobic material,” including writing, images, videos, and any other content that is designed to promote or encourage hate or discrimination against any group (Brenner, 2011). The distribution or posting of such material online is defined as criminal under the CoC, as

is making online threats to any person on the basis of their racial, ethnic, or religious background, and the distribution of information that denies or otherwise attempts to misinform individuals regarding genocide and crimes against humanity (Brenner, 2011). This legislation has tremendous value in addressing the development and radicalization of individuals through the Internet, particularly white supremacist movements.

In addition to hate speech, many of the examples provided throughout this chapter reflect the use of hacking techniques in furtherance of terror or extremist group plots. As a result, several nations have extended their laws pertaining to computer hacking so that they can be applied to these offenses (see [Chapter 3](#) for more detail). For instance, one of the few nations to specifically use the language cyberterror in their legislation is India, which amended its [\*\*Information Technology Act, 2000\*\*](#) to recognize cyberterror as:

When an individual with intent to threaten the unity, integrity, security, or sovereignty of India or strike terror in the people by

- a) Denial of access to a computer resource
- b) Penetrating or accessing a computer resource either without authorization or exceeding authorized access
- c) Introducing or causing the introduction of a computer contaminant (e.g. malware) that may cause injury to persons or death, damage or destruction of property, or adversely affect critical information infrastructure
- d) Accessing a computer resource without authorization or exceeding access to obtain information, data, or a database that is restricted due to state security concerns in order to cause injury to the State, its security, or relationships with other nations

Anyone who is either found guilty of engaging in these behaviors or conspires to commit them can be imprisoned for life.

The United States expanded the Computer Fraud and Abuse Act following the 9/11 attacks through the introduction and passing of the [\*\*Uniting and Strengthening America by Providing Appropriate Tools Required to Intercept and Obstruct Terrorism \(USA PATRIOT\) Act\*\*](#) of 2001. This Act strengthened the existing CFAA laws to include any computer in the world so long as it is “used in a manner that affects interstate or foreign commerce or communications of the United States” (Brenner, 2011). This provision enables US law enforcement to engage in investigations in foreign countries, so long as the investigation is recognized as legitimate by that nation. In addition, the

PATRIOT Act modified the law to also include any unauthorized access to a computer or network that:

- 1 modifies or impairs access to medical data;
- 2 causes physical injury to a person;
- 3 poses a threat to public health or safety; or
- 4 damages a computer used by a government entity in the administration of justice, national defense, or national security.

Though this language does not specifically recognize cyberterror, the expansion of the statute enabled greater latitude for federal law enforcement to pursue cybercriminals and more effectively prosecute those who would target either critical infrastructure or sensitive data sources that could cause significant harm in the real world.

In addition, the PATRIOT Act also relaxed the legal provisions needed for law enforcement agencies to engage in surveillance of electronic communications. For instance, the Act revised provisions of the **Electronic Communications Privacy Act (ECPA)** related to subpoenas of Internet Service Providers (ISPs) and cable companies. The Act enabled law enforcement to obtain the name and address of subscribers, along with their billing records, phone numbers called, duration of sessions while online, services used, communication device information, and other related data. The release of such information can enable law enforcement to more effectively trace the activities of a user to specific websites and content during a given session of Internet use. In addition, the ECPA now defines email that is stored on a third-party server for more than 180 days to be legally viewed as abandoned. As a result, law enforcement can request this data and the content of the email, whether opened or unopened, be turned over without the need for judicial review. Finally, the PATRIOT Act allowed ISPs to make emergency disclosures of information to law enforcement in instances of extreme physical or virtual threats to public safety. Such language allows for greater surreptitious surveillance of citizens with minimal government oversight or public awareness.

At the state level, there is generally little legislation that exists with regard to cyberterrorism. Arkansas, Connecticut, Georgia, Illinois, Indiana, and West Virginia all have statutes that directly or indirectly relate to cyberterrorism (Brenner, 2011). For example, Arkansas recognizes an act of terror as any act or series of two or more acts that attempt to disable or destroy data, computers, or computer networks used by industry, government, or contractors. Connecticut more narrowly defines an act of “computer crime furtherance of terrorist purposes” as an

attempt to use computer crimes in order to intimidate or coerce either the government or civilian populations. Georgia has criminalized the use of a computer in order to disseminate information related to terrorist activities (Brenner, 2011). The lack of state-based legislation may stem from the recognition that an act of terror, whether virtual or real, will more immediately fall under the investigative responsibility of the federal government. At the same time, the presence of such legislation suggests these states are progressive in their thinking about these issues and may serve as models for other states across the country.

Other nations have adopted similar language to that of the USA PATRIOT Act, such as Canada's Anti-terrorism Act of 2001, which changed standards for the interception of domestic communications of all kinds (Brenner, 2011). For instance, this law allows the Communications Security Establishment of Canada (an analog to the NSA) to intercept communications that either begin or end in Canada and involve a foreign source. Prior to this law, any domestic information acquired in the process of an international intercept would have been destroyed or ignored. Though there has been substantive public debate surrounding the legitimacy of these new laws, the Canadian government has not moved to strike them down. Similar legislation in Australia and New Zealand has, however, been repealed due to the perception that they are too extreme and degrade public trust in government (Rid, 2013).

## **Investigating and Securing Cyberspace from the Threat of Terror**

The landscape of agencies responsible for dealing with the threat of terror and extremism in online spaces is varied, and reflects a whole of government approach adopted by many nations over the last two decades. This section will consider the range of national and federal agencies tasked with enforcing the existing laws by place.

### ***The Federal Bureau of Investigation***

As noted earlier, the FBI plays a critical role in the investigation of both traditional crimes and cybercrimes. In fact, the investigation of terror attacks and foreign intelligence operations are among the top priorities of the Bureau. The **National Security Branch (NSB)** of the FBI is designated with the task of gathering intelligence and coordinating investigative efforts to disrupt terrorist groups and foreign intelligence groups (FBI, 2021).

The NSB was established in 2005 as a result of a presidential directive to combine the mission and resources of the counterterrorism, counterintelligence, and intelligence mission of the bureau under a single unit. This branch includes five components: (1) the FBI's National **Joint Terrorism Task Force (JTTF)** which manages 104 JTTFs linking multiple federal law enforcement agencies together, shares intelligence, and works cooperatively on terrorism investigations; (2) the Counterintelligence Division to affect traditional and non-traditional espionage and intelligence gathering in the United States (see [Chapter 11](#)); (3) the Weapons of Mass Destruction Directorate (WMDD) designed to reduce the threat and proliferation of nuclear, biological, and chemical weapons; (4) the Terrorist Screening Center, which generates actionable intelligence for state and local law enforcement agencies and maintains the consolidated Terrorist Watchlist; and (5) the High-Value Detainee Interrogation Group that actively collects information from terror suspects in order to gain information to deter attacks against various targets (FBI, 2021). The Terrorist Explosive Device Analytical Center (TEDAC) also operates within this area as a resource to analyze improvised explosive devices (IEDs) designed and used by terrorist actors. The TEDAC serves as the hub for all analyses of such weapons across the whole of government, including the military (FBI, 2021). Thus, the FBI plays a critical role in both law enforcement, homeland security, and the intelligence community generally.



**For information on the recent DOJ indictment of two Russian spies allegedly responsible for Yahoo hacks, go online to: <http://www.cnn.com/2017/03/14/politics/justice-yahoo-hack-russia/index.html>**

### ***The Department of Homeland Security***

The **Department of Homeland Security (DHS)** is a cabinet-level department which consolidated various federal agencies under a single department heading. Created in 2001 following the September 11 attacks, DHS handles civilian infrastructure and populations within the borders of the United States (DHS, 2021). Their mission includes a variety of agencies focused on traditional physical resources, such as Immigration and Customs Enforcement (ICE) and the Transportation Safety Administration (TSA), and finance via the Secret Service. In addition, the DHS Homeland Security Investigations (HSI) section within ICE has multiple roles in the response to terror threats in the United

States. The **National Security Investigations Division** has the responsibility to respond to terror and crime threats as they move through the US border and throughout the nation. Specifically, the Counterterrorism and Criminal Exploitation Unit focuses on the identification of terror and crime threats through the US border system, particularly through identity document and visa monitoring (ICE, 2021).

Additionally, DHS operates a National Security Unit through its DC headquarters as a unifying body to synchronize and integrate intelligence and operational practice into a single strategic response to terrorism. They manage DHS responsibilities on the FBI's JTTFs to combat threats to national security, with particular focus on economic offenses and border crossing detection. Additionally, the NSU Counterterrorism Sections (CTS) supports the DHS HSI counterterrorism training and coordinating staffing needs to the JTTFs.

ICE HSI also operates the Office of Intelligence to collect information on various aspects of illicit commerce and the movement of potential threats through the United States and its partners. The primary unit of the office responsible for collect intelligence on credible threats is the Intelligence Analysis Division. They produce reports, briefings, and direct information to appropriate agencies to facilitate criminal investigations across ICE (DHS, 2021). The Trade and Financial Crimes Unit (TFCU) produces similar information associated with all manner of the criminal economy, inclusive of smuggled goods detected at the border to money laundering investigations. The National Security and Public Safety Unit collects information on various foreign and domestic threats, including attempts to target critical infrastructure on and off-line. Additionally, the Collections Division focuses on the dissemination of timely sensitive information to all appropriate entities involved in homeland security to improve the response to crime and terror (DHS, 2021). Finally, the Intelligence Integration and Emergency Management (IIEMO) Division provides resources to link federal and state agencies, facilitate information sharing, coordinate the response to natural and man-made threats across ICE, and collect information on various threats reported to ICE (DHS, 2021).

The role of cybersecurity and its link to terrorism and critical infrastructure protection has also grown substantially within DHS over the last decade. DHS now operates the **Cybersecurity and Infrastructure Security Agency (CISA)** which plays multiple roles in coordinating cybersecurity strategies, along with communications in the event of major emergencies and disasters (DHS, 2021). One of the key components under this Office is the National Cybersecurity and Communications Integration Center (NCCIC), which

opened on October 30, 2009 (DHS, 2021). The NCCIC's mission is to minimize the likelihood of successful attacks against both critical information technology and communications networks. The NCCIC also serves to connect multiple government organizations together in order to protect computer systems and networked infrastructure in general. It also plays a role in linking the public and private sectors together in order to help promote information sharing and improve the state of cybersecurity through awareness of emerging threats.



**For more on the organizational structure of the US DHS, go online to: <https://www.dhs.gov/organizational-chart>**

Within the NCCIC, there are four operational branches. First, the NCCIC Operations and Integration branch (NO&I) serves as the hub for planning, coordinating, and integrating all capabilities across the NCCIC (DHS, 2021). Second, the National Coordinating Center for Communications (NCC) serves as the hub for any efforts to either restore or initiate telecommunications services and facilities on behalf of National Security and Emergency Preparedness.

Third, the US-Computer Emergency Readiness Team, or US-CERT, serves as a response center and information clearing house for cyberthreats across the world (DHS, 2021). The CERT provides reporting mechanisms for vulnerabilities and threats to systems, as well as security tools to help patch and protect systems from attack (DHS, 2021). The CERT can also serve to analyze and track threats as they evolve for virtually any branch of government and civilian networks. They also operate multiple educational forums, webinars, and educational resources to enable information sharing on cybersecurity threats to various industry sectors (DHS, 2021).

Finally, an Industrial Control Systems Cyber Emergency Response Team (ICS-CERT), which plays a similar function to the US-CERT, but focuses solely on control systems used in critical infrastructure and systems, such as water and energy providers. The ICS-CERT can also provide incident response operations to restore services and analyze attacks. They also serve as a key point of communication between the private and public sector to share information on control-system related threats (DHS, 2021).

The federal response to terror threats also links to state and local agencies in the United States through **fusion centers** as a means to share and investigate threats within a given area (Chermak et al., 2013; Coburn, 2015). Fusion

centers became a part of the national response to terror in 2003 as a joint effort of the DHS and the Office of Justice Programs to improve communication of intelligence gathering (Coburn, 2015). Fusion centers not only receive and develop investigative leads from federal sources, but also collect and pass relevant information to federal, state, and local entities which may be affected (see also [Chapter 2](#) for detail).

### ***Other Nations' Responses to Cyberterror***

Other nations utilize similar mechanisms to secure various infrastructure from both cyberthreats and traditional terrorism. For instance, the [\*\*Centre for the Protection of National Infrastructure \(CPNI\)\*\*](#) in the United Kingdom exists to inform critical infrastructure owners of emerging threats and coordinate responses in the event of a compromise (CPNI, 2014). Similarly, Australia now has the [\*\*Critical Infrastructure Center\*\*](#) which was founded on January 23, 2017 to coordinate the response to threats to the nation and its territories against the various systems and networks (Australian Government Attorney General's Department, 2017).

Additionally, multiple Western nations operate collaborative policing units to support counterterrorism operations. In the United Kingdom, the [\*\*National Counter Terrorism Policing Network \(NCTPN\)\*\*](#), or [\*\*Police Counter-Terrorism Network\*\*](#) links multiple national agencies, military, and regional police agencies under a single roof. The NCTPN directs efforts through 11 dedicated Regional Counter Terrorism (CTU) and Regional Counter Terrorism Intelligence (CTIU) Units to operate across the United Kingdom, as well as through national units (Counter Terrorism Policing, 2018). The CTUs focus on police and investigation efforts to disrupt terrorist activities, while the CTIUs produce and disseminate actionable intelligence on threats from foreign and domestic actors (Counter Terrorism Policing, 2018).

The Canadian [\*\*Integrated National Security Enforcement Teams \(INSET\)\*\*](#) operate similar structural policing efforts against terrorism through the federal Public Safety Canada. There are five of these teams across the country, which formed in 2002 after the 9/11 attacks in the United States. The Australian Federal Police (AFP) also operate [\*\*Joint Counter Terrorism Teams \(JCTTs\)\*\*](#) in each of the states and territories across the country (AFP, 2022). They also operate the National Disruption Group (NDG), which detects and prevents the travel of individuals who seek to engage in terrorism or seek training abroad (AFP, 2022).

## Summary

This chapter demonstrates the complex and very real threat that is posed by acts of online extremism and cyberterrorism, including the application of hacking techniques in furtherance of ideological agendas. These threats require a sophisticated response from law enforcement at all levels of government in order to properly defend against attacks. At the same time, it may not be immediately clear when an attack is motivated by an extremist agenda or when it is simply criminal. Thus, the problem of cybercrime, hacktivism, and cyberterror will involve investigative resources and initiatives to determine the origins of an attack and the actors responsible. This issue will continue to evolve along with technology adoption and use across the globe. Hopefully, however, we will not experience an electronic Pearl Harbor incident in the years to come.

## Key Terms

- Al Qaeda in the Arabian Peninsula (AQAP)
- Alt-Right, Alternative Right
- Andrew “weev” Auernheimer
- Ardit Ferizi
- Boogaloo Bois
- Boogaloo movement
- Centre for the Protection of National Infrastructure (CPNI)
- Critical Infrastructure Centre
- Cybersecurity and Infrastructure Security Agency (CISA)
- Cyberterror
- Department of Homeland Security (DHS)
- E-jihad
- Electronic Communications Privacy Act (ECPA)
- Electronic Pearl Harbor
- FloodNet
- Fusion center
- Hacktivism
- Information Technology Act, 2000
- Inspire*
- Integrated National Security Enforcement Teams (INSET)
- Irhabi007

Islamic State of Iraq and Syria (ISIS)  
Joint Terrorism Task Force (JTTF)  
Low Orbit Ion Cannon (LOIC)  
National Counter Terrorism Policing Network (NCTPN)  
National Joint Counter Terrorism  
National Policy Institute (NPI)  
National Security Branch  
One Ummah  
Police Counter-Terrorism Network  
Radical Far Right  
Supervisory Control and Data Acquisition System (SCADA)  
Terror  
Uniting and Strengthening America by Providing Appropriate Tools Required to Intercept and Obstruct Terrorism (USA PATRIOT) Act

## Discussion Questions

1. How should we define or view the activities of Anonymous? They hack government targets, civilians, and industry. As such, should their actions be viewed as cybercrime, hacktivism, or cyberterror? Why?
2. What real-world events, whether political, military, or social, could trigger a cyberattack? Why?
3. Why is it necessary to have a combined and coordinated set of agencies linking local to national/federal responses to terrorism and extremists?
4. Are free speech concerns in the United States enough to justify not managing or legislating against hate speech online?

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Chapter

**11**

# CYBERWARFARE AND INFORMATION OPERATIONS ONLINE

## Chapter Goals

- Define cyberwarfare and its relationship to traditional or kinetic warfare
- Understand how nation-states may utilize the Internet as an attack vector in a different way than individual citizens with no state sponsorship
- Define and understand disinformation as a form of cyberwarfare
- Recognize the agencies responsible for offensive and defensive warfare actions in online spaces

## Introduction

In 2015, the **US Office of Personnel Management (OPM)** notified the public that their systems had been compromised by an external source, leading to a data breach (Fruhlinger, 2020). Though data breaches are extremely common, this incident was unlike others as the OPM maintains extremely sensitive records about the government's workforce. Specifically, OPM maintains a database of the background paperwork employees complete to obtain security clearances for various jobs, called the SF-86 form (Fruhlinger, 2020). The contents of these forms includes massive amounts of detail, including financial records, drug and alcohol use, the places individuals have lived throughout their lives, and their fingerprints. The loss of millions of these records creates a substantial risk to US national security, as the information collected from SF-86 forms are used to help decide what level of security clearance an individual may obtain (see [Box 11.1](#) for detail). If a person has substantial debts, personal problems, or other issues that could be used to coerce them into providing secret information, they are less likely to receive a high clearance (Fruhlinger, 2020).

The loss of this extremely sensitive information was traced back to 2013, almost two full years before the breach was announced. Attackers were able to compromise various contractor systems, as well as OPM and the Department of Interior using malware and other tools to finally gain access to the sensitive data they sought (Fruhlinger, 2020). After what is thought to be 18 months of slow, careful attacks, the entities involved were able to exfiltrate over 4.2 million records from government systems (Fruhlinger, 2020).

Though it is not entirely clear who performed the hacks, evidence suggests that state-sponsored hackers associated with China were involved. The tools used were associated with Chinese-language hacker groups and had been used against political activists in Hong Kong and Tibet (Fruhlinger, 2020).

## Box 11.1 An Opinion on the Risk of Data Breaches to National Security

### Why the OPM Hack Is Far Worse than You Imagine

<https://www.lawfareblog.com/why-opm-hack-far-worse-you-imagine>



The scale of the OPM breach is larger and more harmful than appreciated, the response to it has worsened the data security of affected individuals, and the government has inadequately addressed the breach's counterintelligence consequences.

This article, written as an opinion piece, provides a critical assessment of the impact that a data breach, such as the OPM hack, has on the state of US national security. The author provides a detailed breakdown of the sensitive nature of the data obtained and the rather detailed decision-making involved in assigning security clearances to employees. Readers will garner a much more robust appreciation for the scope of this breach and its potential harms.

A number of US government employees were also reassigned from duties in China following the breach, which is also thought to support the role of China in the hack. Finally, the data taken by the hackers clearly relates to the interests of a foreign government (Fruhlinger, 2020). Having clear information on the individuals within a rival government who may be easily swayed into providing sensitive information would be invaluable so as to improve their intelligence collection practices.

This hack is unfortunately just one in a long campaign of Chinese efforts against US government targets in cyberspace. In fact, the security firm Mandiant (2013) published a report linking multiple years of attacks to a single unit of the **People's Liberation Army of China (PLA)** that was previously unidentified. This group, designated Unit 61398 in the 3rd Department of the General Staff Department (GSD) of the PLA, is thought to be staffed by dozens, if not hundreds, of workers with specialized knowledge of computer security and network attacks. The unit has actively compromised various targets for years, including attempts to gain access to companies managing electrical grids and pipelines for oil and gas. In addition, the attackers were able to stay inside of targeted systems for up to a year at a time and maintain backdoor access to

systems. As a result, Mandiant refers to their attacks as **Advanced Persistent Threat (APT)** 1 due to their persistence and effectiveness.



**For more on the APT1 report, go online to:** [http://intelreport.mandiant.com/Mandiant\\_APT1\\_Report.pdf](http://intelreport.mandiant.com/Mandiant_APT1_Report.pdf)

The persistence of high-level attacks with direct connections to the military demonstrates that the online environments we depend on for all aspects of modern life are also a hotbed for attacks between nations around the world. These attacks present clear risks to virtually all citizens of the world, though it is not clear how well these issues are understood. This chapter will identify the role of nation-states in cyberattacks, define the concept of cyberwarfare, and recognize its various forms. The government and military entities involved in both the attack and defense of national resources will also be discussed in detail.

## Defining Warfare and Cyberwarfare

As cyberspace plays an increasingly critical role in managing the everyday aspects of communication and critical infrastructure, governments and military agencies are increasingly attempting to establish their role in cyberspace. With that in mind, we must define a **nation-state** and contextualize its relationship to warfare. Creveld (1999) argues that a nation-state has three characteristics: (1) sovereignty, (2) territoriality, and (3) abstract organization status. **Sovereignty** involves the authority or power to rule as well as make and enforce laws within a given area. **Territoriality** recognizes that a state or governing body exerts power within specific, recognized borders (Creveld, 1999). The idea of "**abstract organization**" involves the concept that each state has a distinct and independent persona, which is separate from that of its people. Specifically, the state is a political entity, while the culture and/or ethnic composition of a place makes up its national identity (Creveld, 1999). For instance, the United States utilizes a democratic system of government, while its national identity is one that is a cultural mélange of various heritages and backgrounds based on the influx of immigrants over time.

National sovereignty and territorial control is critical to the rationale for why cyberspace, which is technically borderless, must be controlled through various means. A nation is thought to have the right to defend itself and its interests

from harm, including the use of force when necessary (Andress & Winterfeld, 2013; Rid, 2013). As a result, nations have the authority to form and maintain standing military forces to use for the purposes of self-defense and proactive use of force when warranted. At the same time, there should be a clear and justifiable cause for any use of force, and it should be viewed as an act of last resort (Andress & Winterfeld, 2013; Rid, 2013). In fact, nations typically employ different strategies before choosing to engage in the use of force, such as diplomatic negotiations with a foreign power or economic sanctions to attempt to produce an outcome (Andress & Winterfeld, 2013; Lancelot, 2020).

These principles are referred to as **jus ad bellum** or the notion of just war as a means to ethically guide conflict and minimize harm as a result of violence in physical settings (Andress & Winterfeld, 2013). Nations can defend their borders, whether on land, sea, or air. There is, however, no single agreed-upon definition for warfare, even among the United Nations. The historical literature on war and warfare tactics, however, suggests that it can be viewed as an act of force or violence that compels the opponent to fulfill the will of the victor (Andress & Winterfeld, 2013; Brenner, 2008; Schwartau, 1996). There are a set of principles that should guide the actions of combatants recognized as the theory of **jus in bello** or how to act in war (Rid, 2013). The **Geneva Convention** and various international laws are currently in place as a means of standardizing rules of engagement that produce the least harm to participants. For instance, the use of chemical or biological weapons can cause extreme physical pain to combatants, easily affect civilian populations, and potentially cause mass losses of life. Thus, there are now multiple international laws and agreements intended to reduce its use in conflicts around the world (Andress & Winterfeld, 2013; Lancelot, 2020).

**For more on the Geneva Conventions and its role in defining the standards for modern warfare, go online to:** <https://ihl-databases.icrc.org/applic/ihl/ihl.nsf/vwTreaties1949.xsp>



Many industrialized nations recognize the threat that cyberattacks can pose to military and governmental infrastructure. Some consider cyberspace to be a new warfare domain just like the various physical spaces in which military operations occur (Andress and Winterfeld, 2013; Rid, 2013). As a consequence, it is necessary to consider how fighting a war in this domain may operate and

what constitutes an act of **cyberwar**. When applied to cyberspace, the use of war tactics appears designed to control and affect the activities of an opposing force. Brenner (2008) defined cyberwarfare as nation-states' "use of military operations by virtual means ... to achieve essentially the same ends they pursue through the use of conventional military force" (p. 65). Thus, the domain of conflict for cyberwar is different from traditional conflicts in that the operations take place in a virtual space (Rid, 2013).

The weapons of cyberwar are also different from those of traditional combat that involves firearms, explosives, and so-called **kinetic weapons** that affect damage to a target. In online spaces, cyberwarfare actors may utilize malware and hacking techniques in order to affect system functionality, access to information, or critical infrastructure (Lancelot, 2020; Rid, 2013). The outcomes and goals of cyberwar, however, are similar to physical war in that fighters may attempt either targeted tactical strikes against a specific target or try to cause as much damage as possible to the operational capacity of a nation-state.

There is no necessary clarity as to whether acts of cyberwarfare must be used in response to physical or cyberattacks (Lancelot, 2020; Rid, 2013). Various nations have stated publicly that they will use physical attacks proportionally in response to certain forms of cyberattack, though there has been little evidence of such incidents occurring in practice (Lancelot, 2020). One of the first such instances was reported on May 6, 2019, when the **Israeli Defense Force** claimed that it bombed a building in Gaza to eliminate a group of Palestinian fighters engaged in a cyberattack against Israeli systems (Newman, 2019). Similarly, the US military reportedly engaged in a cyberattack that disabled Iranian military missile and rocket launchers in June 2019. The attack was launched in retaliation for Iran shooting down a US drone and broader attacks against oil tankers at sea (BBC, 2019).

These incidents highlight the reality that cyberattacks have become an important part of nation-state power, due in part to modern dependencies on technology. Nearly all critical systems in modern industrialized nations depend on the Internet for commercial or logistic support. For example, water and sewage treatment plants, nuclear, hydroelectric, and other power grids are dependent on the Internet for command and control (Rid, 2013). Virtually all facets of banking, stock exchanges, and economic systems are run through the Internet. Even aspects of the military and related defense contractors of the world are run through civilian or commercial telephony (Andress & Winterfeld, 2013). Any attack that could effectively disrupt the communications capacity of the Internet could effectively cripple our society, which would have ripple effects

throughout the real world. At the same time, the sensitive data maintained by government or military agencies could be compromised and/or stolen in order to gain an economic or defensive advantage (Andress & Winterfeld, 2013; Rid, 2013). Thus, hacking sensitive systems would be an easy and immediate way to affect an enemy through cyberwarfare.

Over the last two decades there have been an increasing number of incidents that might practically be viewed as cyberwar (Lancelot, 2020). One of the earliest examples is the conflict between Russia and Estonia in 2007. A conflict developed between Russian and Estonian factions in April 2007 when the Estonian government removed a Russian war monument from a memorial garden in a national cemetery (Brenner, 2008; Jaffe, 2006; Landler & Markoff, 2007). The statue, called The Bronze Soldier of Tallinn, was installed as a monument to the Russian involvement in World War II and was viewed as a relic from Estonia's time as part of the former Soviet Union. Now that Estonia was its own independent nation, the government felt it appropriate to have the statue removed (Guadagno et al., 2010). Russian citizens living in Estonia and elsewhere were enraged by this action, leading to protests and violence in the streets of both countries. Over 1,300 were arrested during protests in Estonia, many of whom were ethnic Russians living in the country.

The conflict quickly grew into online spaces, with hackers in both Estonia and Russia attempting to engage in different hacks and spam campaigns (Brenner, 2008; Jaffe, 2006). Russian hackers also leveraged online forums and hacker sites in order to rally attackers together to increase the volume of their attacks and used huge botnets of compromised computers for DDoS attacks (Clover, 2009; Davis, 2007). The attacks incorporated many individuals who were interested in attacking Estonia out of their love and respect for their homeland, many of whom had little knowledge of computer hacking. As a consequence, Russian attacks were able to shut down critical components of Estonia's financial and government networks, causing significant economic harm to citizens and industry alike (Brenner, 2008; Landler & Markoff, 2007). The Estonian parliament and almost every governmental ministry website were affected. In addition, three of the six national news agencies and two of its largest banks also experienced problems (Clover, 2009). In fact, banks were knocked offline for hours and lost millions of dollars due to DDoS attacks (Landler & Markoff, 2007).

**For more on the transformative impacts of the Russia-Estonia cyberconflict, go online to: <https://www.bbc.com/news/39655415>**



In the wake of this onslaught, the Estonian government accused the Russian government of supporting and encouraging these attacks. To date, there has been no concrete evidence provided to support Russian state sponsorship (Denning, 2010). Many observers, however, have argued this incident is a clear demonstration of how nation-states may engage in conflicts in the future. The actors involved may be driven by their own sense of duty to their country or by actual military doctrine. Regardless, the severity of the attacks demonstrates the need to identify how cyber resources might be affected by conflicts in the real world. In fact, one of the guiding documents for the legal challenges evident in cyberwarfare activities is called the **Tallinn Manual** due in part to these attacks (Lancelot, 2020).

A more recent example is the appearance of a piece of malicious software called **Stuxnet**. This computer worm was used in attacks against the Natanz uranium enrichment facility in Iran (Clayton, 2010; Kerr et al., 2010). Stuxnet was designed to specifically compromise and harm computer systems in order to gain access to the **supervisory control and data acquisition (SCADA)** systems that are used to run the centrifuges and equipment within these plants (Clayton, 2010; Sanger, 2012). Specifically, the code would allow these systems, connected to the Internet, to be given commands remotely by the attacker, while shielding the actual behaviors of the centrifuges from the plant's SCADA control systems. As a result, attackers could surreptitiously disrupt the plant's ability to process uranium and cause confusion among operators and controllers. It is unknown how long the malware was able to operate inside of the facility, though estimates suggest it may have impacted 1,000 of the 5,000 centrifuges in the plant and delayed the overall functionality of the nuclear plant by months or years (Kerr et al., 2010; Sanger, 2012).



### For more information on Stuxnet, go online to:

1. [www.youtube.com/watch?v=n7UVyVSDSxY](https://www.youtube.com/watch?v=n7UVyVSDSxY)
2. [www.youtube.com/watch?v=863SNTqyYto](https://www.youtube.com/watch?v=863SNTqyYto)

Recent evidence suggests that Stuxnet was developed by the United States under the Bush administration as evidence grew regarding the Iranian nuclear program aspirations. The program, called **Operation Olympic Games**, was proactively implemented by an executive order of President Obama because it was thought that this sort of attack would be more targeted, difficult to detect,

and produce fewer civilian casualties or collateral damage than a physical strike (Sanger, 2012). In addition, the use of this code was thought to have reduced the likelihood of a conventional military strike by Israel which would have dangerous consequences for the region as a whole.

The United States has not acknowledged any of the claims made related to Stuxnet, though its release in the wild has given computer security professionals and hackers access to this extremely sophisticated malware. The program may serve as a basis for the development of tools in order to exploit or attack critical infrastructure across the globe (Brodscky & Radvanovsky, 2010; Clayton, 2010). The US Department of Homeland Security (DHS) expressed substantial concern over the use of Stuxnet-like code in attacks against US power installations (Zetter, 2011). Thus, cyberattacks may be an increasingly common way for nation-states to engage one another to cause harm.

**For information on US cyber attempts to attack the North Korean missile program, go online to: <https://www.wired.com/story/cyberattack-north-korea-nukes/amp>**



## The Role of Nation-State Actors in Cyberattacks

Though nations have the capacity to defend their territorial boundaries and sovereignty through force, they face the risk of retaliation from an opposing country. This is true in both physical space and online environments, as noted above. As a result, some **nation-states** may utilize their citizen populations to engage in illegal activities in order to gain either economic or political advantage over another nation (see [Box 11.2](#)). For instance, a nation-state might encourage individual citizens to engage in the theft of trade secrets or intellectual property in order to gain economic advantage over another country they must compete with in the open market (Andress & Winterfeld, 2013; Rid, 2013). The originating nation may provide indirect economic support to actors in order to facilitate their activities, but it does not provide any overt recognition or direct orders that can be traced back to the government. Such actions allow governments to tacitly perform illegal activities without directly evidence of their support for the act.

This is particularly observable in online environments, where foreign governments can take various steps to minimize the likelihood of **attribution**, or association of an attack with their government or military (Rid, 2013). One of the most notable incidents of the last few years involves a major attack against

## Box 11.2 The Use of Civilians in Nation-State Actions

### Putin's Angels: The Bikers Battling for Russia in Ukraine



<https://www.theguardian.com/world/2016/jan/29/russian-biker-gang-in-ukraine-night-wolves-putin>

He and other bikers actively engaged in Russia's covert invasion of Crimea, swapping leathers for body armour; that summer, they joined Ukraine's separatist insurgency.

This article discusses the involvement of a Russian motorcycle gang called the Night Wolves in the recent Russian invasion and annexation of Crimea, a part of Ukraine. The Russian military took part in these actions, though they were supported in part by the Night Wolves as an irregular force. This article highlights the ways that civilians with tacit nation-state backing can help achieve a nation's goals.

Sony Pictures Entertainment in the United States. In 2014, a group calling itself **Guardians of Peace** hacked **Sony Pictures Headquarters** and notified the company of the compromise by flashing a message featuring a red skull on every employee computer stating: “if you don’t obey us, we’ll release data shown below to the world” (Robb, 2014). The hackers used a variety of malware tools to compromise the network, eventually obtaining as much as 100 terabytes of data from the company including personal emails, scripts, and details on all employees.

The hackers dumped massive amounts of intellectual property and personal information online including films that had not yet been released in theaters, details on employee salaries, medical histories, and embarrassing email exchanges between executives regarding various actors and film projects (Robb, 2014). They also threatened Sony employees with physical violence, and eventually any US movie theater if they screened the film “The Interview,” a comedy where two reporters attempt to assassinate North Korean leader Kim Jong-un (Robb, 2014).

While it is possible that these attacks were driven by individual hackers without state support, it is important to note the massive quantity of data acquired by the hackers and the use of somewhat sophisticated attack tools suggest these were no ordinary economically motivated hackers (Zetter, 2016). Additionally,

the fact that they targeted Sony Pictures and made no attempt to sell the information they acquired or blackmail the company but rather dumped it online in multiple batches over time appears to be designed to embarrass the company and its employees (Robb, 2014). The eventual expressed interest of the hackers to keep the company from releasing a film that painted North Korea in a negative light, even including threats of physical violence (Robb, 2014), is more in keeping with the interests of a nation-state rather than that of the larger criminal hacker community that seeks access to sensitive data. Finally, the source of these attacks have some connections to the nation of North Korea, including the use of malware containing Korean-language characters that were identified in subsequent attacks against South Korean targets (Zetter, 2016).

All of these points provide circumstantial evidence that the attacks were the result of state-sponsored actors working on behalf of the North Korean government (Zetter, 2016). The lack of concrete evidence to support the role of the state in sanctioning this activity makes it difficult to identify a clear policy response. It may be best to treat this incident as a crime due to the lack of substantial evidence that the North Korean government ordered this attack to take place. The totality of circumstances would suggest it is something greater than a crime, but the use of a military response may not be appropriate. As a result, the US government engaged in a series of economic sanctions against the North Korean government in retaliation for the attacks (Robb, 2014). As such, the use of actors with no direct ties to a government entity makes it difficult to clearly define this incident as an act of crime, espionage, or war.

## Offensive and Defensive Cyber-Operations

There are three critical aspects of nation-state sponsored activities to affect computer networks, computer systems, and the data they house (Andress & Winterfeld, 2013). The first two focus on offensive activities that nations can take against one another in order to understand or affect their practical operations. The first is **computer network exploitation (CNE)**, referencing the use of various tools and techniques to obtain information about an opposing nation's computer network infrastructure, systems, or data (Andress & Winterfeld, 2013). Attempts to document the Internet-enabled components of a nation's critical infrastructure, inclusive of government, military, and civilian systems fit within this category. For instance, there have been numerous reports over the last few decades regarding Russia and China's attempts to access the US electrical grid (Lancelot, 2020). Similarly, recent reporting suggests the United States

has engaged in the same activities against Russia (Sanger & Perlroth, 2019). These efforts are intended to not only map out where and how their systems work but also assess potential points of compromise and identify footholds into the networks supporting their SCADA infrastructure.



**For more information on nation-state exploitation of power grids, go online to:**

1. <https://www.vox.com/world/2018/3/28/17170612/russia-hacking-us-power-grid-nuclear-plants>
2. <https://www.wired.com/story/berserk-bear-russia-infrastructure-hacking/>
3. <https://www.wired.com/story/russian-hacking-teams-infrastructure/>

Identifying the hardware and software programs used to support a nation are critical in the process of exploitation, as an attacking nation can use this information to map the vulnerabilities that may be present in their system. As noted in Chapter 4, a **vulnerability** is a flaw that can be used to compromise a system through the use of **exploits**, or a piece of code that is written to specifically affect that vulnerability (Andress & Winterfeld, 2013; Taylor, 2001). Since nation-states engage in cyberattacks in ways that will not be immediately identified, they often utilize previously unidentified, or zero-day vulnerabilities and exploits to reduce their likelihood of detection (Rid, 2013).

To do this, nation-states may actively seek out information on vulnerabilities so that they may later be weaponized for attack purposes. For instance, the US government operates a bug bounty program that pays hackers to identify vulnerabilities in all manner of programs (Andress & Winterfeld, 2013). They also operate what is called the **Vulnerabilities Equity Process (VEP)**, which is a high-level review of previously unidentified vulnerabilities performed by representatives of multiple government agencies, including the **National Security Agency (NSA)** (Herpig & Schwartz, 2019). Each vulnerability is reviewed to determine whether it should be reported to the public, or remain undisclosed so that it can be used in attacks by the government.



**For information on the US VEP program, go online to:** <https://www.darkreading.com/vulnerabilities—threats/how-the-us-chooses-which-zero-day-vulnerabilities-to-stockpile-/a/d-id/1333652>

The existence of this program was only made known after a group called **The Shadow Brokers** published a trove of hacking tools and previously unknown vulnerabilities and exploits online (Schneier, 2017). The group claimed to have stolen these materials from the US NSA in 2013, though it is not clear how exactly they obtained them. Regardless, the release of this information enabled hackers to immediately use high-level vulnerabilities in common products, including Cisco Internet routers, and the Microsoft Windows operating system (Schneier, 2017). The vulnerability noted in Windows operating system software went unreported for over five years, and the NSA only notified Microsoft a month before it was disclosed by The Shadow Brokers. Though a patch was released in March 2017 to fix the vulnerability known as **EternalBlue**, many systems remained vulnerable to compromise (Perlroth & Shane, 2019).

Attackers were quick to leverage this vulnerability, and used it in two separate attacks in 2017; the **WannaCry** ransomware in May and **NotPetya** malware in June (see **Box 11.3** for detail). These attacks affected systems around the world and are estimated to have caused over \$1 billion in damages across 65 nations (Perlroth & Shane, 2019). Both forms of malware have links to nation-states, with North Korea thought to have been involved in WannaCry and Russia with NotPetya (Greenberg, 2018). These incidents highlight the

### Box 11.3 The Harm Caused by WannaCry Malware

#### Two Years after WannaCry, a Million Computers Remain at Risk

<https://techcrunch.com/2019/05/12/WannaCry-two-years-on/>



WannaCry spread like wildfire, encrypting hundreds of thousands of computers in more than 150 countries in a matter of hours. It was the first time that ransomware... had spread across the world in what looked like a coordinated cyberattack.

This article provides a brief description of the WannaCry ransomware attack and its relationship to the release of the EternalBlue exploit code developed by the NSA. This piece also notes that there are still millions of computers that are vulnerable to attack through the use of this exploit, demonstrating that security patching is not a perfect solution to security threats.

questionable ethics of nations actively keeping vulnerabilities secret so that they may reserve their use in cyberattacks.

The second offensive action involves so-called **computer network attacks (CNA)**, where various efforts can be taken to either affect the functionality of computer networks and/or data, or to destroy them completely. Attacks like Stuxnet and WannaCry are excellent examples of offensive attacks meant to proactively disable resources within a nation. Distributed denial of service attacks are another excellent example of such an activity, as the attacks make a service unavailable to those who need it. For instance, in 2009, a series of DDoS attacks affected South Korean and US websites associated with both government and commercial entities (Weaver et al., 2009). These attacks rendered various services unusable for periods of time, including the US State Department, the Korean government Assembly and their president's website (Sang-Hung and Markoff, 2009). These attacks ran from July 4 to July 10, which correspond to a North Korean missile launch which occurred on July 4th and the 15th anniversary of the death of the North Korean dictator, Kim Il Sung on July 8th (Sang-Hung and Markoff, 2009). These factors, along with forensic analysis results, suggest that North Korean government actors may be to blame for these attacks (Zetter, 2016).

Another key example of offensive attack operations to affect military targets was identified in 2016 by researchers examining the activities of Russian state sponsored hackers (Volz, 2016). The Russian military intelligence has been linked to an attack against the Ukraine Army's Howitzer artillery equipment. These cannons are able to fire large scale shells to cause serious harm to ground-based targets. The Howitzers operate based in part on targeting information provided by an Android-software application created by a legitimate source (Volz, 2016). Evidence suggests Russian attackers hid a piece of malware in versions of the application and posted it online in places that Ukrainian soldiers were likely to visit and download it for use in the field. The malware enabled Russian military actors to trace the physical locations of the users via the application, and in turn, better target those systems with physical attacks (Volz, 2016). Reporting on the equipment losses due to direct attack suggests that these Howitzers were more likely to be disabled or destroyed since the malware was in the field.

The final activity involves defensive actions on the part of governments and military organizations, referred to as **computer network defense (CND)**. This term encompasses the range of strategies nation-states can employ to protect networks and data from harm, inclusive of software and hardware solution

## Box 11.4 Understanding the Risk of Social Engineering as a Tool for Cyberattack

### Warning as Iranian State Hackers Target LinkedIn Users with Dangerous New Malware

<https://www.forbes.com/sites/zakdoffman/2019/07/22/critical-linkedin-warning-as-irans-hackers-send-fake-invites-laced-with-malware/?sh=4be8a45c6ac1>



The campaign has been targeting LinkedIn users with plausible but bogus invitations to join a professional network and emailed attachments laced with malware that seeks to infect systems with a hidden backdoor and steal data and credentials.

This article provides an overview of a phishing and cyberattack scheme implemented by the Iranian military to target Western nations. The author describes the methodology of the attackers and highlights that nation-state hackers will constantly evolve their methods to improve their likelihood of success.

like firewalls and antivirus software (Andress & Winterfeld, 2013). Additionally, educational campaigns are essential to help reduce the risk that individuals respond to phishing emails, compromised applications, and social engineering campaigns targeting people through both internal and external systems like social media (see Box 11.4 for example).

Network defense is arguably the most challenging component of cyberwarfare, as there is no single solution to minimize the threat from nation-state actors (Andress & Winterfeld, 2013; Rid, 2013). Attacks can take multiple forms, and most nation-state groups will utilize attack strategies that are extremely difficult to identify while they are happening (Volz, 2016). Defenders must also recognize all the different surfaces they have to protect, from computers to mobile devices to weapons systems that utilize computers. Finally, military and government systems are connected to civilian companies and infrastructure through employees and contracting relationships (see Box 11.5; Andress & Winterfeld, 2013). As a result, network defenders must design strategies that incorporate those networks and minimize the potential that attackers access their systems through private targets.

## Box 11.5 Small Businesses Matter in Military Cybersecurity Planning

### Hawaii Wants to Form a Defense Industry Alliance for Local Businesses



<https://www.civilbeat.org/2021/02/hawaii-wants-to-form-a-defense-industry-alliance-for-local-businesses/>

“We’re kind of the connective tissue that brings those folks together, where it’s the local officials, academia, industry, and the military,” he said.

The military already works closely with the University of Hawaii. The Air Force pays for UH’s Maui High Performance Computing Center and the Navy helped create its Applied Research Lab at UH Manoa.

This article provides an overview of a plan being developed in Hawaii to help connect businesses more directly to the military entities operating within the state. Despite its small size and remote location, Hawaii is just behind Virginia for defense spending as a driver for its local economy. Thus, the state is seeking a way to help businesses tap into the defense industry, particularly around cybersecurity.

National network defense strategies are also not prominently advertised or explained in order to minimize their potential to be defeated by attackers. Despite this challenge, one of the more prominently acknowledged strategies for network defense in the United States is a program called **EINSTEIN**. This system was designed to engage in proactive intrusion detection of government systems and potentially isolate those attacks in process (CISA, n.d.). It is currently housed within the **Department of Homeland Security Cybersecurity and Infrastructure Agency (CISA)**, as a means to protect the civilian agencies within the US government.

Though extremely complex in operation, the EINSTEIN program appears to operate by examining the general Internet traffic within civilian government agencies and utilizing this information as a means to establish a baseline for traffic patterns (CISA, n.d.). When Internet traffic deviates from that norm, the system can then consider if this constitutes an anomaly and is potentially

## Box 11.6 The Challenge of Using Active Defense Tools in Practice

### Why the “Biggest Government Hack Ever” Got Past the Feds

<https://arstechnica.com/information-technology/2015/06/why-the-biggest-government-hack-ever-got-past-opm-dhs-and-nsa/>



Put simply, as new capabilities for Einstein are being rolled out, they’re not keeping pace with the types of threats now facing federal agencies. And with the data from OPM and other breaches, foreign intelligence services have a goldmine of information about federal employees at every level of the government.

This article provides a brief exploration of the ways that the use of the US EINSTEIN system failed to stop the Office of Personnel Management breach, which caused millions of pieces of personal data to be lost. The piece notes that the attack techniques used by nation-state actors can easily blend in with general Internet use patterns, making it difficult to identify them while they occur. The article also provides an excellent explanation of the reasons why cyberdefense requires constant revision to keep pace with changes in attack practices over time.

malicious. At that time, the system can actively attempt to actively mitigate this traffic in different ways and share that information with the whole of the government to minimize future attacks from being successful (CISA, n.d.). Such active surveillance is extremely important but is not a perfect solution to stop all attacks (see Box 11.6 for more detail). As a result, there is a need for constant updating and improvement of security measures to minimize the likelihood of successful attacks.

## Information Warfare Campaigns Online

Besides overt or covert cyberattacks, governments are increasingly using cyberspace as a platform to engage in **information warfare** campaigns against various nations. Information warfare involves the use of information and communications technology to gain advantage over an opponent and can involve multiple strategies to collect information from an opponent

## Box 11.7 How the Creative Arts Can Be Used for Disinformation and Misinformation

### The Artists Who Outwitted the Nazis



<https://www.bbc.com/culture/article/20210223-the-artists-who-outwitted-the-nazis>

In the new age of aerial surveillance, camouflaging troops was a critical necessity, and with their insights about light, shade and perspective, painters and sculptors had just the talents for the job. For the first time, artistic skills became weaponised.

This article provides an overview of the ways that artists and theatrical tricks were used by Allied forces to create optical illusions to fool Axis military forces during World War II. There is also a discussion of the so-called Ghost Army, a division of US special troops, who created inflatable tanks and equipment coupled with artificial lights and sounds to suggest entire battalions of soldiers were on the move. This disinformation was invaluable to fool Nazi and Axis forces and shift focus from the actions of real troops. Readers will benefit from this information to better understand the role of information warfare in combat.

or spread your own information (Andress & Winterfeld, 2013). Nations can use print media, radio, television, and other methods to further their interests and spread false information, called **disinformation** (see Box 11.7 for detail). The Internet has become a critical resource to spread disinformation quickly, efficiently, and with minimal attribution in order to either manipulate or demoralize a nation and its populace (Andress & Winterfeld, 2013). Since most people now find news stories online, whether through traditional news media sources or via social media sites like Facebook, governments can leverage this as a resource to engage in campaigns of misinformation or disinformation.

For instance, there is substantial evidence that the Russian government operates a “troll factory” out of St. Petersburg where individuals are paid to actively create and spread false information, whether through social media posts, comments in news stories and videos posted on traditional journalistic outlets, or via websites created by the trolls themselves (see Box 11.8 for detail, Keneally,

## Box 11.8 Inside the Russian Troll Organization

### The Agency

<https://www.nytimes.com/2015/06/07/magazine/the-agency.html>



One Russian newspaper put the number of employees at 400, with a budget of at least 20 million rubles (roughly \$400,000) a month. During her time in the organization, there were many departments creating content for every popular social network.

This article exposes the existence and operation of “The Agency,” wherein a group of people are paid to engage as professional online trolls for the benefit of the Russian government. The depth of their efforts is unparalleled and affects various nations in ways that no one could necessarily appreciate on the surface. This is required reading to understand the depth of the Russian information warfare apparatus.

2017). The individuals engaged in this effort are referred to as **trolls** as a historical reference to individuals who actively seek fights and cause trouble in online platforms. They also operate covertly through false online profiles that attempt to make the user seem like a citizen of a specific place and a true believer in a specific ideology in order to make their arguments more compelling and believable to others (Helmus et al., 2018; Timberg, 2016). In turn, trolls seek to turn average people against their governments or against their fellow citizens in order to sew mistrust and discontent and challenge the ability of a nation to be effectively led.

The Russian troll brigade is thought to have actively engaged in a long campaign of misinformation to interfere in the 2016 US presidential election. Throughout the election, there were various news stories and websites designed to spread deliberately false information about the Democratic candidate Hillary Clinton to diminish the perception she was fit to serve. These stories quickly took on the moniker of **fake news** in an attempt to delineate their fictitious nature and differentiate it from news from traditional news stories (Higgins, 2016). For instance, stories were posted on fake websites and social media claiming that Hillary Clinton promised to give amnesty to all undocumented immigrants who could prove they voted Democrat in the election (Rogers & Bromwich, 2016).

The generation of fake news was furthered in part by the actions of Russian nation-state sponsored hacker groups who used a phishing scheme to gain access to the email accounts used by members of the Democratic National Committee and the Clinton campaign (Pegues, 2018). This effort was successful and led hackers to gain access to a trove of emails containing both banal and sensitive information related to both the campaign and then-candidate Clinton's activities (Pegues, 2018). These messages were slowly released via the websites DCLeaks and WikiLeaks beginning in June 2016 and continuing through November in the run-up to the election in order to negatively affect the public's view of her ability to do the job (Morning Edition, 2019).

These steady but slow and small releases of information, coupled with fake news stories that went viral on various social media platforms, had a deleterious effect on a portion of the voting public's views. The insidious nature of these interactions cannot be understated and have had lasting impacts on more than just the candidates. For instance, a staffer on the Clinton campaign named Seth Rich was murdered during what appeared to be a failed street robbery on July 10, 2016 shortly after the first releases of emails from the hack (Kroll, 2020). Three days after his death, whatdoesitmean.com posted a claim that he was killed by assassins working on behalf of the Clintons to keep him from talking to the FBI about their corrupt practices. An intelligence brief was published on the same day giving the same basic details by the Russian SVR, the equivalent of the US CIA (Morning Edition, 2019). The concordance of these events suggests that the story was a plant by Russian intelligence services, but it gained extreme attention on social media and mainstream press, particularly Fox News opinion shows (Kroll, 2020). The story has been debunked in various outlets, though it continues to circulate and has caused dramatic harm for his surviving family members (Kroll, 2020).



**For more on the involvement of Russian state sponsored hackers in disinformation campaigns during the 2016 election, go online to:**

1. <https://www.theguardian.com/technology/2016/jul/26/dnc-email-leak-russian-hack-guccifer-2>
2. <https://time.com/4600177/election-hack-russia-hillary-clinton-donald-trump/>
3. <https://time.com/5168104/mueller-indictment-russia-troll-factory-help/>

## Box 11.9 The Role of Russian Hacking in Climategate?

### Seven Years before Russia Hacked the Election, Someone Did the Same Thing to Climate Scientists

<https://www.motherjones.com/politics/2017/12/climategate-wikileaks-russia-trump-hacking/>



At the time, some observers openly wondered whether Russia might have orchestrated the Climategate hack. Investigators and other experts haven't found much to support that hypothesis—the true culprit remains a mystery.

This article explains that in 2008, a university research group examining climate change had their email accounts hacked. The information released in that hack eventually led to a wide focus on discrediting the science behind climate change, due in part to the ways that the scientists referred to their work. Years afterward, analyses suggest that these leaks link back to Russian actors, though the exact reason for such an incident remains the subject of speculation. The fact that the release of private emails and the ensuing disinformation campaigns they produced highlight the utility of disinformation in order to advance a cause.

Though this was the first demonstrated instance of a coordinated nation-state-backed attempt to influence political outcomes in the United States, there is evidence that Russia has had a long involvement in disinformation to affect public opinion (see [Box 11.9](#) for detail). The troll brigade has engaged in a long-standing campaign to destabilize European political order to increase Russian power within the region (Helmus et al., 2018; Higgins, 2016). There have been repeated attempts to influence German voters' views, as well as the population of Finland that directly borders Russia. They have also attempted to whitewash and legitimize the Russian invasion of the Ukraine via fake news, propaganda, and trolling (Helmus et al., 2018).

The persistence and prevalence of false news stories, conspiracy theories, and misleading comments online led the European Union (EU) to create a specialized task force designed with the express purpose of identifying the Russian campaign's strategies and exposing them to the public (Trans European Policy

Studies Association (TEPSA), 2016). The **EEAS East StratCom Task Force** was created in March 2015 by the European Council to provide information to the EU and its member states on the extent of Russian disinformation campaigns. They publish the **Disinformation Review** every Thursday to show the latest examples and trends in Russian trolling, as well as daily updates on the practices of Russian media broadly (TEPSA, 2016).



For more information, go online to: <https://euvdisinfo.eu/disinfo-review/>

The use of disinformation is not limited only to Russia, as many other nations have found success in the use of social media and online news in order to affect public opinion (see **Box 11.10** for detail). Recent evidence from Facebook and Instagram noted that both French and Russian disinformation campaigns have

### **Box 11.10 How Nations are Using Disinformation to Their Benefit**

#### **Are China and Iran Meddling in US Elections? It's Complicated**

<https://www.vox.com/21418513/china-iran-us-election-meddling-russia>

“I would expect each country to follow a different playbook, just because they have different approaches to foreign policy,” Darrell M. West, vice president and director of Governance Studies at the Brookings Institution, told me. “And China and Iran already know that everybody’s watching how Russia does it. I don’t think they just want to repeat that.”

This article highlights the ways that China and Iran are adapting disinformation and persuasion campaigns to online spaces in ways that suit their needs. The writer notes that Russia has a very specific strategy for affecting foreign policy, though it is not necessarily useful for all nations to employ in the same way. This article highlights the ways that China’s strategy will differ in a global context and how it will work to their greater benefit.



been active on their platforms targeting multiple African nations beginning in 2019 (Timberg & Dwoskin, 2020). These efforts appear targeted toward affecting election outcomes in the Central African Republic as well as the surrounding nations on the continent. Similarly, China has been engaged in a persistent campaign of targeted misinformation in Hong Kong due to their attempts to democratize and separate from China (Goh, 2019). They also attempted to affect presidential elections in Taiwan in the hopes of installing a pro-China candidate (Kirby, 2020). These developments demonstrate that information warfare is a real, powerful, insidious, and ultimately challenging form of cyberwarfare for any nation to defeat.

## Securing Cyberspace from the Threat of Cyberwar

The threats posed by cyberwarfare efforts requires us to understand the scope of military and government organizations tasked with defending national resources and engaging in proactive offensive efforts against other governments. Since many of their activities may be classified, it is difficult to know exactly what organizations involved in this space may do or how they are truly structured. Thus, this section will provide an overview of the publicly acknowledged organizations involved in offensive and defensive actions in cyberspace. Additionally, this section will largely focus on the military agencies involved in protecting cyberspace from nation-state targets. A limited discussion of the federal civilian organizations will be presented to avoid redundancy, as the role of agencies like DHS in protecting critical infrastructure from attack from terrorists and nation-states alike is discussed in [Chapter 10](#).

Given the substantial risks presented by the loss of electrical power to civilian and military infrastructure in the event of a cyberattack, the US [\*\*Department of Energy \(DOE\)\*\*](#) plays a critical role in the maintenance and protection of energy programs and production generally. Most nations' power grids are heavily dependent on the Internet and computer technology for operation and management, making them susceptible to compromise (Department of Energy, 2020). Thus, the DOE operates the Office of Intelligence and Counterintelligence in order to generate intelligence on various threats to our energy infrastructure, as well as those of foreign governments and nations. The DOE also operates an Incident Management Program, coordinated with US-CERT (Computer Emergency Response Team, see [Chapter 2](#)), to respond to various cyberthreats (DOE, 2021). This includes reporting incidents, generating security bulletins for vulnerabilities in various desktop and SCADA systems, as well as incident response management and tracking (DOE, 2021).

Additionally, the newly formed DOE **Office of Cybersecurity, Energy Security, and Emergency Response** (CESER) is designed to improve the overall response to the security of the nation's overall energy infrastructure by creating a coordinated hub for responses to both natural disasters and human-driven attacks (Office of Cybersecurity, Energy Security, and Emergency Response, 2021). One of the key elements of this office is the Cybersecurity for Energy Delivery Systems (CEDS) Division, which provides support for research and development of tools to increase the resiliency of the energy infrastructure of the country. This includes a focus on strengthening the capabilities of the various public and private energy providers to share information on cyber-threats, and enhance their ability to engage in incident responses in the event of an attack (Office of Cybersecurity, Energy Security, and Emergency Response, 2021). They even hold the CyberForce Competition, wherein college students engage in the simulated attack and defense of a simulated energy infrastructure, while also trying to maintain the usability of the infrastructure for simulated customers (DOE, 2020).

Though law enforcement has general oversight over cybercrimes and incidents of terror, the military has exclusive response to acts that might be defined as cyberwar, such as attempts to compromise DoD networks or those of related defense contractors. To that end, the Pentagon established the **US Cyber Command (USCYBERCOM)** in 2009 in order to manage the defense of US cyberspace and critical infrastructure against attacks (Andress & Winterfeld, 2013). It was initially located under the US Strategic Command until 2018 when it became its own full and independent Command body (US Cyber Command, 2021). All four arms of the US military (Army, Navy, Air Force, Marines) are represented on what are called Joint services within the Command. Its focus is on DoD networks only, while all civilian aspects of cyberspace are managed by the DHS.

The Command has a primary responsibility to centralize and coordinate the defensive and offensive efforts of the information security space for the Department of Defense in all areas. In fact, there are four separate teams within USCYBERCOM for (1) general network defense, (2) tailored priority threat defense for specific aspects of the DoD infrastructure, (3) offensive attacks, and (4) mission support for offensive and defensive teams via analysis and planning (US Cyber Command, 2021). USCYBERCOM also operates the Technical Outreach division, which acts as an engagement arm for the Department of Defense to industry and researchers working in the field of cybersecurity and workforce development. They attempt to develop resources to improve the

capabilities of warfighters in both attack and defensive operations (US Cyber Command, 2021). Additionally, USCYBERCOM cooperates in the X-Force program, which provides internships and fellowships for undergraduate and graduate students to participate in projects related to cybersecurity and work-force development (US Cyber Command, 2021).

The Department of Defense also operates the DC3, or **Department of Defense Cyber Crime Center**, which is focused on handling digital and media forensic analyses, as well as training and technical development for various elements of the government and defense industry. Specifically, the Cyber Forensics Laboratory (CFL) performs various forms of forensic analysis for materials identified in the field on both hardware and software, as well as on sensitive networks (DC3, 2021). The Cyber Training Academy also operates to produce training for various arms of the DoD in forensic seizure and analysis, as well as network attack and defense. The Technical Solutions Development team produces new software and hardware for the military and defense contractors as needed to help better engage in threat identification and response (DC3, 2021).

The Vulnerability Disclosure Program (VDP) also operates within the DC3 as a means to identify vulnerabilities within the DoD infrastructure and increase its resiliency to various attacks. Finally, the Center houses the Defense Industrial Base Collaborative Information Sharing Environment (DCISE), which provides security and training for various defense contractors to improve the security of intellectual property moving between private industry and military or government systems (DC3, 2021). This is a critical aspect of cybersecurity to help shore up the defense of potential vulnerabilities in the connection between government, military, and industry networks.

In addition to the DoD, the NSA plays a critical role in the protection and investigation of attacks against sensitive military networks (NSA, 2021). The NSA serves as a key resource in both data encryption and protection of nearly all federal government computer networks. They also investigate attacks against computer networks from nation-state and non-nation-state actors alike (NSA, 2021). Finally, they play a critical role in intelligence gathering of foreign nations' cyber infrastructure in order to map vulnerabilities and develop offensive cyber strategies (see **Box 11.11** for examples of tools developed by the NSA). The NSA combines agents with skills in computer science, engineering, mathematics, and linguistics in order to better investigate various issues related to cybersecurity threats. Similar agencies are present in various nations, such as Australia's Defence Signals Directorate (DSD), Canada's Communications Security Establishment (CSE), New Zealand's Government Communications

### Box 11.11 The Tools Created by the NSA for Espionage and Attack

#### Everything We Know of NSA and Five Eyes Malware



<https://medium.com/@botherder/everything-we-know-of-nsa-and-five-eyes-malware-e8eac172d3b5#.cw0vpzc84>

After years of publications, and even a massive commercial speculation... it comes to no surprise that Western governments are also engaged in malware attacks. However, we still know very little on their capabilities and sophistication.

This article provides an overview of all the malware and tools that were disclosed by Edward Snowden in the large dump of NSA documents he made available to reporters. This analysis details myriad programs used for both active surveillance and cyberattacks. The scope of tools and the systems they compromise is extremely surprising and demonstrates the technical sophistication of some of the programs used to various ends in the wild.

Security Bureau (GCSB), and the UK's Government Communications Headquarters (GCHQ; see Andress & Winterfeld, 2013).

The development of USCYBERCOM emerged around the same time as those of other similar command infrastructures across the world. Most countries across the globe now have some units within their military or national defense forces that engage in practical network defense (Lancelot, 2020). The extent to which nations engage in offensive cyberattacks is variable, with different degrees of publicly accessible information on their operations. For instance, Australia established the Cyber Security Operations Centre (CSOC) in 2009 as a co-ordinated response for cyberattacks against government systems. Canada and the United Kingdom have established similar agencies in order to help defend against attacks (Andress & Winterfeld, 2013).

Cyberwarfare operations units have spread across Asia as well, though with varied composition by nation. For instance, the Chinese government has established both offensive and defensive military organizations housed within so-called Information Warfare Militia Units, Technical Reconnaissance Bureaus (TRB), and the GSD (Andress & Winterfeld, 2013). At the same time, these forces may be augmented by the larger population of active hackers operating

within the bounds of the nation with or without state sponsorship. India also recently formed the Defense Cyber Agency within its military with the responsibility of engaging in largely defensive measures of the nation's infrastructure. Japan, Singapore, South Korea, Sri Lanka, and Vietnam also have cyberwarfare capabilities. In addition, North Korea has engaged in far more overt offensive operations against nations around the world (Andress & Winterfeld, 2013). Incidents like the Sony Pictures Entertainment hack, if truly performed by North Korea, would suggest they have substantive capabilities that must not be taken lightly.

The Russian government also has cyberwarfare capabilities that are housed within the Federal Security Service of the Russian Federation, the Federal Guard Service, and the General Staff (Andress & Winterfeld, 2013). Various nations in the EU have also formed offensive and defensive cyberwarfare units. For instance, France, Germany, Italy, the Netherlands, Poland, Portugal, Romania, and Spain have resources within their national defense forces and military. Similarly, the **North Atlantic Treaty Organization (NATO)**, which formed in the wake of World War II to provide a joint operational military alliance for the United States and Europe, has become increasingly involved in cyberwarfare (NATO, 2021). The organization has focused heavily on cyber defense for its networks and that of the broader alliance countries, particularly across the EU. Additionally, NATO has formed the Cooperative Cyber Defense Centre of Excellence in Tallinn, Estonia as a resource to train member nations in various aspects of cyberwarfare and improve the overall intelligence sharing and resilience of its networks (NATO, 2021). Member nations also engage in yearly cyberwar games as a means of testing their readiness for various attacks and improve their capacity to engage in active defensive and offensive tactics.

## Summary

This chapter demonstrates the complex and very real threat that is posed by acts of cyberwarfare, and the inherent challenges in defending networks from nation-state sponsored attacks. These threats require a sophisticated response incorporating civilian and military entities to be effective against compromise. The fact that nation-states can also twist the information-driven nature of the online communications to their advantage also complicates the process of active defense. This issue will continue to evolve along with technology adoption and social media platform use across the globe. It is, however, clear that cyberwarfare incidents will increase in the coming years.

## Key Terms

Abstract organization  
Advanced Persistent Threat (APT)  
Attribution  
Computer network attack (CNA)  
Computer network defense (CND)  
Computer network exploitation (CNE)  
Cyberwar  
Department of Defense Cyber Crime Center  
Department of Energy (DOE)  
Department of Homeland Security Cybersecurity and Infrastructure Agency (CISA)  
Disinformation  
Disinformation Review  
EEAS East StratCom Task Force  
EINSTEIN  
EternalBlue  
Exploit  
Fake news  
Geneva Convention  
Guardians of Peace  
Information warfare  
Israeli Defense Force  
Jus ad bellum  
Jus in bello  
Kinetic weapons  
Nation-state  
National Security Agency (NSA)  
North Atlantic Treaty Organization (NATO)  
NotPetya  
Office of Cybersecurity, Energy Security, and Emergency Response  
Operation Olympic Games  
People's Liberation Army of China (PLA)  
The Shadow Brokers  
Sony Pictures Headquarters

Sovereignty  
Stuxnet  
Supervisory control and data acquisition (SCADA)  
Tallinn Manual  
Territoriality  
Troll  
US Cyber Command (USCYBERCOM)  
US Office of Personnel Management (OPM)  
Vulnerability  
Vulnerabilities Equity Process (VEP)  
WannaCry

## Discussion Questions

1. Do you think it is acceptable for nations to reserve the right to report critical vulnerabilities to the public? How do you weigh the risks of harm relative to the benefits of using them in a potential attack scenario?
2. What real-world events, whether political, military, or social, could trigger a cyberattack?
3. Why do you think incidents like the Sony Pictures Hack or the Russian trolling operations do not lead to more substantial policy responses from the United States? Is it too difficult to find an appropriate response? What do you think would be acceptable?
4. The threat of nuclear war and the proliferation of weapons of mass destruction (WMD) is deterred in part by the idea of mutually assured destruction, not only for the two nations but for the larger world. Given that nearly every nation has economic and critical infrastructure dependent on technology, if a nation-state were to engage in cyberwar against a rival, it would demand a physical or cyber response. With that in mind, how can nation-states deter the use of cyberattacks against one another? How do we respond to attacks committed by hackers or nation-states who are not influenced by traditional deterrence methods?

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Chapter

**12**

# **ILLICIT MARKET OPERATIONS ONLINE**

## Chapter Goals

- Define and differentiate open and closed markets in both physical and cyberspace
- Discuss the transitions in online market operations from bulletin board systems (BBS) to Internet Relay Chat (IRC) to forums and the Dark Web
- Recognize the process of selling and purchasing goods and services from vendors advertising physical and digital goods through online advertisements
- Identify the differences between forums, shops, and cryptomarkets
- Understand the myths regarding illicit services advertised on the Dark Web

## Introduction

In February, 2021, a Wisconsin mother of four named Kelly Harper was arrested by FBI agents after attempting to hire hitmen to kill a man (Rickert, 2021). The intended victim was notified of the plot by journalists after they uncovered the plot, who then contacted the FBI. The journalists involved in this case were not attempting to uncover a shadowy network of hitmen operating in their local area (Rickert, 2021). Instead, they were doing research on the practices of Dark Web vendors and were interviewing an individual who claimed to run a hitman site. The operator provided the journalists with chat logs, including an exchange between themselves and an individual who paid them \$5,633 in Bitcoin, a cryptocurrency, to kill the unnamed victim (Rickert, 2021). The reporters involved received substantial details about the victim, including a physical description, his phone number, address, workplace, and information about their car. They were also able to deduce the person who paid for the services was Kelly Harper, which led them to contact law enforcement.

Events like these demonstrate the scope of illicit market operations occurring every day in online spaces. As noted in [Chapter 5](#), the Internet has created unparalleled opportunities for commerce, whether between major corporations or retail establishments. The same is true for small businesses and individuals who make and sell various goods. Websites like eBay, Craigslist, and even Facebook Marketplace also allow individuals to sell used or new items to others both locally and globally.

Criminals have seized upon the communications, finance, and retail tools made available to the public in online spaces to create a parallel economy, trading goods, and services in ways that mirror legitimate business practices (Barratt, 2012; Holt et al., 2016; Martin, 2014). As explained in prior chapters, there is now an entire cybercrime-as-service economy operating online for hacking tools and personal data. It should also come as no surprise that goods and services formerly offered only in physical spaces, like narcotics and paid sex work, are now available in online spaces on both the Open and Dark Web.

There are multiple questions as to how these economies can coexist and the extent to which they intersect with offline illicit markets. In addition, it is essential to ask whether services like contract killing and other serious crimes actually advertise online and why. This chapter attempts to address these questions through an assessment of the existing body of research on both offline and online criminal markets. In turn, readers will be able to identify both the realities and myths that perpetuate regarding criminal goods and services online and better understand the challenges they present for law enforcement and policy makers.

## Differentiating Physical and Virtual Markets

Criminologists and sociologists have long examined the ways that individuals engage in the sale of illicit goods, whether in illicit sex work (e.g., Scott & Dedel, 2006; Weitzer, 2012), firearms (Cook et al., 2009; Kennedy et al., 1996), the resale of stolen goods (Klockars, 1974; Schneider, 2005; Wright & Decker, 1994), and all manner of illegal drugs (Jacobs, 2000; May & Hough, 2004; Turnbull, 2002). Scholars have also considered differences in the practices of vendors on the basis of their role as street-level dealers to those in middle tiers of distribution (Adler, 1993; Jacobs, 2000; Potter, 2009).

Researchers have also noted the unique structures illicit market operations can take in physical spaces. Many simple forms of transactional crime occur in public venues, including street corners and alleys as with drug sales (Jacobs, 1996, 2000; Johnson et al., 2000; Johnson & Natarajan, 1995; Knowles, 1999; Topalli et al., 2002; VanNostrand & Tewksbury, 1999) and prostitution (Holt et al., 2014; Scott & Dedel 2006; Weitzer, 2012). Such activities enable buyers to gain access to vendors with no necessary introductions or immediate restrictions on behavior. When customers and vendors interact in such environments, they may be referred to as **open markets** (Eck, 1995; May & Hough, 2004). Such activities are highly risky for both buyer and seller, as their actions

may be observed by law enforcement, as well as other criminals who target participants for drugs, guns, or money (Jacobs, 1996, 2010).

Participants within open markets can take various steps to reduce their risk of detection and minimize negative sanctions stemming from arrest or informal threats like robbery by other criminals (Cross, 2000; Jacobs, 1996, 2000; Johnson et al., 2000; Johnson & Natarajan, 1995; Knowles, 1999; Topalli et al., 2002; VanNostrand & Tewksbury, 1999). For instance, drug dealers may hide small quantities of product in their mouths so as to quickly swallow it if they are detected by police (Jacobs, 1996). This reduces their likelihood of drugs being confiscated if they are patted down and minimize any criminal penalties if they are arrested for dealing (Jacobs, 1996).

The risks participants face from police efforts and other criminal actors have led to the formation of what some refer to as **closed markets**, where transactions only occur between known, trusted participants (Johnson et al., 2000; May & Hough, 2004). This phrasing recognizes that participants restrict access to goods and services on the basis of some sort of social vetting by others. Closed markets may operate behind closed doors, as with crack houses or other residence-based markets, though they may also operate in public spaces with efforts taken to hide their overt illicit activities (Hamid, 1998; Johnson et al., 2000; May & Hough, 2004). There are distinct benefits to closed markets, in which participants assume less risk from outsiders. At the same time, they reduce opportunities for vendors to engage in spontaneous transactions with strangers, which may increase their overall market share (May & Hough, 2004). These conditions also limit opportunities for customers in the event of problems with sellers or their products over time.

Regardless of structure, the participants in illicit markets face some degree of risk from formal and informal sources. To help assess risk and gage the legitimacy of participants, actors in open and closed markets can also use both verbal and nonverbal cues to determine whether it is safe to engage in a transaction with that person (Jacobs, 1996, 2000; Johnson & Natarajan, 1995). For instance, individuals who are unable to correctly use any slang terms to refer to a product may be viewed as an outsider who cannot be trusted (Jacobs, 1996; Johnson & Natarajan, 1995). Individuals who also attempt to buy large quantities of drugs or pay in unusual denominations may also appear too risky to sell product to, even if they are regular clients (Jacobs, 1996; Knowles, 1999).

Comparing these dynamics to the behaviors of participants in virtual markets, one may assume that they are completely different. For instance, virtually all participants in online markets can operate with greater anonymity than in

physical spaces (Barratt, 2012; Holt & Dupont, 2019). The ability to operate in a faceless, nameless environment that is difficult to monitor makes it difficult for participants to be tied to their real identities (Barratt, 2012; Décaire-Hétu & Giommoni, 2017; Tzanetakis et al., 2015). Individuals can also use tools to hide their physical location as revealed by their IP address details through the use of virtual private networks (VPNs), proxy servers, or other anonymization tools like Tor (Holt et al., 2016; Smirnova & Holt, 2017).

Additionally, the process of making purchases in virtual markets is very different from that of physical markets. Sellers are limited in how they connect with vendors, as they must make contact through electronic means like forum posts, email, or chat-based applications (Barratt, 2012; Dupont et al., 2017; Hutchings & Holt, 2015). They must state in writing what quantities of product they want, and negotiate prices through these mediums (Holt & Lampke, 2010; Tzanetakis et al., 2015). Once a negotiation is completed, buyers must then pay the vendor. In physical space, this is usually done via paper currency; virtual markets depend on digital currencies to send and receive payments (Holt & Dupont, 2019; Moeller et al., 2017).

Finally, the delivery of goods in online illicit markets is very different from what is observed in real-world markets. Upon receipt of payment, vendors in online spaces are then expected to provide the goods to the buyer, though delivery varies based on the nature of the product (Copeland et al., 2020; Herley & Florêncio, 2010). Individuals buying credit card numbers, personal information, or other digital items, such as hacking tools, may receive them via a direct download or other method of online delivery. Physical goods like drugs or guns are typically shipped via physical delivery services like Federal Express, UPS, DHL, or various postal services (see [Box 12.1](#); Copeland et al., 2020; Décaire-Hétu et al., 2016).

Despite these differences, there are some similarities evident in the practices of online market actors. First and foremost, participants in online illicit communities face risks from law enforcement and criminal actors who may seek to harm participants (Décaire-Hétu et al., 2016; Holt & Dupont, 2019). The inability to use visual cues complicates the process of identifying individuals who may be undercover law enforcement, or even cybersecurity researchers posing as potential customers. Additionally, unreliable actors who seek to rip off customers by taking their money and sending no product can easily pose as vendors in markets (Herley & Florêncio, 2010; Tzanetakis et al., 2015).

As a consequence, participants in online markets are heavily dependent on the use of nonverbal cues to determine the legitimacy of potential actors. Text,

### Box 12.1 How Drug Dealers' Use of Shipping Services Can Lead to Arrest

#### Onetime UI Grad Student Facing Federal Charges of Making, Selling Drugs



[https://www.news-gazette.com/news/onetime-ui-grad-student-facing-federal-charges-of-making-selling-drugs/article\\_39502acf-ecbb-56a4-a1f4-91e876e9ca72.html](https://www.news-gazette.com/news/onetime-ui-grad-student-facing-federal-charges-of-making-selling-drugs/article_39502acf-ecbb-56a4-a1f4-91e876e9ca72.html)

... the government alleges that between September 2016 and this past weekend, Caamano was engaged in the production of counterfeit Xanax, an often-abused anti-anxiety drug, which he was mailing from U.S. Postal Service boxes in Champaign to other states, using an EasyPost account.

This article provides an excellent overview of how an individual selling drugs online was arrested, due in part to the detection of drugs as they were in transit. Though there is anonymity in online environments, it is much harder to remain anonymous when products have to be delivered to a physical address. As a result, this is a key point of risk in the process of online illicit good sales.

images, and slang appearing in websites, email, and other forms of online communications used by vendors and customers are essential when considering the validity of an ad, or a customer request (see Figures 12.1 and 12.2; Décaray-Hétu et al., 2016; Herley & Florêncio, 2010; Tzanetakis et al., 2015). Correct use of language and images that are not taken from other websites or online sources are all useful to establish an actor's legitimacy.

In addition, some markets encourage customers to post reviews of vendors' goods and their overall operational practices to identify illegitimate actors. Forum communities on both the Open and Dark Web tend to encourage customers to post reviews describing their interactions with vendors on the basis of their communications, delivery methods, customer service and other factors associated with a transaction (Décaray-Hétu & Leppänen, 2015; Holt, 2013; Holt & Lampke, 2010). The degree to which vendors also clearly describe their goods can also be a sign of their trust and quality, especially regarding malware and cybercrime-as-service products since their customers may not have the skills

The screenshot shows a user interface for a Dark Web marketplace. On the left, there's a sidebar with categories like WEED, HASH, CONCENTRATES, EDIBLES, and BAKERY. The main area has a search bar at the top with placeholder text "Search in all categories...". Below the search bar is a message about onion address changes. A security warning about JavaScript is also present. The central part of the page displays four product cards:

- 1g PREMIUM OG KUSH \*Bulk\*** - Price: 17.00€, Weight: 7.00€/g - 17.00€/g, Source: DerFeinschmecker\_
- 3.5g Super Star Dawg - (Stardawg)** - Price: 28.95€, Weight: 6.83€/g - 8.27€/g, Source: tennatechdude\_
- 1g Vanilla Kush** - Price: 12.45€, Weight: 8.69€/g - 12.45€/g, Source: Raetabarbers5671
- 3g Mimosa - Coffeshop - AAA+** - Price: 40.00€, Weight: 11.53€/g - 13.33€/g, Source: AmsterdamGenetics\_

Fig. 12.1 An example of a Dark Web drug site

The screenshot shows a website for "Onion Identity Services". The header features the site's name in large, stylized letters. Below the header is a navigation bar with links for "Products", "Info", "Login", and "Registration". The main content area is titled "Order Process:" and contains instructions for buyers: "After buying an ID or passport send us a message with your age and gender so we can find a matching dataset, alternatively you can provide a dataset (name, age, gender, size etc). We will also need a biometric photo in high quality and signature scanned, we will give more instructions after your purchase." Below this is a section titled "Passports" with an image of a passport card.

Fig. 12.2 An example of a Dark Web passport vending site

necessary to effectively use their services (Holt & Lampke, 2010; Holt et al., 2016; Hutchings & Clayton, 2016). In that regard, vendors who offer reliable customer service lines via instant message, Jabber, and other platforms may garner a better overall reputation among customers (Holt & Lampke, 2010; Hutchings & Holt, 2015).

A proportion of markets have also evolved to take on the characteristics of closed markets in physical space by changing the ways that individuals can gain access to vendors and their goods. While many illicit online markets may operate through open websites and forums, a proportion also utilize registration and password portal systems (see Holt & Bossler, 2015 for review). These systems require individuals to create an account with the site, where they must create a profile linking their username to an email account or some other means of off-site contact. This process can be easily falsified, enabling law enforcement and unscrupulous actors the ability to engage in transactions under a guise of legitimacy (Holt & Dupont, 2019).

As result, there has been some growth in vetted communities operating on both the Open and Dark Web. These sites utilize registration systems but also require individuals to be socially vetted by members of the community or forum operators (Holt et al., 2016). For instance, potential registrants may be asked to provide information about their online activities, association with other forums and communities, and even name two individuals who may already be members who can vouch for their claims (Dupont et al., 2017).

The use of social vetting may be useful to help minimize the presence of law enforcement, though it does not guarantee that participants will not cheat one another. For instance, a hacker forum called **Darkode** operated between 2008 and 2015 as a high-level market for the most sophisticated actors to buy and sell products (Dupont et al., 2017; Holt & Dupont, 2019). It was taken down by a multinational law enforcement investigation in 2015 and was referred to by US prosecutors as “one of the gravest threats to the integrity of data on computers... around the world” (Department of Justice, 2015). For instance, members of the forum sold various malware including exploit kits, Trojans, and credit card numbers.

During its first few years of operation, individuals were able to join the forum only after being invited by an existing member who knew the individual personally. The process changed in late 2012 after several cybersecurity researchers and journalists were identified and kicked out of the community (Dupont et al., 2017). From that point forward, invitations could only come from one of the site administrators to help reduce potential external threats. Regardless of the

method of invitation, potential members were not given complete access to the forum. They would first have to post in a specific new recruit section called “fresh fish” where they would have to explain their activities in the cybercrime underground, noting what forums they belonged to, their associations to other hackers, and identify any distinct skills they may have (Dupont et al., 2017). Existing members could then vote on whether the person could be given full membership status and participate in the forum.

The use of social vetting as noted with Darkode is not a perfect solution to eliminate the risk of external threats to participants (Dupont et al., 2017; Holt & Dupont, 2019). The successes of Darkode participants likely helped draw police attention to the community and increase the members’ risk of arrest. Another option that some communities take to reduce the likelihood of outsiders attempting to join is to require members to place a deposit with the site operators (Moeller et al., 2017). It is thought that only individuals who want to make a purchase would be willing to provide money to a criminal marketplace or vendor. Similarly, some sites would hold money in escrow for both buyers and sellers to ensure successful transactions (Holt, 2013; Hutchings & Holt, 2015). These measures should help ensure all participants are interested in doing business with one another and are focused on specific business outcomes and not simply snooping or monitoring ongoing activities.

**For more information on legal actions against Darkode, go online to:** <https://www.youtube.com/watch?v=tovhoaxQstQ>



Unfortunately for market participants, there is always the possibility that the site operators will simply take those deposited funds and shut down their site without completing any transactions. Such events are often referred to as **exit scams** and have occurred with some frequency in Dark Web cryptomarkets (see **Box 12.2** for detail; Schwartz, 2020). It is unclear if the decision to shutter a site is a function of untrustworthy actors scamming participants, or a conscious decision to close the operation before the operators could be subject to law enforcement investigations (Riley, 2019). Regardless, when an exit scam occurs, the participants are often left with no option to recoup their losses or products (Riley, 2019). Thus, there is no one strategy that can be employed to ensure that an individual gets what they want from any transaction involving illicit goods in online markets.

## Box 12.2 The Risk of Exit Scams in Dark Web Markets

### “The ‘Exit Scam’ Is the Darknet’s Perfect Crime”



<https://www.vice.com/en/article/xyw7xn/darknet-slang-watch-exit-scam>

It turns out that a logistical problem with darknet markets is that when a vendor throws in the towel, it's very tempting for him or her to stop mailing drugs but continue pocketing customers' payments for as long as possible.

This article presents a sound overview of the reasons why exit scams occur and how Dark Web participants can reduce the risk of being victims of such a scheme. The author highlights that while strategies can be employed to identify reputable vendors and markets, there is still inherent risk of loss because of the illicit nature of the transactions generally.

## The Development and Evolution of Illicit Markets Online

To understand the current state of illicit market operations, we must first assess its historical iterations. The nature of these markets developed in tandem with changes in technology and the user base of the Internet as a whole. For instance, early bulletin boards and news groups were used to facilitate the exchange of pornography (Lane, 2000) and arrange off-line drug transactions (Power, 2013). Though these interactions demonstrate the utility of the communications power of the Internet, hackers were among the first to operate illicit markets on the Internet in the 1980s. As noted in [Chapters 3 and 5](#), hackers during this time operated a sort of barter system economy where individuals would trade information, access to telephone party lines, and pirated software as currency. Individuals would give others access to these materials in exchange for access to bulletin board systems (BBS) and other resources as a means to gain notoriety and demonstrate skills to others (Meyer, 1989).

As Internet speeds increased and the World Wide Web developed, so too did the opportunities for illicit economies to bloom. The rise of the MP3 and CD technologies fostered the underground exchange of music via peer-to-peer file

sharing services like Napster, and **Internet Relay Chats**, or **IRC** (see [Chapter 5](#)). The development of IRC was particularly impactful on the formation of illicit economies, as it enabled individuals to amass collections of music and media (Cooper & Harrison, 2001; Nhan, 2013). The servers hosting these channels became hotbeds for piracy communities focused on uploading and downloading content, and soon came to the attention of federal law enforcement for violations of the Digital Millennium Copyright Act.

In the late 1990s and early 2000s, the rise of e-commerce platforms and digital currencies enabled the formation of illicit markets based on financial transactions between buyers and sellers. Some of the first markets focused on the sale of credit and debit card data, whether on IRC channels or in forums operating on the World Wide Web (see [Chapter 6](#); Holt et al., 2016). The development of botnet malware and its utility to send spam email and denial of service (DOS) attacks fostered the growth of cybercrime-as-service vendors as well (see [Chapter 4](#); Holt, 2013; Hutchings & Clayton, 2016). There were even novel attempts to sell drugs, such as ecstasy, through chat rooms, though the transactions appeared to take place offline (see [Box 12.3](#); May & Hough, 2004).

The rapid growth in e-commerce around the world, coupled with expanded Internet use, led to a boom in illicit market operations in the early and mid-2000s. Much of the activity shifted from IRC to forums, due in part to their

### Box 12.3 Early Drug Sales Online

#### 13 on Staten Island Accused in Internet Sales of Illicit Drugs

<https://www.nytimes.com/1999/11/17/nyregion/13-on-staten-island-accused-in-internet-sales-of-illicit-drugs.html>



The police called the investigation “Operation You’ve Got Jail.” Inspector McCool said that detectives from the computer crimes unit, using fake user names, logged into public chat rooms on America Online where the gang members arranged sales of Ecstasy, hallucinogenic mushrooms, Special K and other drugs popular at night clubs and among high school and college students.

This article provides important historical insights into the nature of illicit drug sales online, as the individuals arrested in this sting were thought to be among the first to be arrested for arranging drug sales via chat rooms.

ease of use and ability to be coupled with other forms of online communication and commerce. Researchers began to examine the ways forum communities grew around activities like prostitution, and monetized forms of sex work like camming (see [Chapter 6](#); Weitzer, 2012). Services like Craigslist also came to the attention of criminals as a means to covertly sell stolen goods, prostitution, and even hitmen services (Carr, 2011).

The expansion of illicit economies in online spaces led to increased attention from law enforcement, culminating in a series of undercover investigations to disrupt their operations. Coordinated multinational law enforcement operations were used to take down major underground forums like the Shadowcrew, the members of which trafficked in over 1.7 million credit cards and pieces of personal information (Holt, 2010). Craigslist was also targeted for its role in prostitution in the late 2000s, as sex workers could regularly post messages advertising their services at no cost through their Erotic Services section (see [Chapter 6](#); Carr, 2011; Weitzer, 2012). Even third-party payment processors were implicated for their role in enabling online illicit markets (Holt et al., 2016; Hutchings & Holt, 2015). For instance, the operators of a digital currency system called **e-Gold** were arrested and charged with money laundering and other offenses in 2008 (see [Box 12.4](#); Zetter, 2008).

Though these enforcement actions had short-term impacts to the illicit market space, the majority of vendors and customers found other platforms to

### Box 12.4 Taking Down E-Gold

#### Bullion and Bandits: The Improbable Rise and Fall of E-Gold

<https://www.wired.com/2009/06/e-gold/>



The story of the first digital currency backed entirely by gold and silver began in 1995, while Jackson was still treating cancer patients.

This article traces the development of e-Gold as a form of digital currency, which was created by Douglas Jackson, from its humble beginnings to its value as a resource for payments between cybercriminals for a range of offenses. This story provides a balanced discussion of the challenges of regulating online currencies and potential for misuse by all manner of criminals regardless of the service provider's relationship to law enforcement.

use to engage in transactions. Backpage and escort review sites quickly replaced Craigslist as an advertising platform for paid sexual encounters (Weitzer, 2012). New services like Liberty Reserve and Web Money replaced e-Gold as preferred payment platforms, though they were also subject to law enforcement actions (Holt & Bossler, 2015). A number of cybercrime markets also shifted toward closed access models to help minimize external penetration by law enforcement and security researchers (Dupont et al., 2017; Holt et al., 2016).

**For more information on legal actions against the payment service Liberty Reserve, go online to:** [https://www.youtube.com/watch?v=pOVbOcCA1\\_A](https://www.youtube.com/watch?v=pOVbOcCA1_A)



Perhaps the most dramatic shift in online illicit market operations occurred in 2011 with the creation of the Dark Web market called the Silk Road. The website was hosted on **TOR**, or **The Onion Router**, which is a free encryption software operating via a browser plugin. Individuals using TOR become part of a global network of users, where everyone's web traffic is routed through one another's Internet connection (Barratt, 2012). This functionality enables individuals to hide their IP address and location in physical space by virtue of hiding behind other users' Internet connectivity (Barratt, 2012). The same is true for webservers hosted on TOR, making it difficult for law enforcement to effectively shut down websites because they may not be able to physically associate a server to a specific service provider or physical location (Décary-Hétu et al., 2016). In fact, sites hosted on the TOR network end in the extension. onion and can generally only be opened via the TOR browser or specialized plugins for open web browsers.

**For more information on TOR, go online to:** <https://www.torproject.org/>



The Silk Road was created by Ross William Ulbricht, who used the online handle Dread Pirate Roberts. The site was created as a retail platform to sell all manner of goods from international vendors, which quickly included illicit

narcotics (Barratt, 2012). The fact that individuals began selling drugs through this platform was not necessarily novel. What was ingenious was the fact that individuals paid vendors for their products using an electronic currency called **Bitcoin** (Barratt, 2012). It is known as a **cryptocurrency**, in which the details of transactions between participants are stored in a decentralized database called **blockchain** (Martin, 2014). This enables participants to follow the path of payments between two parties, but in a way that cannot be immediately associated to a real person. As a result, participants can feel secure in the notion that outsiders will not be able to know any details about the real identities of participants.



**For more information on the nature and use of blockchain technologies, go online to:** [https://www.youtube.com/watch?v=SSo\\_EIwHSd4](https://www.youtube.com/watch?v=SSo_EIwHSd4)

The combination of a TOR-based site where only TOR users can access the content and encrypted payment systems was extremely revolutionary in the evolution of online market practices. These operations became known as **cryptomarkets**, reflecting the use of encryption in both site operations and payment systems (Martin, 2014). As a result, the site generated massive attention from media and law enforcement, which may have helped increase its overall visibility in the underground. The site was eventually taken down through an FBI investigation, culminating in the arrest of the Dread Pirate Roberts on October 2, 2013 (Gibbs, 2013).



**For more information on the arrest of Dread Pirate Roberts, go online to:** <http://arstechnica.com/tech-policy/2013/10/how-the-feds-took-down-the-dread-pirate-roberts/>

Other cryptomarkets quickly emerged in parallel to the Silk Road to gain a share of the extremely lucrative profits generated from the sale of illicit goods via TOR. When the Silk Road was taken down, vendors moved to other markets and found receptive audiences seeking out products (Décary-Hétu & Giommoni, 2017). Some vendors also created their own unique Dark

Web sites to advertise their products (Décaray-Hétu et al., 2016; Smirnova & Holt, 2017). These sites are sometimes referred to as **shops** in which they serve as e-commerce platforms created and operated by individual vendors to offer their products directly to potential customers (Martin, 2014; Smirnova & Holt, 2017). For instance, there are a number of shops that claim to sell firearms and explosive devices to individuals around the world (Copeland et al., 2020).

As the Internet and various technologies continue to evolve, so too will the practices of illicit markets in online spaces. The rise of cryptomarkets and Tor will likely be supplanted by some other platform in the near future, whether because of increased attention from law enforcement or more easy-to-use tools for buying, selling, and accessing customers. The increasing availability of encrypted messaging apps may also foster transformations in the process of buying and selling illicit goods (see **Box 12.5**). Thus, there is a need for researchers and law enforcement to continuously examine illicit markets in online spaces so as to better understand their social and financial processes.

### **Box 12.5 Charting New Directions for Online Illicit Markets**

#### **Social Media Has Provided a New Marketplace for Drugs and Police Are Struggling to Keep UP**

<https://www.abc.net.au/news/2020-08-24/rise-and-challenge-of-social-media-drug-dealing/12545320>



Three years ago Alex began using social media to sell drugs – and business took off. “Before social media, I usually got about five clients daily,” says Alex, who didn’t want to use their real name or reveal his or her gender.

This article highlights changes in the ways that drug vendors have adapted to platforms like Facebook as a means to advertise encrypted applications channels where they can sell product with minimal risk. The individuals interviewed note that such platforms are far less visible than Dark Web shops and forums and demonstrate how drug transactions and advertising will change along with shifts in technology.

## Contextualizing the Practices of Illicit Market Participants

The diversity of products sold through illicit market operations on the Open and Dark Web call to question how vendors and buyers actually complete transactions and receive goods, especially narcotics and guns. The practices of vendors are actually quite consistent, regardless of whether the items are physical products, like a gun or a fake passport, or digital products like credit card data (Copeland et al., 2020; Décaray-Hétu et al., 2016; Holt & Lee, 2020; Roddy & Holt, 2020). The process begins in earnest with an individual vendor making an ad for their product, whether through a post in a forum or cryptomarket or via their own website or shop. The more detail they can give, the more likely they are to be viewed as legitimate, in which transparency appears to create a degree of reliability for the seller (Copeland et al., 2020; Tzanetakis et al., 2015).

Any attempt to demonstrate the specific characteristics of their products is helpful, such as pictures of a gun that are not stock photos, or images of one's narcotics. Providing detailed descriptions of malware or its functions is also useful, as is allowing potential buyers to sort their data for sale by geographic place, or by card type (Dupont et al., 2017; Holt et al., 2016). In the case of physical goods sellers, the more information that they can provide to highlight their shipping process, the more it may help to instill trust in the vendor (Copeland et al., 2020; Décaray-Hétu et al., 2016). For instance, noting that they ship in plain brown wrapping, or conceal the real item in other materials, is helpful as it demonstrates to customers that they are concerned about the security of goods in transit.

Additionally, advertisements typically indicate the price for goods which will vary based on the nature of the product. As an example, credit card vendors may provide a price based on piece counts to encourage customers to buy in bulk (Herley & Florêncio, 2010; Smirnova & Holt, 2017). Drug vendors may indicate pricing by the gram or ounce depending on the type of narcotic they are selling (Décaray-Hétu et al., 2016). Counterfeit identity documents may also provide specific pricing based on the type of document being purchased, with higher prices for passports relative to drivers' licenses or state ID cards (Holt & Lee, 2020).

A more reputable advertisement will also provide the vendor's preferred means of payment. In some instances, they may list their cryptocurrency wallet details to enable direct transfers of funds for product (Décaray-Hétu et al., 2016; Moeller et al., 2017). Additionally, vendors will list their preferred methods of communication, which vary based on whether the seller operates on the Open or Dark Web. Individuals on the Open Web may allow contacts through instant

messaging platforms like Jabber or ICQ, as well as a variety of email addresses (Hutchings & Clayton, 2016; Hutchings & Holt, 2015). Some actors on both the Open and Dark Web may also use less public communications platforms, such as internal messaging systems in forums, or contact sheets that go directly to website owners in the case of shops (Copeland et al., 2020; Roddy & Holt, 2020).

There is a great deal of evidence suggesting that Dark Web vendors and customers utilize **encrypted email** systems for communications (Décaray-Hétu et al., 2016; Martin, 2014). These platforms are extremely helpful to conceal one's activities from law enforcement and outsiders as they often do not log personal information, like one's name or IP address. In addition, the email systems utilize software that encrypts message content from user to user and while in storage (Martin, 2014). Individuals can only read the content when the correct decryption key is applied, which is only available to the account holder. As a result, messages cannot be read while they are in transit, nor by the service provider. This creates substantial protection for individuals who do not want their messages to be observable by any outside party (Décaray-Hétu et al., 2016).

The customer must then make contact through whatever means required in order to provide the vendor with their order request. As noted earlier, buyers are typically required to provide funds up front to the seller, assuming a degree of risk because the vendor may not actually provide working data, malware, or physical goods (Copeland et al., 2020; Holt & Lampke, 2010). This is particularly true in the case of some physical goods, like firearms and narcotics, as the products may take some time to be delivered. Vendors typically use common package delivery services like DHL, UPS, and FedEx, with some even delivering through traditional national postal services (Copeland et al., 2020; Décaray-Hétu et al., 2016).

The process of physically shipping illicit goods dramatically increases the risk of arrest for one or both parties as the item may be discovered in transit (Décaray-Hétu et al., 2016). This is exemplified by the number of arrests in Australia and the UK stemming from individuals buying firearms on the Dark Web that ship from the United States (see [Box 12.6](#) for information). Weapons have been identified by Homeland Security investigators before they leave the country, at which point they notify law enforcement in the destination country (Copeland et al., 2020). The packages are allowed to ship to their final destinations, which are being monitored by local law enforcement. Once received, police then arrest the individuals on charges related to illegal purchase and possession of firearms.

Should an individual actually receive the goods that they paid for, there are a few different outcomes that may occur. First, if the product is as advertised,

## Box 12.6 Dark Web Gun Sales and the Law

### Teenager Jailed for 16 Years after Buying Gun and Ammunition on Dark Web



<https://www.shropshirestar.com/news/uk-news/2019/09/13/teenager-jailed-for-16-years-after-buying-gun-and-ammunition-on-dark-web/>

He used the cryptocurrency Bitcoin to purchase a Glock 17 handgun and five rounds of ammunition from an online gun dealer on the dark web, ordering it to his family home in Gloucester [England].

This article highlights the risk of Dark Web weapon sales for offline crimes, as a 19-year-old man named Kyle Davies was arrested in Gloucester, England, for purchasing a firearm through a shop. The weapon was identified by US law enforcement officers in transit, who notified the UK police. They arrested Davies upon delivery of the weapon, and a search of his home revealed evidence he was planning a mass shooting. His arrest may have stopped an act of serious violence from happening.

they may use it in whatever way they see fit, and simply enjoy their purchase (Copeland et al., 2020; Holt & Lee, 2020). Second, some may choose to post a review, feedback, or provide details to online associates about the quality of the product (Décary-Hétu et al., 2016; Martin, 2014). Such effort is often valuable for both other customers to know what vendors are reliable, as well as the vendor to help increase their potential customer base.

A third option involves receipt of an incorrect item or some other problem with the product. Should this occur, the customer must carefully review the terms of service for their purchase (Holt & Lee, 2020; Hutchings & Clayton, 2016). This may be a relatively informal set of rules posted by a vendor in their shop or forum advertisement, or can be far more explicit and detailed in the case of some cybercrime-as-service providers. Some vendors clearly state that they do not offer refunds, while others may provide conditional returns or refunds if it is within a certain amount of time after purchase, or there was an error in producing the item (Dupont et al., 2017; Holt et al., 2016; Hutchings & Holt, 2015). Vendors who make such claims are often viewed as being more reliable as they are offering a degree of customer support and service, which helps to retain repeat customers over time.

## Debunking Claims Related to Illicit Market Operations

Though research regarding online illicit markets has grown substantially in the last decade, there are still many questions and myths that abound about their operations. Media portrayals of the Dark Web suggest anything can be found there for a price with a heavy emphasis on unusual and frightening content. For instance, a video game was released online in 2016 called **Welcome to the Game** (Hospodar, 2021). The plot centers around the player accessing the Dark Web to find a **red room**, where someone is streaming the live torture of a person. The player must examine the code of various websites in the game to determine the URL of the red room, while avoiding having their computer hacked or being kidnapped by an online enemy (Hospodar, 2021). Once entered, the player then watches a cutscene of the red room's executioner torturing and eventually killing someone. The game was so popular that a sequel was released in 2018, which places the player into the plot as a reporter trying to solve a kidnapping that appears to have been orchestrated by a group of individuals operating on the Dark Web (Hospodar, 2021). The threats to the player increase in this version, including a hitman hired on the dark web to kill them, and hackers who can be stopped by buying tools from hacker marketplaces on in-game illicit online markets.

For more information on the video game series **Welcome to the Game**, go online to: <https://www.pcgamer.com/hack-the-deep-web-and-hide-from-hitmen-in-offbeat-horror-game-welcome-to-the-game-2/>



The popularity of this game series helps to reinforce myths about aspects of the illicit operations occurring online. The primary conceit of the series regarding the operation of red rooms on the Dark Web, where individuals can pay money to view the live torture, or murder of a human being, has yet to be proven (Pettit, 2021). There is virtually no documented evidence of these rooms truly featuring live torture or murder, though one need only look to YouTube and other video streaming sites on the open web to see gruesome images of human tragedy (Pettit, 2021). Additionally, as noted in **Chapter 8**, there is a massive amount of images and video content of children being sexually and physically abused online. There are also various places where individuals can livestream this content and direct the behavior of participants.

The fact that such horrific content can be found in various parts of the Internet calls to question why anyone would pay for such content on the Dark Web. It may be due in part to curiosity over finding this content and seeing it for oneself to satisfactorily address the question of whether they are real (Pettit, 2021). It is more likely that any site advertising itself as a red room is actually only taking the individual's money as a scam (see [Box 12.7](#)). There are limited examples of individuals actively seeking out serious abuse and red room content online. For instance, an Italian police investigation of child sexual abuse led to the arrest of two Italian teens after they paid to see the serious sexual abuse, torture, and murder of children via live stream (Zmudzinski, 2020). The two used the term red room to refer to the content they viewed, though it is not clear if they were seeking this content as a function of their sexual proclivities or an interest in torture.

In much the same way, there are number of ads that can be found immediately on the Dark Web where individuals offer their services as **hitmen**, or individuals willing to engage in violence for a fee on behalf of others (Bateman, 2021; Roddy & Holt, 2020). Some of the ads are clearly false, as they may be less than a page and use vague language, suggesting they will do anything to anyone for money. At the same time, some vendors take careful steps to use photos, carefully crafted language, and provide full price sheets (Roddy & Holt, 2020). These ads often use language indicating the hitman has prior military experience

### Box 12.7 Assessing the Red Room Phenomenon

#### In Search of the Darkest, Most Disturbing Content on the Internet



<https://www.washingtonpost.com/news/the-intersect/wp/2015/09/02/in-search-of-the-darkest-most-disturbing-content-on-the-internet/>

Late last week, a rumor both disturbing and riveting began circling forums like 4chan and Reddit. A mysterious group claimed to have captured several Islamic State fighters—and promised to torture and kill them live on the Dark Web.

This article explores and attempts to briefly debunk the notion of red rooms on the Internet, and the broader challenge of identifying fact from fiction on the Dark Web.

or were involved in organized crime activities (Bateman, 2021). Additionally, an analysis of multiple advertisements' pricing was in line with amounts paid to individuals who were contracted for violence through in-person contacts (Roddy & Holt, 2020).

Though the use of such language and pricing may give the vendor a sheen of legitimacy, it is unclear whether vendors actually offer the services they list (see Box 12.8). Most media reporting on hitmen services suggest they are not real and only seek to rip off potential customers. Several journalists and bloggers have noted that the website operators paid off individuals who say negative things about the vendors to hide their scams (Bateman, 2021). Others attempted to silence critics by taking extreme steps like threatening them with violence. For instance, a researcher named Chris Montiero who focuses on Dark Web hitmen has shared videos of people holding his personal information on handwritten notes in front of burning cars as a veiled threat of what may happen to him (Bateman, 2021). He has not, however, found any evidence supporting the notion that hitmen advertising online actually provide the services they are paid for.

### **Box 12.8 The Threat of Hitmen Services on the Dark Web**

#### **"I Kept Looking Over My Shoulder": Teen Suspects Ex-Boyfriend Targeted Her in Dark Web Hit Job**

<https://www.oxygen.com/crime-news/alexis-stern-allegedly-targeted-online-assassination-plot-besa-mafia>



In 2018, the Minnesota teenager [Alexis Stern] learned she was the target of a mysterious online assassination plot. Detectives told Stern that a user by the name of Mastermind 365 had paid roughly several thousand dollars in bitcoins to have her murdered. She thought she was being pranked.

This article explores the unclear nature of online hitmen advertisements, but the real risks presented by allowing individuals with an avenue to pay others for the threat of violence. The story explains how a paid contract against Alexis Stern appeared online and the ways that both local and federal police have responded to the threat against her life. Readers will understand the challenge such a case may present for police.

Similar claims have emerged around kidnapping as an ancillary component of Dark Web hitmen service providers (Bateman, 2021; Roddy & Holt, 2020). A British model named Chloe Ayling was kidnapped in Milan Italy during July, 2017. She was a model and was traveling for a photo shoot arranged by her agent. While there, she was injected with ketamine, stuffed into a large bag, and driven in the trunk of a car to a remote farmhouse (Hattenstone, 2018). Her kidnappers claimed to be **The Black Death Group**, consisting of Dark Web human traffickers operating out of Romania. They claimed to specialize in the sale of sex slaves and ran various websites featuring pictures of women who they claimed were available for sale (Hattenstone, 2018). Chloe was to be their next auction item if her family did not pay a ransom.

Fortunately, there is no such group known to operate in the real world. Interpol investigated their operations, though there was no evidence to suggest their claims of trafficking were real (Hattenstone, 2018). In fact, the sites were operated by a 30-year-old Polish man named Lukasz Herba. He staged both the photo shoot and the kidnapping with assistance from his brother, Michael (Hattenstone, 2018). He also appeared to have brainwashed Chloe into believing the group existed and that he loved her and wanted to help her escape the group's clutches. They both traveled to Milan and appeared outside of the English consulate days after the kidnapping and requested assistance (Hattenstone, 2018).

Shortly after Lukasz was arrested and eventually found guilty of kidnapping by the Italian criminal justice system. The trial revealed the extremely convoluted and unusual circumstances of the case, as Ayling and Herba were observed shopping for shoes together while she was supposedly attempting to escape from the kidnappers. In addition, Ayling has seemingly focused on garnering media attention from the kidnapping and seems relatively unaffected when discussing her experiences (Hattenstone, 2018). Instances such as these, where the realities of the incidents cannot be fully observed, enable outrageous claims of the goods and services for sale on the dark web to proliferate and gain legitimacy over time.

## Summary

Taken as a whole, computers, mobile devices, and the Internet provide an environment where illicit products can be sold in parallel to real-world goods markets. There are many similarities between the practices of vendors and their customers in both virtual and real spaces, though there are some distinctions in the ways that they must manage risks to their operations. The existence of illicit markets online also enables the spread of myths and untruths about what

kinds of services may be obtained, which may only cause further harm to others as with hitmen and kidnapping services. As a result, there is a need for vigilant efforts by law enforcement, ISPs, and other place managers to regulate online spaces and limit the spread of these goods markets over time.

## Key Terms

Bitcoin  
Black Death Group  
Blockchain  
Closed market  
Cryptocurrency  
Cryptomarket  
Darkode  
E-Gold  
Encrypted email  
Exit scam  
Hitman  
Internet Relay Chat (IRC)  
Open markets  
Red room  
Shop  
TOR (The Onion Router)  
Welcome to the Game

## Discussion Questions

1. Who do you think faces the greatest risk for engaging in an illicit market online, such as for narcotics or stolen data? Is it the customer or the vendor? Why?
2. In a post-COVID-19 world, how do you think illicit markets will change? Do you think more people will move to online spaces for buying and selling anything illegal?
3. What myths or ideas have you heard about what can be purchased on the Dark Web? What is the most outrageous thing, and why do you think that myth persists?

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Chapter **13**

**CYBERCRIME  
AND  
CRIMINOLOGICAL  
THEORIES**

## Chapter Goals

- Understand how traditional criminological theories can be applied to cybercrime offending and victimization
- Assess the usefulness of specific criminological theories, such as social learning theory and the general theory of crime, in explaining a variety of cybercrimes
- Compare a situational theory of victimization with an individual-level explanation to understand cybercrime victimization
- Explore whether new cybercrime theories are necessary

## Introduction

Over the last several decades, scholars have debated how cybercrime offending differs from traditional crime. This textbook has demonstrated so far that motivations for cybercrime offending are typically the same as those for traditional offending. Financial incentive is a substantial motive for some hackers, malware writers, and virtually all fraudsters. Individuals who download legal and illegal pornography enjoy the easy access to material that satisfies their sexual desires. Online harassment, similar to traditional bullying, allows someone to hurt others and therefore have power over them from a distance. There is also the thrill and rush for deviants that are associated with harassing others, downloading pornography, swindling others, and breaking into a computer system. Thus, Grabosky's (2001) comment seems apt:

Computer crimes are driven by time-honoured motivations, the most obvious of which are greed, lust, power, revenge, adventure (p. 243), and the desire to take "forbidden fruit." None of the above motivations is new. The element of novelty resides in the unprecedented capacity of technology to facilitate acting on these motivations. (p. 244)

As a result, cybercrime could be viewed as "old wine in a new bottle" (Grabosky, 2001; Wall, 1998). If this is the case, traditional criminological theories should have no difficulty in explaining cybercrime if it is simply "old wine."

The previous chapters, however, illustrated that there is something unique about cybercrime that separates it from traditional criminal activity. Although it might be the same "old wine," there are instances of "new wine," such as

malware creation, that has little connection to the physical world. The second part of this analogy, the new bottle, is also pertinent in that virtual space is different than physical space. The Internet allows easy access to most people around the world and provides an avenue for individuals to engage in cybercrime while feeling largely anonymous. The Internet also allows the offender, whether an individual, group, or nation-state, to avoid making physical contact with the victim or his/her property. Thus, cybercrime may not be viewed as “old wine in new bottles” or even “new wine in new bottles,” but “rather many of its characteristics are so novel that the expression ‘new wine, but no bottles!’ becomes a more fitting description” (Wall, 1998, p. 202).

In addition, examining the uniqueness of cybercrime might allow us to better understand more about these phenomena as well as provide brand new insights on traditional forms of crime (Holt & Bossler, 2016). Discussions of new cyber-specific criminological theories might be a catalyst for additional theoretical creation and elaboration. Taken as a whole, this chapter will show that the future of cybercrime research is bright. Studies that elaborate complex associations that have been held in the traditional literature for decades will also provide new insights into the commission of crime – both traditional and cyber related.

Unlike traditional criminological textbooks that place theories into categories (e.g., classical and positivist) and then cover each theory in chronological order, our focus is on how criminological theories have been applied to cybercrime. Thus, we focus on the theories that have been examined the most often and have therefore provided substantive insights into why individuals commit or do not commit these offenses. Considering that a subcultural framework has been used extensively through this text, we first begin with a discussion of subcultural research on cybercrime; readers should consider the information they read in the first 12 chapters for more detail. The two strongest competing theories for explaining cybercrime based on empirical support – Ron Akers' (1998) social learning theory and Gottfredson and Hirschi's (1990) general theory of crime – will then be discussed. The chapter then progresses to cover theories that have recently been receiving more attention in the cybercrime literature but still have not received the same level of focus as social learning theory and the general theory of crime – Agnew's general strain theory, techniques of neutralization, and deterrence theory. Two victimization theories that have been used to better understand cybercrime victimization – routine activity theory, a situational theory of victimization, and the general theory of crime, an individual-level theory – are then described and assessed. We finally conclude

with a discussion of how a traditional criminological theory has been modified to better understand cybercrime – digital drift theory.

## Applying Criminological Theories to Cybercrime Offending

### *Subcultural Theories*

#### *Overview*

Most criminological theories focus on offending as a consequence of individual-level factors that may be affected through properly targeted intervention strategies. These theories, however, do not explore the meaning that offending has for some individuals and the depth of their participation in peer networks that may facilitate criminal activity. Researchers who explore criminality through a subcultural lens can provide substantive depth on the how and why of criminal behavior (Miller, 1958; Short, 1968).

Defined from a broad perspective, a **subculture** is any group having certain values, norms, traditions, and rituals that set them apart from the dominant culture (Brake, 1980; Kornblum, 1997). Subcultures form as a response to either a rejection of the dominant culture (Miller, 1958) or around a distinct phenomenon that may not be valued by the larger society (Quinn & Forsyth, 2005; Wolfgang & Ferracuti, 1967). This includes an emphasis on performing certain behaviors or developing skill sets (Maurer, 1981) and learning the rules or codes of conduct that structure how individuals view and interact with different groups (Foster, 1990). Subcultures also utilize special terms and slang, called an **argot**. They may also have some outward symbols of membership like tattoos or informal uniforms (Maurer, 1981). Thus, demonstrating such knowledge illustrates an individual's reputation, status, and adherence to a particular subculture.

In many ways, subcultural frameworks share common elements of social learning theory (Akers, 1998), since involvement in a subculture influences behavior by providing individuals with beliefs, goals, and values that approve of and justify particular types of activities, including crime (Herbert, 1998). In fact, the transmission of subcultural knowledge increases the likelihood of involvement in criminal behavior despite potential legal consequences for these actions (Miller, 1958; Short, 1968). As such, subcultural frameworks provide an important perspective to explain how the values and ideas espoused by members of a group affect the behavior of its members.

## *Subcultures and Cybercrime*

The development of the Internet and computer technology has had a dramatic impact on the formation of and participation in deviant or criminal subcultures (DiMarco & DiMarco, 2003; Holt & Bossler, 2016; Quinn & Forsyth, 2005). The anonymity and distributed nature of the Internet enables individuals to connect to groups that share similar likes, dislikes, behaviors, opinions, and values, regardless of the participants' locations in the real world (DiMarco & DiMarco, 2003). Some individuals may not be able to discuss their interests or activities with others in the real world due to fear of legal reprisal or concerns that others around them may reject them because they do not share their interests.

Technology allows individuals to connect to others without these fears and even provide information about a behavior or activity to improve their knowledge and minimize fear of detection (Blevins & Holt, 2009; Holt, 2007; Quinn & Forsyth, 2005). Individuals can readily communicate subcultural knowledge through email and other forms of computer-mediated communications, or CMC (Holt & Copes, 2010; Holt et al., 2008). In turn, this information can increase the likelihood of success when engaging in illicit behavior despite potential legal consequences. Thus, the value of the Internet and CMCs with individuals across the globe is pivotal in the pursuit of crime and deviance online and offline.

Throughout this textbook, we have used the subcultural framework extensively to describe the individuals that participate in a certain activity as well as the beliefs, structures, and interactions that provide support to them in opposition to community norms and standards that have defined them and their behavior in many cases as deviant or criminal. In [Chapter 3](#), we explored the hacker subculture, devoid of Hollywood portrayals, and its primary norms of technology, knowledge, learning, and secrecy, regardless of the individual's involvement in malicious hacking. [Chapter 4](#) described how the interests and beliefs of malware writers are generally congruent with those of the larger hacker subculture. In [Chapters 7 and 8](#), we discussed how the Internet has allowed individuals with deviant sexual orientations to interact with one another, gain validation for their sexual desires, exchange both materials and beliefs, and be part of a community. Finally, [Chapter 10](#) examined the ways the Internet provides a means for extremist groups to indoctrinate individuals in favor of their movement.

Technology allows individuals to be introduced to core principles and norms of the group while allowing them to interact with members from a safe physical distance. Future cybercrime scholars will continue to find this framework

fruitful in explaining how group dynamics affect individuals' belief systems and participation in cyber deviant acts.



**For more discussion on different types of both offline and online subcultures, including the hacker subculture, go online to: <http://subcultureslist.com/hacker-culture/>**

### **Social Learning Theory and Cybercrime**

#### *Overview*

Over the last century of research, scholars have found that the most consistent predictor of future offending is whether an individual has committed an offense in the past. Arguably the second most important predictor is whether that person has friends or associates who engage in crime and delinquency (Pratt et al., 2009). This link between peer behavior and offending has been the source of a substantial amount of both research and theory aimed at explaining this relationship.

In 1947, Edwin Sutherland presented in his book, *Principles of Criminology*, one of the first theories to explain the peer-offending relationship: differential association theory (Sutherland, 1947). Sutherland argued that criminal behavior was learned in a process involving interactions and communication with others, with the most important interactions stemming from intimate personal groups. During this process, an individual not only learned techniques on how to commit crimes but also motives, rationalizations, and attitudes that supported the violation of the law. A person became more likely to commit delinquent or criminal acts when his or her “definitions,” referring to rationalizations and attitudes, which supported the violation of the law exceeded those that were unfavorable to breaking the law. Criticisms over the years, however, have centered heavily on the theories: (1) testability; and (2) lack of specificity on the learning process mechanisms responsible for the commission of deviant and criminal behavior (Kornhauser, 1978; Matsueda, 1988).

Since the 1960s, Ron Akers has reformulated differential association theory to specify the learning mechanisms through which criminal behavior is learned. In what has become known as **social learning theory**, Akers (1998) expanded upon Sutherland’s original differential association theory by introducing principal components of operant conditioning, namely, that behavior followed by

rewards or reinforcements will be more likely to continue while acts followed by punishment will be less likely (Akers, 1998). Thus, Akers' (1998) social learning theory argued that the learning process of any behavior, including crime, includes four principal components: (1) **differential association**; (2) **definitions**; (3) **differential reinforcement**; and (4) **imitation**.

This dynamic learning process begins by associating with others, both deviants and nondeviants. Differential associations to deviants provide both models for deviant behavior and definitions, such as attitudes and norms, which may favor breaking the law or providing justifications that neutralize possible negative consequences of deviance. Following Sutherland's differential association theory, social learning theory holds that individuals who have a greater proportion of beliefs supportive of deviant behavior will be more likely to engage in those activities.

Although definitions supporting criminal activity are critical to the offender to justify their behavior, criminality will occur if it is reinforced through some means, whether social or financial. For example, an individual who perceives that he will receive praise from his friends for throwing a rock through a window will be more likely to throw the rock. If that praise comes, he will be more likely to continue this behavior in the future. Perceived or actual punishments, however, will decrease the likelihood of that behavior. The punishments can take the form of adding negative stimuli, such as spanking or arresting, or can be in the removal of positive stimuli, such as taking away television privileges. Finally, imitation plays a major role in the social learning process as individuals may engage in deviant behavior after watching someone else engage in the same behavior. Imitation plays a larger role in the earlier stages of the learning process. As the process continues, however, definitions and differential reinforcements become more important. Social learning theory has been one of the most commonly tested criminological theories and arguably has received the strongest empirical support to date in its favor for explaining a wide variety of behaviors (Akers & Jensen, 2006; Lee et al., 2004; Pratt et al., 2009).

### *Social Learning Theory and Cybercrime*

Given the support Akers' (1998) theory has in the larger research community, it is no surprise that scholars have seen its potential importance in explaining why individuals commit cybercrime. The complexities of computer programming make the connection between learning and cybercrime quite apparent. Depending on the specific cybercrime, individuals must "learn not only how

to operate a highly technical piece of equipment but also specific procedures, programming, and techniques for using the computer illegally” (Skinner & Fream, 1997, p. 498). Even though computer technology has become more user-friendly due to convenient interfaces, there is a need for a learning process in which the basic dynamics of computer use and abuse are learned from others.

Digital piracy (see [Chapter 5](#)) at first does not seem overly complex. Someone simply downloads a music or movie file without authorization. Social learning theory would hold that in order for individuals to commit digital piracy, they must participate in a social learning process. The individual must interact with fellow digital pirates, learn how and where to perform downloads, imitate what they have observed, learn definitions supportive of violation of intellectual property laws, and be rewarded either financially or socially for their efforts in order for the piracy to continue.

Virtually every study examining digital piracy finds that associating with pirating peers, regardless whether the interaction is face-to-face (Bossler, 2021; Burruss et al., 2019; Higgins & Marcum, 2011; Holt et al., 2012) or virtual (Miller & Morris, 2016), is the most significant correlate in predicting piracy behaviors. Friends and intimate relationships can provide information on the methods required to engage in piracy and the location of materials on the Internet. Piracy requires some technological skill that can be garnered through direct associations with others. The continuous technological developments noted in this community also require peer associations in order to readily identify new mechanisms to download files. Individuals are then able to engage in simple forms of piracy through imitation (Hinduja, 2003; Holt & Copes, 2010; Holt et al., 2010; Ingram & Hinduja, 2008; Skinner & Fream, 1997). As piracy becomes easier for an individual, the need for these delinquent associations could decrease. Furthermore, positive reinforcement for participation in software piracy is evident through both financial (i.e., free movies and music) and social (i.e., praise for showing someone how to use torrent sharing software) rewards (Hinduja, 2003; Holt & Copes, 2010; Van Rooij et al., 2017).

Studies have also shown that pirates have both definitions that favor the violation of intellectual property laws and techniques of neutralization that diminish their personal responsibility for their actions (Brown, 2016; Burruss et al., 2019; Higgins & Marcum, 2011; Ingram & Hinduja, 2008; Skinner & Fream, 1997). Members of the piracy subculture espouse attitudes that minimize the impact of copyright law and the harms caused by pirating media. For instance, individuals who pirate materials commonly justify their actions by suggesting that downloading a few songs or media does not actually harm the property

owners or artists (Brown, 2016; Higgins & Marcum, 2011; Ingram & Hinduja, 2008). Pirates also believe that their actions are not inherently wrong since there are no clear guidelines for ethical behavior in online environments (Higgins & Marcum, 2011; Ingram & Hinduja, 2008). These attitudes are often communicated between pirates and encourage further participation in piracy over time.

In much the same way, social learning theorists argue that individuals who engage in computer hacking would need to associate with individuals who hack. These relationships should increase their likelihood to imitate hacking activity early in their development as a hacker as well as be exposed to definitions favorable to using technology in this fashion. As they participate further in the hacker subculture, hacking would be socially reinforced, possibly even financially, and the behavior would continue.

Studies have shown that all four social learning components are empirically related to hacking behaviors (Bossler & Burruss, 2011; Skinner & Fream, 1997). The importance of peer associations in influencing hacking behavior is not only found in qualitative studies and anecdotal stories but has been consistently found to be one of the most important predictors of hacking behavior in quantitative studies as well (Bossler, 2021; Bossler & Burruss, 2011; Holt et al., 2012; Leukfeldt et al., 2017; Skinner & Fream, 1997). Morris and Blackburn (2009) found that college students who associate with delinquent youth had a larger impact on more serious forms of computer crime, such as attempting hacking, malicious file damage, or manipulation, than their attitudes. Delinquent peer associations have been empirically shown to be important in providing models to imitate (e.g., Morris & Blackburn, 2009) as well as in the introduction and acquisition of beliefs and excuses to justify computer attacks (Bossler & Burruss, 2011; Skinner & Fream, 1997). Similar to the arguments that the hacker subculture provides positive social encouragement and praise for successful and innovative hacks, scholars testing social learning hypotheses have found similar results (Bossler & Burruss, 2011; Skinner & Fream, 1997). Skinner and Fream (1997) found that teacher encouragement, as well as participation in electronic bulletin boards, increased the likelihood of students guessing passwords.

As discussed in Chapter 3, websites and chat rooms can play a large role in the social learning process of hackers. Box 13.1 displays an article that summarizes different websites where individuals can learn basic ethical hacking skills.

Scholars have also found social learning theory to be useful in understanding different forms of online violence. Individuals who associate with deviant peers are more likely to cyberbully (Bossler, 2021; Lianos & McGrath, 2018),

### **Box 13.1 Examples of Websites that Provide Information on Hacking Techniques**

#### **Best Websites to Learn Hacking**

<https://www.compsmag.com/best/websites-to-learn-ethical-hacking/>

Hacking isn't an individual subject that anyone can pick up overnight. This can't be accomplished after reading one article and visiting a few of these websites – the phrase is used to indicate that in time and with a lot of practice, you'll be able to ... hack like a pro.

This article provides an overview of ten-key websites that can help individuals learn to hack ethically. There is inherent value in this article because it demonstrates that information on hacking can be acquired through virtual venues with a great deal of ease and engender the learning process in meaningful ways.

cyberstalk (Choi et al., 2017; Marcum et al., 2017), and sexually harass others online (Choi et al., 2017).

Scholars have also begun examining how social learning theory can be applied to how the Internet can radicalize youth to support or commit acts of terrorism (Freiburger & Crane, 2011; Pauwels & Schils, 2016). Terrorist groups have clearly been able to use the Internet to increase membership by gaining access to youth around the world (differential association) and communicating beliefs (definitions) that support terrorist activities. Within online support systems, second-generation youth in new countries may feel isolated and discriminated against and may be able to find and communicate with others online who are in similar situations. As their feelings intensify and they participate more often in online discussions, they will be more prone to accept the definitions favoring the particular ideological message promulgated on these websites. In addition, the Internet provides strong positive reinforcement in that it can make terrorists into instant celebrities, martyrs for the cause, and can glorify them long after they died. These reinforcements provide the perception to youth that the glory, not to mention increases in self-esteem and self-identity, stemming from violence and harm greatly outweigh the negative consequences. Finally, the information and videos posted online provide simple steps for someone to follow and imitate (Freiburger & Crane, 2011).

As the above paragraphs demonstrated, Akers' (1998) social learning theory is not just one of the most theoretically and empirically sound theories to account for traditional forms of crime, but it also applies equally as well to a wide variety of both simple and more complex forms of cybercrime.

## ***General Theory of Crime***

### ***Overview***

Unlike most traditional criminological theories that focus on examining why people commit crime, social control theories ask the opposite question: "What causes people to actually conform to the rules?" Control theories argue that individuals engage in crime as a function of our basic human nature, and the desire to obtain the rewards that crime can bring, whether economic or emotional. They argue that motivation is generally invariant among all individuals, meaning that no one person is any more motivated to commit a crime than another. What separates criminals from noncriminals then is the amount of control placed on the individual, whether by the law, society, school, family, friends, oneself, or other institutions and groups. Criminals simply have less control placed upon them, making them freer to pursue their pleasures through the most efficient means, which is quite often illegal.

Over the last two decades, the most popular, parsimonious, and highly tested social control theory developed has been Michael Gottfredson and Travis Hirschi's (1990) **general theory of crime**. The theorists argue that most crimes are relatively simple actions that provide immediate gratification. Based on the characteristics of most crimes, Gottfredson and Hirschi argue that offenders have certain behavioral and attitudinal characteristics, including being impulsive, insensitive, and giving little consideration to the future. Since they act on the spur of the moment, they give little thought to the consequences of their actions. The lack of forethought and other behavioral characteristics lead them to fail in school, have poor relationships with others, and engage in risky behaviors in which the long-term consequences outweigh the meager short-term benefits, such as smoking, drug use, and unprotected sex. Taken as a whole, Gottfredson and Hirschi (1990) argue that criminal behavior and other risky activities stem from one's level of **self-control**, or the ability to constrain their own behavior through internal regulation. Adequate levels of self-control are primarily formed in childhood through proper parental child-rearing techniques, including monitoring, recognizing inappropriate behavior, and punishing that inappropriate

behavior. Although the theory might seem simplistic, low self-control has been one of the more consistent correlates of crime (Pratt & Cullen, 2000) and has been consistently linked to a wide range of crime and deviance.

### *The General Theory of Crime and Cybercrime*

The general theory of crime has frequently been applied to cybercrime since it is a general theory, meaning that it should be able to explain any form of crime. Self-control theorists argue that most forms of cybercrime are similar to that of traditional crime: they are simple in nature, can be performed with little to no skill, and will lead to long-term consequences greater than short-term benefits. Thus, the reason why people commit cybercrime is the same reason people steal, hit, rob, burglarize, and sell drugs – inadequate levels of self-control.

Empirical research consistently supports the argument that low self-control is a significant predictor in understanding why people commit a wide variety of cybercrimes and cyber deviance, including, but not limited to: online harassment (Holt et al., 2012; Li et al., 2016; Lianos & McGrath, 2018), downloading online pornography (Buzzell et al., 2006), digital piracy (Higgins & Marcum, 2011; Udris, 2016), and online economic crimes (Moon et al., 2010). Individuals with low levels of self-control are more likely to harass, bully, or stalk others online due to both their inability to control their temper and their inclination to “solve” problems physically rather than mentally (Holt et al., 2012; Li et al., 2016).

Individuals who are impulsive and focus on easy and simple immediate gratification are more likely to view and download online pornography (Buzzell et al., 2006; Holt et al., 2012). Digital piracy, whether involving software, music, or movies, is considered a simple task that requires minimal skill, provides immediate gratification with almost no effort, and indicates little empathy for the owners of the intellectual property (Higgins & Marcum, 2011). In addition, individuals with low self-control are more likely to commit identity theft (Moon et al., 2010), simply viewing online economic crime to be a simple and easy way to make quick cash to support immediate wants.

There is some potential that more complicated forms of cybercrime, such as computer hacking, may not be accounted for through the general theory of crime. Self-control theorists would argue that computer hacking is simplistic and that hackers are just taking advantage of easy opportunities. They would also expect hackers to have some of the same characteristics of “traditional” criminals, including: impulsivity; lacking diligence; not focusing on long-term goals; not being cognitive; self-centered and non-empathetic; and easily becoming

frustrated. Research provides some support for this idea, though there are some major inconsistencies as well (Bossler & Burruss, 2011). Both traditional criminals and computer hackers illustrate a lack of empathy for their victims (Turgeman-Goldschmidt, 2005). In addition, hackers often state that they engage in hacking activities because of the thrill or rush of the hack (Schell & Dodge, 2002). They also enjoy the adventure of exploring what new technology can do.

Much of what is known about sophisticated hacks and malware development, however, suggest hackers have higher levels of self-control. They can typically be cognitive and verbal, as demonstrated by their strong commitment to and mastery of technology (Holt, 2007; Schell & Dodge, 2002). Many hackers are also enrolled in high school/college or employed, sometimes in the security field, all indicating some interest in long-term goals (Bachmann, 2010; Holt, 2007; Schell & Dodge, 2002). The potential disparity between hackers and those who engage in “hacks” makes it difficult to apply the characteristics of low self-control to hacking in general. Hackers that can be considered “script kiddies” seem to have the characteristics of the traditional criminals to which Gottfredson and Hirschi (1990) refer (Holt, 2007). They fulfill their immediate gratification by using simple techniques, like downloading others’ programs, shoulder surfing, brute-force attacks, and social engineering, that do not require any deep knowledge of technology or much time and effort (Holt & Kilger, 2012). More advanced forms of computer hacking, such as the creation of malicious software, require a much greater amount of technical proficiency as well as time and energy to perfect the program – concepts incongruent with low self-control (Bossler & Burruss, 2011; Holt & Kilger, 2012).

Empirical tests support the complex relationship between low self-control and computer hacking. Holt et al. (2012) found that *low* self-control predicted computer hacking, specifically accessing another’s computer account of files without his/her knowledge or permission, in a sample of youth. Holt and Kilger (2008), however, found that hackers “in the wild” had similar *higher* levels of self-control compared to a sample of college students in information security courses. Bossler and Burruss (2011) also found that in a college sample, youth who committed three types of hacking behaviors (guessing another person’s password into his/her computer account or files; accessing another’s computer account or files without his/her knowledge or permission to look at information; and adding, deleting, changing, or printing any information in another’s files without permission) and did not partake in the social learning process needed higher levels of self-control in order to be able to figure out how to hack. Individuals with lower levels of self-control were more likely to be involved in a social learning process which

connected them with peers who taught them methods of hacking and reinforced the value of these activities (Bossler & Burruss, 2011). Self-control had a larger influence on hacking via its indirect effect on hacking through the social learning process than its direct effect on hacking. In simpler terms, one can argue that lower levels of self-control were more related to computer hacking generally.

Bossler and Burruss (2011) considered this “partial support” at best for the general theory of crime’s ability to explain computer hacking. The lack of general research on this issue, however, leads to a fundamental and basic question: is computer hacking a simple activity that can be explained by one important concept such as low self-control or is it a more complex activity that requires being involved in a long-term social learning process that requires peers teaching and reinforcing behaviors? The current body of research suggests that both answers are correct. Simple hacking techniques, such as brute-force attacks (see [Chapter 3](#)) require little skill and can be explained by both low self-control and social learning, though the influence of the social learning process on hacking is always stronger than the effect of low self-control. At the same time, more complex forms of hacking require advanced skills that are acquired through a social learning process and/or on their own due to their higher levels of self-control.

In the end, there is no denying the importance of low self-control in understanding the commission of cybercrime. These studies indicate that self-control may predict crime in the cyberworld as well as it does in the terrestrial world. In addition, research also shows that the influence of delinquent peer associations is a stronger predictor of cybercrime than levels of self-control (Holt & Bossler, 2014, 2016). Thus, the general theory of crime and social learning must be discussed together in some respects rather than treated separately.



**For more information on how “easy” it is to hack a computer, go online to: [https://motherboard.vice.com/en\\_us/article/famous-iphone-hacker-geohot-shows-us-how-easy-it-is-to-hack-a-computer](https://motherboard.vice.com/en_us/article/famous-iphone-hacker-geohot-shows-us-how-easy-it-is-to-hack-a-computer)**

### ***Agnew’s General Strain Theory***

#### ***Overview***

Robert Agnew’s (1992, 2006) **general strain theory** is an individual-level theory developed as an expansion of Robert Merton’s (1938) classic strain theory. Merton’s original version of strain theory posited that being unable to achieve

the goal of economic achievement leads to a sense of frustration. To deal with this strain, individuals need to find other ways to satisfy their needs which could include criminal activity. In Agnew's version, he discusses the role of frustrations leading to negative emotions, such as anger, frustration, and depression, which if not addressed appropriately, can lead individuals to engage in crime as a response.

Agnew (1992) identified three primary categories of strains that can have a substantive impact on emotional states: (1) the threatened or actual failure to achieve positively valued goals; (2) threatened or actual removal of positively valued stimuli; and (3) threatened or actual presentation of noxious stimuli. In simpler terms, not achieving a goal (e.g., not landing the job that you wanted, failing a test), having something positive taken away (e.g., loss of a parent or loved one), or experiencing something bad (e.g., bullying, family conflict) can all lead to negative emotions such as frustration or anger. These central arguments have received sound empirical support since the theory's inception. Life strains significantly influence involvement in delinquency (Agnew & White, 1992; Broidy, 2001; Paternoster & Mazerolle, 1994), though this relationship is mediated by increased levels of negative emotions, particularly anger and frustration (Brezina, 1998; Mazerolle & Piquero, 1997). Those who experience greater negative emotions are more likely to respond to strain with delinquency and crime.

### *General Strain Theory and Cybercrime*

Almost all scholars who have applied general strain theory to cybercrime have chosen to examine cyberbullying. This is sensible, given that the virtual environment allows individuals to immediately and easily vent frustration and anger at others in a detached way that does not require direct interaction with their victim (see [Chapter 9](#)). Thus, it would make sense for it to also apply well to explaining why some individuals choose to cyberbully others. Another reason is that in Agnew's (2001) significant elaboration of general strain theory, he identified bullying as a strain that was particularly relevant for explaining delinquency. He specifically provided four conditions that bullying satisfies to cause strain: (1) the victim will perceive the bullying as unjust; (2) it will be perceived as being high in magnitude or importance because of the vitality of peer relationships for youth; (3) the bullying will be occurring away from traditional forms of social control such as parents or teachers; and (4) the victim will be exposed to aggressive behavior to model his or her own future behavior.

## Box 13.2 Emotional, Mental, Behavioral, and Physical Effects of Cyberbullying

### The Real-Life Effects of Cyberbullying on Children



<https://www.verywellfamily.com/what-are-the-effects-of-cyberbullying-460558>

Any type of bullying can have physical and psychological effects on a child. Anxiety, fear, depression, low self-esteem, behavioral issues, and academic struggles are just a few of the challenges kids may experience if they targets. Cyberbullying, however, may be particularly damaging.

This article demonstrates the substantive emotional harms that children can experience as a result of cyberbullying. The impact of this experience can be wide-ranging and may be sufficient to lead an individual to feel anger and frustration over a long period of time, which ties in to Agnew's general strain theory.

The empirical research to date has supported this application of general strain theory (see [Box 13.2](#)). Young people, who are more likely to experience a wide variety of strains, including poor school performance, perceived unfair sanctions from teachers or parents for conduct, and the experience of negative life events, are more likely to participate in bullying behaviors on and offline (Lianos & McGrath, 2018; Moon et al., 2011; Paez, 2018; Patchin & Hinduja, 2011).

Cyberbullying victimization, however, can also be viewed as a strain on its own. Studies have demonstrated that experiencing cyberbullying can lead youth to commit future delinquency, abuse substances, or self-harm (Baker & Pelfrey, 2016; Hay et al., 2010; Hinduja & Patchin, 2007; Kaakinen et al., 2018; McCuddy & Esbensen, 2017). In fact, cyberbullying victimization is often found to have larger effects than physical bullying on future offending and substance use (Hay et al., 2010; McCuddy & Esbensen, 2017). Wright and Li (2013) found that both peer rejection and cyberbullying victimization predicted future online aggression even when controlling for past acts of cyber aggression. In addition, being cyberbullied led to more aggression when coupled with peer rejection (Wright & Li, 2013) and physical bullying (Wright & Li, 2012).

Although general strain theory has shown itself to be a relevant theory for explaining traditional forms of crime as well as cyberbullying, the extent that it

will apply to other forms of cybercrime has yet to be fully examined (Holt & Bossler, 2016). For example, studies have generally not found evidence linking various types of strain with digital piracy (e.g., Brunton-Smith & McCarthy, 2016). Although its propositions are not strongly connected to property-driven cybercrime, such as digital piracy, its tenets marry well with the often predatory nature of computer hacking. General strain theory provides interesting propositions on why individuals would commit computer hacks. For instance, there may be certain life events, whether being fired, failing in school, or losing a boyfriend or girlfriend, that may lead individuals to experience negative emotions. Experiencing anger, resentment, frustration, or possibly depression may all be pertinent triggers that could lead someone to lash out and attempt to harm others by attacking their systems (for examples, see Rege, 2013). More advanced examinations of general strain theory could consider whether involvement in political or ideologically driven hacks, like those of Anonymous could stem from individual perceptions of how technology and information is used in our society, coupled with anger or frustration, affects involvement in illegal computer intrusions to address their perception of the problem. Only future research can address how general strain theory can apply to forms of cybercrime other than cyberbullying.

## ***Techniques of Neutralization***

### *Overview*

Gresham Sykes and David Matza's (1957) **techniques of neutralization** focus on how beliefs affect the process of deciding to commit a delinquent or criminal act. This theory assumes that most people hold conforming beliefs but may still engage in criminal behavior occasionally. Delinquents and criminals develop neutralizations prior to committing the act to justify why the behavior was acceptable and not in conflict with their general belief system. This allows them to **drift** between criminality and conformity without accepting a deviant or criminal identity (Matza, 1964). Unlike social learning theory, which would argue that the criminal offender had more beliefs supporting breaking the law than conforming beliefs, techniques of neutralization argue that the offender maintains a conventional belief system but can still justify deviant behavior.

Sykes and Matza (1957) developed five basic techniques that allow individuals to break from conformity: (1) **denial of responsibility**: someone else, event, or situation will be directly responsible for the offense and should be

blamed; (2) **denial of an injury**: no one or thing will get hurt or damaged; (3) **denial of a victim**: there is no discernible victim (e.g., large corporation) or the “victim” deserved it; (4) **condemnation of the condemners**: those who would condemn their actions are hypocritical and doing so out of personal spite; and (5) **appeal to higher loyalties**: the offense is for the greater good of the group. One can summarize these five techniques with the following statements: (1) “It wasn’t my fault;” (2) “No big deal. Nothing really happened;” (3) “They deserved it;” (4) “You would have done the same thing;” and (5) “My friends needed my help.”

### *Techniques of Neutralization and Cybercrime*

Scholars have applied the techniques of neutralization to a range of cybercrimes in order to understand how these behaviors can be justified by individuals who primarily live conforming lifestyles and have value systems congruent with that of traditional society. Most of the research focus has been on digital piracy, particularly in college samples, arguing that students hold justifications that allow them to download music or media without believing themselves to be criminals. Quantitative analyses of piracy have found weak (Hinduja, 2007) to moderate support (Higgins et al., 2008; Ingram & Hinduja, 2008; Marcum et al., 2011; Morris & Higgins, 2009) for the acceptance of various beliefs that justify this behavior. Scholars who have interviewed digital pirates have found stronger support for techniques of neutralization (Holt & Copes, 2010), which may be due to the nature of interviews allowing the respondents to express their feelings clearly, rather than giving preselected responses to a given question. Holt and Copes (2010), for example, found that persistent pirates do not see themselves as part of some piracy subculture, but simply that they have beliefs that justify these actions.

Ulsperger et al. (2010) performed one of the most intensive qualitative examinations of music piracy using a sample of youth born in “Generation Y” between 1982 and 1992. The authors found that the most prevalent technique supported among this group was denial of responsibility, at 36 percent of all sampled. Individuals in the sample placed the blame for their pirating behaviors on the mere existence of the Internet, time constraints to go to the store, economic disadvantage, being underage and not being allowed to purchase the music, and the simplicity of downloading music. The second most common technique was condemning the condemners, with students focusing their attention on the fact that it seems that everyone does it, governmental apathy in

addressing downloading music, and the record industry's need to refocus its energies to something else. Fifteen percent denied that there was a victim and thought that the music industry was greedy, CDs were too expensive, and corporations were exploiting customers. Another 15 percent denied that an injury even occurred. They argued that there was no moral harm, music is not a tangible product, they were previewing it for later purchase, and that they were informally promoting the artist. Finally, they also appealed to higher loyalties than the law and the music industry, including their friendships, freedom, God's gift of music, free trade, and environmental concerns.

Scholars have also found that hackers use a variety of techniques as well to justify their actions, as documented in [Chapter 3](#) (see also [Box 13.3](#)). Many hackers deny any injury occurred by arguing that either their computer exploits do not actually cause any harm (Gordon & Ma, 2003) or that gaining unauthorized access to computer systems is not very serious in comparison to other illegal acts (Chua & Holt, 2016). Others blame victims for having inadequate computer skills or computer systems to prevent the victimization (Chua & Holt, 2016; Jordan & Taylor, 1998; Turgeman-Goldschmidt, 2005). Hackers may also appeal to higher loyalties by stating that they are helping society by exposing corruption or providing knowledge freely to society (see [Chapter 3](#); Chua & Holt, 2016). They may also argue that the victim had it coming or that large corporations are greedy and do not really need the additional profits that their hacking prevented.

### Box 13.3 Justifications for Hacking

#### Hacking Can Be Justified

<http://debatewise.org/debates/3452-hacking-can-be-justified/>



With the possibility of cyber warfare and concerns over hacks that result in huge amounts of information being stolen getting more widespread white hat hackers are becoming more necessary to ensure security. Can such attacks be justified?

This article provides a robust and informed debate on the ways that hackers may be able to justify their involvement in serious attacks. The article provides good insights from both the perspective of hackers and of infrastructure owners and governments that may be harmed.

In Morris's (2011) insightful study examining the justifications that hackers frequently use, he found that neutralizations help us understand password guessing and illegal access to a computer system specifically, but not for file manipulation. He also found that associating with delinquent peers was a significant predictor of computer hacking over and above individual beliefs and agreement with techniques of neutralization. He therefore summarized that the techniques of neutralization are complementary to other theories but not necessarily a standalone theory.

Finally, Copes and Vieraitis's (2009) study on how traditional identity thieves use techniques of neutralization is insightful for understanding online economic crime, even if their sample did not include online identity thieves. The identity thieves stated that they would not engage in just any type of crime; they would not physically hurt others for money as this was perceived to be morally wrong. They most frequently used: (1) denial of injury; (2) denial of victim; (3) appeal to higher loyalties; and (4) denial of responsibility when justifying their actions. The most common justification used by the identity thieves is that their actions did not cause any real harm to actual individuals. Most loss was minor and victims resolved the problems with a few quick calls. If the thief acknowledged that a victim existed, they thought of large organizations that deserve victimization because of their unethical business practices. Thus, they not only denied these organizations victim status, but also "condemned the condemners" (Sykes & Matza, 1957).

The identity thieves also justified their crimes by stating that they were trying to help others (i.e., appeal to higher loyalties) by obtaining money. Their efforts could provide a better life for their children or give confidential information or government documents to family members and friends. In these cases, they did not normally think their actions were ethical, but that the needs of their families and friends were more important in the decision-making process. Finally, many of the identity thieves who worked within organizations claimed that they only played a minimal role in the crime, received little reward, and their supervisors in the organizational hierarchy had greater responsibility for the offense.

In summary, Sykes and Matza's (1957) techniques of neutralization provides scholars with a framework to understand various forms of cybercrime, particularly digital piracy, computer hacking, and identity theft. Although quantitative analyses usually only provide modest support for the theory's propositions, in-depth qualitative interviews provide much stronger evidence. As a result, neutralization theory research will likely continue in the future as scholars attempt to identify rationalizations that allow usually conforming individuals to drift temporarily into online criminal behavior.

## Deterrence Theory

### Overview

The Classical school of criminology, which dates back to the mid-18th century, was the product of the intellectual beliefs of the Enlightenment era. They viewed humans as hedonistic, rational, and calculating. As a result, crime was the result of free will and rational decision-making by individuals. People weighed the benefits and costs of a possible decision and chose whichever increased pleasure and decreased pain. They were not compelled to do so by any internal (e.g., biological) or external (e.g., demons) forces beyond their control. In order to minimize the possibility of crime, society needed structures to convince individuals that crime was neither a profitable nor pleasurable choice. To do this, governments needed to clearly codify laws on what was inappropriate, set punishments that were equal to the pleasure of the crime so no incentive would exist, apprehend criminals when they broke the law, and punish them swiftly (Paternoster, 1987).

The principles of **deterrence theory**, generated by Cesare Beccaria, are a direct reflection of the ideas of the Classical school. This perspective argues that humans will be deterred from choosing to commit crime if they believe that punishments will be certain, swift, and proportionately severe. The **certainty** of the punishment refers to how likely it is that the individual will be caught and punished for the offense. Swiftness, or **celerity**, of the punishment refers to how quickly the punishment follows the criminal act, not the apprehension of the offender. Finally, the **severity** of the punishment involves the intensity of the punishment relative to the harm caused by the crime.

Scholarly research has shown modest support for deterrence theory propositions using a wide variety of methods, including retrospective accounts, perceptual surveys, and longitudinal assessments (Paternoster, 1987; Pratt et al., 2006; Yu & Liska, 1993). Studies have shown that certainty, not severity, is the most important deterrence component. Increasing the perceived probability of getting caught is more important than increasing the severity of the punishments (e.g., more years in prisons, larger fines) associated with the crime.

### Deterrence and Cybercrime

Based on **Chapters 2–12** of this text, it is clear that most Western nations based their government structures and criminal justice systems on the tenets of the Classical school. Each chapter has ended with a discussion of the legislation

that nations have passed to criminalize certain computer-related behaviors, the specific punishments associated with each offense, and the agencies that enforce violations of these laws. These structures should provide an easily communicated framework to deter would-be cybercriminals based on the certainty of getting caught and receiving appropriate punishments.

Scholars have generally expressed concerns about the ability of governments to deter cybercrime through the threat and application of formal sanctions if law enforcement or government agencies cannot attribute a cybercrime or cyberattack to a certain person, organization, or nation (Brenner, 2007). Many cyber offenders may feel immune to the threats of formal sanctions as a result of the anonymity of the Internet. Any concerns about the seriousness of punishments is moot if offenders believe that the certainty of apprehension of many cybercrimes is low (Holt & Bossler, 2016).

Researchers have attempted to test if formal sanctions deter various forms of cybercrime, primarily using college samples. In a recent study, Bossler (2021) found that college students who perceived formal sanctions to be more certain and severe were less likely to commit digital piracy, commit minor forms of computer hacking, and online harass others; perceptions of formal sanctions, however, were not significantly related to any category of cybercrime when also examining perceptions of informal sanctions (i.e., punishments from family and friends) and deviant peer associations. Instead, associating with deviant peers and perceptions of informal sanctions were the two strongest predictors of cybercrime.

Other scholars have also examined which specific elements of deterrence appear to have an influence on behavior. Higgins et al. (2005) found that certainty of punishment, not severity, reduced the likelihood of piracy, supporting deterrence research on traditional criminal offending. Wolfe et al. (2008) examined whether intent to commit digital piracy was influenced by self-imposed guilt, the perception of whether family and friends might find out about the piracy, and the fear of getting a virus through pirated materials. Their results showed that guilt, an informal source of punishment, was one of the strongest factors preventing individuals from downloading music illegally. The fear of a malware infection was not, however, significant. Thus, it may be that informal levels of social control, such as guilt and embarrassment, might prove more useful in decreasing digital piracy than legal actions.

Scholars have also examined whether computer hackers can be deterred. In a sample of college students, Skinner and Fream (1997) found that the severity

of punishment associated with computer intrusions decreased their occurrence. The certainty of detection, by either administrators or students, was not significantly related to hacking behavior.

Extending this line of inquiry into the deterrability of hackers, Maimon and associates (2014) conducted an experiment to study whether displayed warning banners affected the progression, frequency, and duration of computer intrusions or trespassing. Using a set of live computers connected to the Internet that are designed to be attacked, called honeypots, the authors found that the warning banners did not affect immediate termination of computer intrusion. Individuals who saw the warning banner were no more likely to leave within the first 5 seconds than those who were not presented with the banner. In addition, the warning banners did not reduce the volume of repeated trespassing incidents. The warning banners did, however, shorten the duration of the trespassing incidents (Maimon et al., 2014). In a similar study, Wilson et al. (2015) found that the presence of surveillance banners reduced the severity of computer intrusion attacks, measured by whether commands were entered into the system, but only in longer first system trespassing events. Howell et al. (2017) presented either no warning banner or one of three types of warning banners – altruistic moral persuasion, legalistic, and ambiguous – to computer intruders and found that the difference in warning banners was not related to the keystrokes entered by the intruder to avoid detection. Thus, researchers have found modest support at best that traditional deterrence mechanisms can deter hackers from trespassing into university network systems.

Since the Internet allows individuals to attack both end users and government targets, researchers have presented arguments as to how deterrence can be used to prevent cyberattacks or cyberterrorism (e.g., Blank, 2001; Brenner, 2007; Geers, 2012). For example, Guitton (2012) argued that actor attribution (determining the source of an attack) can act as a deterrent, but only when the individual had a good knowledge of the attribution process, acted rationally, and was concerned about the costs of punishment. Attribution will not, however, be effective for irrational actors who do not fear punishments, possibly because the praise received from a successful cyberattack requiring skill is considered more important to these individuals. If deterrence only appears to be influential for rational actors, how should nation-states protect themselves from hackers who are more concerned about the perceived benefits of the cyberattack and to make a political statement regardless of the costs to him or his country? This assumes that a nation can actually identify the source of an intrusion in the first place, which is not always possible (Brenner, 2007).

Clearly, more research needs to be conducted on the benefits of a deterrence framework to understand various forms of cybercrime. In some instances, the lack of deterrence research regarding cybercrimes appears to have to do more with its testability and measurement issues than the logic of its theoretical arguments. Thus, future researchers might move away from conducting surveys which have had difficulty assessing the theory to more experimental designs.

### Applying Criminological Theories to Cybercrime Victimization

Criminologists have not only used traditional criminological theories to better understand why some individuals are more likely to commit various forms of cybercrime, but also which factors place individuals at greater risk for cybercrime victimization. The two most common theories used to assess the likelihood of cybercrime victimization are Lawrence Cohen and Marcus Felson's (1979) **routine activity theory** and Michael Gottfredson and Travis Hirschi's (1990) general theory of crime.

#### Routine Activity Theory

##### Overview

Cohen and Felson (1979) argued that direct-contact predatory victimization occurs with the convergence in both space and time of three primary components: (1) a **motivated offender**; (2) a **suitable target**; and (3) the **absence of a capable guardian**. If one component is missing, crime will not occur making this an ideal theory to examine how offender and victim interactions may be artificially affected to reduce crime. Motivated offenders constitute any individuals or groups who have both the inclination and ability to commit crime. Cohen and Felson assumed that there would always be an ample supply of motivated offenders. Thus, they were more interested in how social (e.g., more women joining the work force) and technological (e.g., lighter electronics) changes affected changes in national crime rates.

A target, whether referring to a person or object, is viewed as suitable based on how attractive it is to the offender on a wide range of factors, including monetary value, ease of access, and other intrinsic values. Finally, capable guardians exist to protect the target from harm. Guardianship can be expressed in various ways, including physical (e.g., security cameras, lighting, alarm systems,

locks), social (e.g., friends), and personal (e.g., knowing martial arts, carrying pepper spray) forms.

Scholars who use routine activity theory are particularly interested in how daily behavioral routines increase a target's proximity to motivated offenders while also affecting both capable guardianship and target suitability. Understanding routine activities is important in that they normally separate individuals from the safety of their homes, people they trust, and their possessions. Scholars have found this theory to be very successful in predicting a wide variety of both property crime victimization, such as burglary (Cohen & Felson, 1979; Couple & Blake, 2006) and larceny (Mustaine & Tewksbury, 1998), as well as violence, such as physical assault (Stewart et al., 2004) and robbery (Spano & Nagy, 2005).

### *Routine Activity Theory and Cybercrime Victimization*

Routine activity theory was identified by early cybercrime scholarship as a key theory to better understand cybercrime (Grabosky & Smith, 2001; Newman & Clarke, 2003). Scholars have argued that each component of this theory – motivated offenders, suitable targets, and the absence of a capable guardian – are present in cyberspace. As the previous chapters have indicated, there is an abundance of individuals who have the inclination and ability to harass others, download child sexual abuse materials, hack into computers, or try to commit online fraud. In keeping with the spirit of routine activity theory, cybercrime scholars do not assess motives but rather focus on the factors affecting victimization risk.

The suitability or attractiveness of a target in cyberspace varies substantially based on the interests of the offender. The target may be a computer system or network, sensitive data, or an individual. For the crime of computer intrusion, a hacker may want to compromise a system because they want access to specific information or files. On the other hand, they may simply want to see whether the system can be penetrated (Holt, 2007). In incidents of harassment, an individual may be targeted for various reasons, whether because of a perceived slight, a failed relationship, or because of perceived weakness and social isolation (see [Chapter 9](#) for detail).

Finally, there are guardians in cyberspace equivalent to the ones we use to protect ourselves in the physical world. Computers have various forms of physical guardianship, equivalent to locking our houses, such as antivirus software and password-protected screens. Antivirus and similar programs are designed expressly to reduce harm from hackers and other cybercriminals who might want access to your sensitive information (see [Chapter 4](#)). Social guardianship



### Box 13.4 Self-Protection While Online

#### Security Tip (ST06-003): Staying Safe on Social Network Sites

[www.us-cert.gov/ncas/tips/ST06-003](http://www.us-cert.gov/ncas/tips/ST06-003)

While the majority of people using these sites do not pose a threat, malicious people may be drawn to them because of the accessibility and amount of personal information that's available. The more information malicious people have about you, the easier it is for them to take advantage of you.

This security bulletin from the US-CERT provides practical information on the ways that individuals can protect themselves and their personal information in social media sites like Facebook. The article also demonstrates the inherent benefits of self-protection in online environments.

can play a large role in the cyberworld as well since our friends can protect us from harassment and other forms of victimization or they can be the ones that harass us, unintentionally send us corrupted files via email, or teach risky activities such as how to commit digital piracy. Finally, personal guardianship in cyberspace could include developing an understanding of computer technology, updating software, changing passwords, and not providing sensitive personal information (see [Box 13.4](#) for example).

Although the components of routine activity theory easily apply to all forms of cybercrime victimization, Majid Yar (2005) expressed concern regarding the applicability of the theory as a whole. He notes that routine activity theory:

requires that targets, offenders and guardians be located in particular places, that measurable relations of spatial proximity and distance pertain between those targets and potential offenders, and that social activities be temporally ordered according to rhythms such that each of these agents is either typically present or absent at particular times. Consequently, the transposability of RAT to virtual environments requires that cyberspace exhibit a *spatio-temporal ontology* [emphasis in original] congruent with that of the “physical world,” i.e. that place, proximity, distance and temporal order be identifiable features of cyberspace. (p. 414)

In essence, cyberspace does not meet these criteria because virtual environments are spatially and temporally disconnected, disorganized, active at all times, and web pages are born and die in relatively short amounts of time. Most scholars, however, view the interaction of the offender and victim in cyberspace through the web or email as analogous to physical interactions (Bossler & Holt, 2009). Reyns et al. (2011) addressed this concern theoretically with their cyberlifestyle-routine activities theory which connects motivated offenders and victims through networked systems. The network between victim and offender allows for both a conduit to exist in cyberspace between the two groups and an eventual overlap in time for the interaction to occur. Other scholars have commented that Yar's (2005) critique may be applicable to offenses committed on certain websites, but that computer networks associated with universities, government agencies, and corporations are fairly stable and that offenses committed against these networks (e.g., computer intrusions) may be more predictable by online routine behaviors of the networks' users (Maimon et al., 2013).

A large body of scholarship has developed which empirically tests the applicability of routine activity theory to cybercrime (Bossler, 2020; Holt & Bossler, 2016). The findings are quite mixed as they vary based on cybercrime type, measurements, and samples. Much of the research examining routine activities theory and cybercrime victimization has focused on its ability to predict online harassment and cyberstalking victimization. The findings provide limited evidence that general routine technology use affects risk of online harassment or cyberstalking victimization, including spending time in chat rooms, social networking sites, and email (e.g., Bossler et al., 2012; Hinduja & Patchin, 2009; Holt & Bossler, 2009; Moore et al., 2010; Ngo & Paternoster, 2011; Re却ns et al., 2011; Ybarra et al., 2007; see Leukfeldt & Yar, 2016 and Wick et al., 2017 for exceptions). Using a large dataset in the Netherlands, Leukfeldt and Yar (2016), however, found that direct forms of communication, such as email, MSN and Skype, and Tweeting, increased the odds of interpersonal cyber victimization as it increased the victim's online visibility. Wick et al. (2017) also found that disclosing personal information online, including both information and pictures, was related with a higher likelihood of cyber harassment victimization by romantic partners.

Specific online behaviors have been found to be related to malicious software infections, but the findings vary by sampling. Scholars generally do not find online routine behaviors, such as online banking or shopping, emailing, or spending time on social media to be related to malware victimization in

college samples (Bossler & Holt, 2009; Holt & Bossler, 2013). They have, however, found significant relationships in non-college samples. For example, Bergemann et al. (2018) found that computer usage frequency and the number of Internet devices owned were related to malware victimization in a German adult sample. Respondents were able to reduce their odds of victimization by avoiding certain behaviors, such as using suspicious Internet links and public hotspots, downloading software, and posting private information online. Additionally, Reyns (2015) found that booking online reservations, online purchasing, and social networking were all related to malware victimization in a Canadian adult sample.

The importance of online routine behaviors in understanding online economic crime victimization is also dependent on the type of victimization examined. In Ngo and Paternoster's (2011) examination of phishing victimization in a college sample, they found little evidence to support the argument that knowing respondent online routine behaviors would help predict who is more likely to be a victim of phishing. The only significant behavior that increased victimization was whether the respondent committed various forms of computer deviance. They did not find that measures of exposure to motivated offenders (e.g., spending more time on the Internet, writing emails, being in chat rooms), target suitability (e.g., communicating with strangers, providing personal information, demographics), and capable guardianship (e.g., security software, computer skill) were related to phishing victimization. Reyns (2015), however, found in a Canadian sample that several online behaviors such as online banking, booking reservations, online purchasing, and social networking were related with phishing victimization. In Dutch samples, buying products online and participating in direct communication (e.g., email) and web forums increased the likelihood of being a victim of online fraud (Leukfeldt & Yar, 2016; van Wilsem, 2013). Chen et al. (2017) also found in a sample of Internet users that being a victim of an Internet scam was related with online shopping, opening emails from unknown sources, and disclosing information online. These behaviors both increase victim visibility online and make them more accessible by motivated offenders, which differentially increases risk of victimization.

In another recent study examining how online routines affected identity theft victimization, Reyns and Henson (2016) used data from the 2009 Canadian General Social Survey and found that individuals that do their banking and make purchases online were more likely to be victims of identity theft. Individuals who posted personal information on social media sites and other

online spaces were also more likely to be victimized. Importantly, those who had been targeted by hackers or responded to a phishing email were also much more likely to be victimized, suggesting identity theft may be an antecedent experience of primary victimization via certain forms of cybercrime (Reyns & Henson, 2016). It also appears that racial minorities and those individuals with a higher income are viewed as more suitable targets or participate in online activities that increase their chances of identity theft victimization.

Individual involvement in various forms of cybercrime increases the risk of cyber victimization as well. Specifically, engaging in bullying, harassment, computer hacking, digital piracy, and other forms of cybercrime appears to increase the risk associated with harassment and bullying (Hinduja & Patchin, 2009; Holt & Bossler, 2009; Holt et al., 2012; Ngo & Paternoster, 2011; Reyns et al., 2011; Ybarra et al., 2007). In addition, committing cyber deviance may lead to increased odds of becoming a victim of phishing (Ngo & Paternoster, 2011), malware infection (Holt & Bossler, 2013), and online financial crime (Kerstens & Jansen, 2016). The online deviant activities of a person's friends also increase the risk of victimization as this directly increases exposure to motivated offenders while also decreasing guardianship (Bossler et al., 2012; Hinduja & Patchin, 2008; Holt & Bossler, 2009; Reyns et al., 2011).

The use of protective software programs, such as parental filtering software and antivirus programs, appears to do little to reduce the risk of online harassment victimization (Holt & Bossler, 2009; Leukfeldt & Yar, 2016; Marcum, 2010; Navarro et al., 2017; Ngo & Paternoster, 2011). The findings on the ability of antivirus programs to decrease malware victimization and online economic victimization are also mixed. Various studies have found strong support that antivirus programs decrease these forms of victimization (e.g., Bergemann et al., 2018; Williams, 2016). For example, Williams (2016) found that antivirus software and secure browsing both decreased the odds of online theft victimization in the Eurobarometer data. Other studies, however, have found that using antivirus software is either not related with phishing victimization (e.g., Leukfeldt, 2014) or that it was related with higher levels of malicious software infection (e.g., Reyns, 2015). This second finding is presumably because individuals with antivirus software programs are more likely to know whether their computer has become infected or that they possibly updated and installed their software after victimization.

In a study that specifically examined online forms of identity theft, Holt and Turner (2012) examined the protective factors that made certain individuals more resilient in high-risk online environments where sensitive information

must be transmitted to complete an economic transaction or communicate generally. Within their sample of students, faculty, and staff at a large university, they found that only 2.3 percent of individuals who reported no risk factors (defined in their study as the commission or victimization of different forms of online deviance) had someone obtain their financial information electronically without their knowledge or permission within the last 12 months. Almost 15 percent of individuals who reported at least five of these risk factors reported being victims of online identity theft. Within this group of high-risk individuals, they found that those individuals who updated their protective software, such as antivirus, Spybot, and ad-aware, were less likely to be victimized. They did not find, however, that having firewall protection or higher levels of computer skills decreased victimization within this group.

Individual technical or computer skills, a form of personal guardianship, has generally not been found to be related to lower forms of online harassment victimization (Bossler et al., 2012; Holt & Bossler, 2009), phishing (Leukfeldt, 2014), data loss from malware infection (Bossler & Holt, 2009), or identity theft (Holt & Turner, 2012). There are exceptions. For example, Graham and Triplett (2017) found in a nationally representative sample that individuals with more digital literacy were less likely to respond to online phishing scams. In some instances, studies have found that those with greater computer proficiency may have an increased risk of victimization (Bocij & McFarlane, 2002; Hinduja & Patchin, 2008; Holt & Bossler, 2009). This may be that those with higher computer skills are better able to recognize when they have been victimized.

In summary, routine activity theory has shown itself to be the most empirically sound theory in explaining both traditional and cyber victimization.

### **General Theory of Crime and Victimization**

#### *Overview*

Another theory used by scholars to account for cybercrime victimization is whether the individual characteristics of the victim somehow influenced the odds of their victimization. The most common individual theoretical trait that researchers have examined in relation to victimization is the individual's level of self-control. Although Gottfredson and Hirschi (1990) consider self-control theory to be a *general theory of crime*, and not technically a theory of victimization, they argue that the high correlation between offending and

victimization is because both are a result of inadequate levels of self-control (pp. 92–94).

The characteristics of low self-control (i.e., short-sighted, insensitive, impatient, risk-taking) that increase the odds of offending also theoretically increase the likelihood of victimization through various mechanisms (Schreck, 1999). Individuals with lower levels of self-control do not accurately consider and perceive the consequences of their actions, both increasing the probability of crime and victimization. They put themselves in risky situations and act inappropriately, increasing opportunities to offend, while at the same time placing themselves in close proximity to offenders who may prey upon them.

Research over the last decade has shown that Gottfredson and Hirschi's concept of low self-control is a consistent but modest predictor of why certain individuals are more likely to be victimized (Pratt et al., 2014). Its effect, however, is stronger for noncontact forms of victimization (e.g., fraud) than direct contact victimization and decreases when controlling for risky behaviors that could possibly mediate the relationship (Pratt et al., 2014).

### ***Low Self-Control and Cybercrime Victimization***

The link between low self-control and traditional victimization appears to apply to cybercrime victimization in a variety of ways. First, individuals with low self-control favor short-term immediate gratification with little regard to long-term consequences (Gottfredson & Hirschi, 1990). Their enjoyment of risk-taking and thrill-seeking decreases the safety of themselves and their property, increasing **vulnerability** to victimization (Schreck, 1999). In online environments, individuals with low self-control engage in risky behaviors, which opens them up to malicious software infection and other forms of victimization (Holt & Bossler, 2009). They may also interact with strangers in chat rooms and other virtual environments and provide them with sensitive information that could lead to online harassment or cyberstalking.

Second, individuals with low self-control have little empathy for others. This makes it difficult for them to relate to others, create stronger social ties, and understand other people's intentions (Gottfredson & Hirschi, 1990; Schreck, 1999), all increasing their vulnerability. If individuals have challenges interacting with others face to face, their problems are probably compounded in a virtual environment. Third, their low tolerance means they are more likely to want to resolve issues physically rather than mentally and may get easily angered or frustrated. Individuals who may get easily frustrated or provoked when dealing

with others online may simply escalate situations and increase the chances of harassment, bullying, or threatening online interactions.

Finally, individuals with low tolerance may increase their vulnerability when they become easily frustrated with complex security devices and stop using them or not use them correctly (Schreck, 1999). Unfortunately, computer security programs can be quite complex and are not necessarily intuitive. They are, however, necessary to protect a computer, its data, and the security of the user. In addition, computer owners must be diligent and regularly update protective software. Individuals with low self-control are generally not diligent and will not consistently make the effort to protect their computer and themselves.

Empirical research generally finds that self-control is associated with cybercrime victimization. The type of cybercrime victimization, however, is an important factor in assessing the size of the relationship (Bossler & Holt, 2010; Reyns et al., 2019). Low self-control might help understand cybercrime victimization where the person is the target (e.g., having password changed; harassment) and not computers in general (e.g., large phishing attempts; Bossler & Holt, 2010; Holt et al., 2016; Pratt et al., 2014; Re却ns et al., 2019). When the effect of low self-control is statistically significant, its impact is small.

For example, Bossler and Holt (2010) examined the effect of low self-control on five cybercrime victimization types in a college sample. They found that having lower levels of self-control increased the risk of one's passwords being obtained to access computer accounts and files, someone adding, deleting, or changing information in one's computer files without the owner's knowledge or permission, and being harassed online. Other studies have also found low self-control to be a significant, albeit not the most important, predictor of both sexual and nonsexual online harassment victimization and cyberstalking (Fox et al., 2016; Holt et al., 2016; Ngo & Paternoster, 2011).

The literature on the relationship between low self-control and economic crime victimization is mixed as it depends on the type of victimization studied and the sample utilized. Low self-control has not been found to be significantly related to electronic credit card theft (Bossler & Holt, 2010), identity theft (Reyns et al., 2019), and phishing attacks (Ngo & Paternoster, 2011) in college samples. Scholars using Dutch data sets, however, have found that there is significant overlap between the commission of online financial cybercrimes and cyber victimization, including the role that low self-control has in increasing the odds of various forms of online fraud victimization, including consumer fraud, auction fraud, virtual theft, and identity fraud (Kerstens & Jansen, 2016; van Wilsem, 2013).

In summary, Gottfredson and Hirschi's (1990) general theory of crime provides an interesting perspective of how an individual's characteristics increase the risk of victimization. The inability of individuals with low self-control to prevent themselves from committing acts that have long-term negative consequences may also increase their odds of victimization by placing them in risky situations with the wrong people (Schreck, 1999). Although the major arguments logically apply to cybercrime victimization as well, empirical studies show that low self-control is a weak predictor of person-based cyber victimization types, such as online harassment and hacking victimization.

It may be that this relationship stems from the fact that individuals with low self-control are more likely to associate with delinquent peers who are more likely to victimize those who are in close proximity to themselves. For instance, Bossler and Holt (2010) found that low self-control's effect on hacking and harassment victimization became nonsignificant when controlling for peer offending. This meant that low self-control did not directly cause these victimizations because of impulsivity or carelessness, but that low self-control increased their likelihood of associating with delinquent peers who were probably more likely to victimize the respondent. Thus, this relationship should be further explored to refine our understanding of the relationship between self-control and victimization generally.

## Need for New Cyberspace Theories?

### *Space Transition Theory*

Though there are a number of traditional criminological theories that have been applied to cybercrimes, a few researchers have called for new theoretical paradigms that may more accurately account for these offenses. For instance, K. Jaishankar (2008) proposed a theory he called **space transition theory**, which argues that people behave differently while online than they otherwise would in physical space. In turn, individual behavioral patterns are different online than they are in physical space. This theory has seven basic postulates about both human behavior and offending generally:

- 1 Persons with repressed criminal behavior (in the physical space) have a propensity to commit crime in cyberspace, which, otherwise they would not commit in physical space, due to their status and position.
- 2 Identity flexibility, dissociative anonymity, and lack of deterrence factor in that cyberspace provide the offenders the choice to commit cybercrime.

- 3 Criminal behavior of offenders in cyberspace is likely to be imported to physical space; that in physical space may be exported to cyberspace as well.
- 4 Intermittent ventures of offenders in cyberspace and the dynamic spatio-temporal nature of cyberspace provide the chance to escape.
- 5 (a) Strangers are likely to unite together in cyberspace to commit crime in physical space; and (b) associates in physical space are likely to unite to commit crime in cyberspace.
- 6 Persons from closed society are more likely to commit crimes in cyberspace than persons from open society.
- 7 The conflict of norms and values of physical space with the norms and values of cyberspace may lead to cybercrimes.

The utility of this theory has yet to be identified as few have empirically investigated these hypothesized relationships (see Kethineni et al., 2018 for an example). Some of the concepts presented in the theory are variants of concepts from previously discussed theories, such as social learning theory. Other propositions, however, appear incongruent with some of the information presented throughout this book. For instance, there is clear evidence that data thieves may not know one another offline but regularly interact in virtual spaces to buy and sell personal information (see [Chapter 6](#)). Furthermore, the rates of participation in cybercrimes like cyberbullying are somewhat consistent across place, regardless of the political landscape of the nation (see [Chapter 9](#)). Thus, it is possible that his insights apply better to some forms of cybercrime than others. Regardless, space transition theory is one of the few theories created specifically to address cybercrime. Only future empirical testing of his theory will be able to assess these propositions. In addition, his theory may inspire other scholars to create cybercrime-specific theories.

### **Digital Drift**

Another promising approach is to modify traditional criminological theories to better fit the realities of cyberspace. Goldsmith and Brewer (2015) recently created the concept of **digital drift** based on Matza's (1964, 1969) drift theory, which argues that youth are not completely socialized into a delinquent subculture but rather are exposed to delinquent youth and belief systems that help neutralize or justify delinquent behavior. Goldsmith and Brewer argue that technology creates a wide variety of opportunities for individuals to both engage and disengage from different criminal communities on and offline.

The anonymity and escapism provided by the Internet allows individuals to be exposed to different communities that are disconnected from their actual identity and act in ways online that they would not have otherwise in the traditional world.

The Internet provides two conditions necessary for digital drift to occur according to Goldsmith and Brewer: affinity and affiliation. Affinity refers to the various online content that may appear attractive and exciting to youth (e.g., pornography, hacking tips, free music), but exposes them to criminal behaviors and justifications that suggest that these online behaviors are socially acceptable. Affiliation refers to the means in which youth are able to interact and deepen their relationships with online deviants and offenders. Accessing and spending time with new online social networks expose youth to individuals who may provide justifications, neutralizations, and reassurances that the wrongdoing is “normal.” Youth can therefore drift back and forth between conformity and deviance depending on whether they are online or not as well as with what specific social network they are associating.

Digital drift would appear to be a useful framework to understand how individuals, particularly youth, become exposed and commit common forms of cybercrime and cyber deviance by exploring online communities. As discussed in various chapters of the book, individuals can learn techniques and justifications to hack ([Chapter 3](#)), commit digital piracy ([Chapter 5](#)), download pornography ([Chapter 7](#)), and bully ([Chapter 9](#)) via exchanges with online networks. Goldsmith and Brewer (2015), however, apply their theoretical adaptation to explain acts of lone-wolf terrorism and pedophilia. In the end, Goldsmith and Brewer have provided an interesting modified theory which can be applied to multiple forms of cybercrime, but a great deal more of theoretical discussion and empirical research is necessary by the academic community.

Finally, another possible step for criminologists to better understand cybercrime offending and victimization is to look at scholarly work from other fields, including, but not limited to: computer science, information technology, psychology, and political science. Criminologists primarily examine the behavioral aspects of cybercrime offending and victimization from a sociological perspective. They do not have the expertise and backgrounds needed to properly examine how the brain operates, how global dynamics influence individual behavior, and how to improve computer security safeguards. Drawing from the expertise of these relevant fields could greatly improve our understanding of cybercrime and identify alternative strategies to address involvement in cybercrime offenses (see [Box 13.5](#) for examples of psychological theories of cybercrime).

### Box 13.5 Psychological Theories of Cybercrime

Needs analysis surveys for computer crime investigations indicated the ability to obtain reliable and valid offender profiles were pressing issues in law enforcement (Rogers & Seigfried, 2004). In addition, Loch and Conger (1996) concluded, “individual characteristics all appear to be important in determining ethical computing decisions” (p. 82). Thus, research should not only focus on information assurance and security, but it should also focus on the personality and cognitive characteristics associated with computer criminality. This box briefly summarizes three psychological theories which have been applied to various cyberdeviance: theory of moral development, theory of planned behavior, and theory of reciprocal determinism.

#### Theory of Moral Development (Kohlberg, 1976)

According to Kohlberg (1976), moral reasoning transforms and develops through three levels, with two stages within each level. In the pre-conventional level (I), morality is “external,” meaning children view a behavior as “good” or “bad” due to perceived rewards and consequences. In Stage 1, children engage in behavior because of hedonistic rewards and praise that follow and refrain from engaging in certain behaviors to avoid possible negative consequences. In Stage 2, the child continues to make decisions that satisfy their own needs while occasionally satisfying the needs of others. A sense of reciprocity and the motto, “you scratch my back, and I will scratch yours” begins. In the conventional level (II), the individual begins to recognize and be influenced by social order. In order to move into Stage 3, the child must be able to recognize the viewpoints of others. In Stage 3, moral behavior is reflected in the labels assigned to the child by his/her family, peers, and other social groups. The child recognizes that there are good and bad behaviors and it is important to be viewed by others as either a “good girl or good boy.” Stage 4 refers to the “law and order” orientation, meaning the child feels bound by the need to follow rules in order to maintain social order. Acting morally means conforming to authoritative figures and obeying social rules. In the final level, post-conventional (III), morality is ultimately internalized, and the individual begins to define morality apart from formal (laws, social rules) and informal social controls (peer groups, family). In Stage 5, the

individual recognizes the welfare of others and the fact that moral decisions are made for “the greater good.” There is a utilitarian approach to moral decision-making, meaning decisions should be made to maximize happiness and reduce suffering. Finally, Stage 6 is the highest stage of moral development known as the “universal ethical-principle orientation.” In this stage, an individual has abstract moral principles guided by a sense of basic human rights, objectivity, and equal respect for all.

Research has compared the stages of moral development with ethical computer decisions. For example, Gordon (1994) compared the moral stages of development in a sample of virus writers classified as adolescent, young adult, professional adult, or ex-virus writers. Results suggested the adolescent and young adult virus writers were within normal ranges for moral development when compared to their nonvirus writer age mates. The adult virus writers, however, were in lower stages of moral development compared to their nonvirus writer age mates (Gordon, 1994). Rogers (2010) believed script kiddies, the least technical hacker, were only at Stage 2 of moral development due to their immaturity and attention-seeking behavior. As for cyber-punks and identity thieves, their disregard for authority and selfish tendencies also place them into a similar stage of moral development as script kiddies. The heterogeneity of virus writers makes it difficult to assign a specific stage of moral development, as virus writers can range anywhere from Stage 2 to Stage 5 of moral development. Finally, Rogers (2010) suggests the professionals (i.e., an elite group of hackers) rank in one of the higher categories of moral development, Stage 5, because of their flexibility of moral character, since professionals may be either white-, gray-, or black-hat hackers, depending on which hacker code they follow.

### Theory of Planned Behavior (Ajzen, 1985, 1991)

The theory of planned behavior (Ajzen, 1985) argues that whether a person intends to engage in certain behaviors is determined by: attitude toward the behavior, subjective norm, and perceived behavioral control. First, this theory suggests that beliefs create attitudes. Behavioral beliefs, which are the expected outcomes for engaging in a particular behavior, influence our attitude toward the behavior. For example, we are more likely to have a positive attitude toward eating apples if we have positive beliefs

about apples, such as “an apple a day keeps the doctor away.” In predicting someone’s behavior, we also need to examine their concern over “what others might think,” referred to as subjective norms, as well as how other people will react to that particular behavior, or normative beliefs. Returning to the example of the apple, we might be more motivated to eat an apple rather than French fries if we want to be perceived as healthy by our peers. Finally, our opinions of perceived control, whether we are capable of engaging in the particular behavior, also affect whether we are likely to engage in certain behaviors. Perceived control is influenced by our control beliefs, which are beliefs about the presence of factors that may help or hurt our ability to engage in a particular behavior. If your favorite fast-food chain was closing, you might need to decide between being perceived as healthy by your friends or eating your favorite unhealthy food at the restaurant that is closing. Overall, all of these beliefs – behavioral, normative, and control – guide the creation of behavioral intentions, and these beliefs will be weighted differently based on their importance to a particular behavior.

Only a few studies have applied the theory of planned behavior (Ajzen, 1985, 1991) to unethical computer behaviors. Chang (1998) found that perceived behavioral control was the most significant predictor of people’s intentions to pirate software. Regardless of a person’s intentions, the appropriate resources or opportunities must be present in order for that person to engage in the unethical computer behavior. Rennie and Shore (2007) suggested six controls to curb a person’s intentions to engage in computer hacking: (1) computer security legislation; (2) reducing vulnerability of computer systems; (3) parental controls; (4) reducing peer pressure; (5) cyber policing; and (6) reducing access to hacking tools. These controls relate directly to Ajzen’s (1985) perceived control, subjective norms, and attitude toward the behavior. For example, encouraging parents to talk to their children about computer ethics, as well as reducing the impact of peer pressure, may deter an individual from computer hacking due to changes in subjective norms. In addition, strengthening computer and information security, as well as making it difficult to obtain computer hacking tools, will increase the perceived controls over one’s ability to engage in computer hacking. Finally, through computer security legislation and cyber policing, an individual will more likely view

computer hacking in a negative light due to the possible negative outcomes (i.e., prosecution).

### Theory of Reciprocal Determinism (Bandura, 1977)

When we try to understand “why” people behave in a certain way, we tend to argue for either nature or nurture explanations. Bandura’s (1977) theory of reciprocal determinism combined the classic “nature versus nurture” attitude into a social cognitive theory that acknowledges both the external and internal factors related to human behavior. The theory of reciprocal determinism states psychological, biological, and cognitive (personal internal factors = P) and environmental (external factors = E) factors all interact and exert bidirectional influences on human nature (behavior = B). These factors intermingle and affect one another in multiple directions; however, reciprocity does not imply equality in the amount of influence that one factor has over another (Bandura, 1977, 1978, 1994). Overall, determinism reflects an interaction between multiple variables in multiple directions rather than an independent relationship resulting in unidirectional cause and effect. In addition, the variables in the tripartite model differ in regards to their strength or magnitude of influence on human nature. According to Bandura (1986), “when situational constraints are weak, personal factors serve as the predominant influence in the regulatory system” (p. 35). If environmental constraints are “weak,” there are ineffective barriers keeping an individual from engaging in a particular behavior.

For example, the globalization of technology has created an environment where Internet child pornography is readily available, accessible, and affordable (Triple-A Engine, see Cooper, 1998). Essentially, viewing child pornography is both easy to commit and not get caught. There are other external factors, unique in some aspects to cyberspace, which may influence whether an individual engages in computer deviance. According to Campbell and Kennedy (2009), “characteristics inherent to the electronic environment may contribute to antinormative behaviors” (p. 18), specifically anonymity (Lipson, 2002), reduced social cues (Kiesler & Sproull, 1992), and deindividuation (Zimbardo, 1969). As stated by Morahan-Martin and Schumacher (2000), “Social contact over the Internet does not

involve face-to-face communication and can even be anonymous, which can lessen social risk and lower inhibitions” (p. 25). Internet users are able to try out new roles, identities, and self-presentations, which is facilitated by the perceived anonymity or “cloak of safety” provided by the Internet. For example, anonymizers, steganography, and encryption are considered hacker “tools of the trade,” which provide some level of anonymity and secrecy online (Holt, 2010).

Overall, Bandura’s theory of reciprocal determinism incorporates both the environmental and personal factors associated with human behavior. Preliminary research suggests this theory may explain why some people are more likely to engage in cybercrime, specifically Internet child pornography, when others do not. Future research is needed to determine if this theory is applicable to other forms of cybercrime.

What similarities do you see between these three psychological theories and the criminological theories covered in this chapter?

## Summary

Criminological theory has much to offer to our understanding of both cybercrime offending and victimization. Although the criminological theories discussed in this chapter have important insights on why certain individuals are more likely to offend or be victimized, empirical studies have provided more support for certain theories overall. For example, Ron Akers’ (1998) social learning theory is currently the best theoretical framework that we have to understand both traditional and cybercrime offending. Cohen and Felson’s (1979) routine activity theory is the most utilized and supported theory to explain traditional and cyber victimization. Other theories have shown moderate support and need more scrutiny to determine their validity for cybercrime.

Most assessments involve some form of digital piracy offending and harassment victimization. An increased amount of work is occurring explaining the correlates and causes of computer hacking and identity theft, but scant research has been conducted on more complex forms of cybercrime such as malicious software distribution and cyberterrorism. In addition, it is possible that cybercrime with all of its unique characteristics will prompt new theories to be created. The creation of new theories to explain crime in the virtual world might not only help provide a better understanding of cybercrime but may possibly lead to new insights about crime in the physical world as well.

## Key Terms

Absence of a capable guardian  
Appeal to higher loyalties  
Argot  
Celerity  
Certainty  
Condemnation of the condemners  
Definitions  
Denial of a victim  
Denial of an injury  
Denial of responsibility  
Deterrence theory  
Differential association  
Differential reinforcement  
Digital drift  
Drift  
General strain theory  
General theory of crime  
Imitation  
Motivated offender  
Routine activity theory  
Self-control  
Severity  
Social learning theory  
Space transition theory  
Subculture  
Suitable target  
Techniques of neutralization  
Vulnerability

## Discussion Questions

1. Do you agree that cybercrime is “old wine in a new bottle?”
2. Which theory made the most sense to you in explaining crimes in a virtual world? Why?

3. Think of a recent news event involving cybercrime. Which theory helps you better understand why that individual committed that crime?
4. Does the idea of a low-self-control hacker make sense to you? Why or why not?
5. What risky activities do you partake in when you are online? How do those actions relate to routine activity theory?
6. Do we need cybercrime-specific theories or are traditional criminological theories adequate?

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Chapter **14**

# EVOLUTION OF DIGITAL FORENSICS

## Chapter Goals

- Differentiate between computer forensics and digital forensics
- Explain the *ad hoc*, structured, and enterprise phases of digital forensics
- Identify potential sources of digital evidence
- Understand the differences between closed-source and open-source software
- Describe the four stages in a digital forensic investigation
- Examine the role of digital evidence in criminal and civil court cases
- Understand the importance of evidence integrity to digital forensic investigations and the court of law

## Introduction

In March 2010, 18-year-old Kimberly Proctor was brutally raped and murdered in the small town of Langford in British Columbia, Canada, by two teenage boys, Kruse Hendrik Wellwood, 16, and Cameron Alexander Moffat, 17 (CBC News, 2010). Kimberly was lured to Wellwood's home where she was beaten, tortured, and sexually assaulted for several hours, her legs and arms were bound with duct tape, and her head was covered with a plastic bag. Kimberly was stuffed into a freezer then left overnight, and according to court documents, she died of asphyxiation. The medical examiner, however, was unable to determine if she was deceased prior to or after being placed in the freezer. In the morning, her body was driven to a secluded area under a bridge where the teenage boys set her on fire. This crime was solved thanks to a digital trail of evidence left behind by the two teenage boys. According to Roberts (2011), "police investigating this case ... gathered the digital equivalent of 1.4 billion pages of paper evidence, including Facebook and MSN messages, text messages and chat histories" (para. 7). For example, while chatting on *World of Warcraft*, Wellwood confessed to the murder of Kimberly Proctor to his online gamer girlfriend (Zetter, 2011). In 2011, both teenage boys pleaded guilty to first-degree murder and indignity to human remains and were sentenced as adults to life imprisonment with no possibility of parole for ten years. The murder of Kimberly Proctor was solved through the use of digital forensics.

Before we discuss the evolution of digital forensics, it is important to understand what we mean by the term forensic science. **Forensic science** is the application of science to the law, meaning the scientific process of gathering and

examining information to be used by the criminal justice system (see Saferstein, 2010). When compared to the other fields of forensic science, digital forensics is in its infancy.

Consider the field of forensic entomology. Forensic entomology is the study of insects in death investigations, and its first recorded use was in a homicide investigation in 13th-century China (McKnight, 1981). The case involved a homicide where the weapon was determined to be a sickle. All of the men in the village laid their sickles down on the ground, and although they all appeared to be “clean” to the naked eye, the murderer’s sickle became covered with flies due to the small traces of blood and tissue that remained on the sickle – the murderer then confessed to the crime (McKnight, 1981).

What does forensic entomology have to do with the history of digital forensics? Think about all of the changes that have occurred over the years in the different branches of forensic science – the advancements with technology in DNA analysis or the ability to obtain latent fingerprints. It only makes sense that digital forensics is a new branch of forensic science – it could not exist without the advent of computer technology. A central theme throughout this chapter is the fact that technology has been the driving force behind the field of computer forensics. The field of computer forensics evolved into the field of digital forensics as technology continued to influence law enforcement investigations.

Digital forensics may be the youngest of the forensic sciences, but that does not mean it is the least important. By the end of this chapter, you will appreciate how almost every criminal investigation now involves some form of digital evidence. In addition, you will understand the difficulty law enforcement faces when trying to identify and recover evidence from the ever-changing and developing digital world. Finally, we will explore the importance of evidence integrity and forensic soundness since digital evidence is only admissible if its authenticity can be verified in a court of law.

## From Computer Forensics to Digital Forensics

The need for computer forensics developed with the onset of the **Information Age** or **Digital Age**; this digital revolution was marked by the increased production, transmission, and consumption of, and reliance on, information. Modern computers began to emerge in the mid-20th century and were mostly owned and operated by large corporations, such as universities and government agencies. At this time, traditional computer crime investigations were theft of computers or computer components. However, the Information Age changed the meaning

of the word computer crime. As personal computers surfaced in the mid-1970s, old crimes with new tricks emerged as well, and computer crimes were no longer limited to only theft of components. Computers were now being used to commit *old crimes* using *new tricks*, specifically referring to financial crimes (fraud, embezzlement), the majority of which were committed by insiders (Clifford, 2006). For example, individuals employed at financial institutions embezzled money by writing computer programs that would transfer a tenth of a cent into their account (Fernandez et al., 2005). This type of fraud is referred to as *salami slicing* because only small amounts of money are taken from each account, but the dividends add up to a tremendous sum (Kabay, 2002). With computers being used as *the means* for criminal activity, such as computer fraud or embezzlement, there was a growing concern of how best to combat these “old crimes with new tricks.”

### **Events of the 1970s**

By the late 1970s, there was an increasing recognition that computer criminality was growing on a national and international scale. In 1976, the Council of Europe Conference on Criminological Aspects of Economic Crime was held in Strasbourg, France. This conference identified several categories of computer crime, including fraud (Schjolberg & Tingrett, 2004). In the United States, the first federal cybercrime legislation was introduced, the Federal Computer Systems Protection Act of 1977, by Senator Ribikoff. This Act would make “the use, for fraudulent or other illegal purposes, of any computer owned or operated by the United States, certain financial institutions, and entities affecting interstate commerce” a federal crime. Although this act was not passed, Senator Ribikoff is credited for raising awareness of the need for cybercrime legislation (Clifford, 2006).

Shortly thereafter, Florida became the first state to enact a cybercrime law, the **Florida Computer Crimes Act of 1978**. This legislation was in response to a scandal at the Flagler Dog Track in Miami, Florida, where employees used a computer to print fraudulent tickets (see **Box 14.1**; Hochman, 1986). The Florida Computer Crimes Act (1978) cited offenses against intellectual property, offenses against computer equipment or supplies, and offenses against computer users. In other words, it was a felony to access another’s computer or modify, delete, or copy files without authorization, and it became a misdemeanor to modify or damage computer equipment without authorization. In the United States, a *felony* is considered to be a more serious criminal act that is usually punishable by one year or more in prison, whereas a *misdemeanor* is considered a less serious offense that is usually punishable up to one year in jail (see Kamisar et al.,

## Box 14.1 The Flaggler Dog Track Incident

### Win, Place ... and Sting

<https://vault.si.com/vault/1979/07/23/win-placeand-sting>



[Jacques Lavigne] knew he was going to make a potful of money ... He could do it quickly enough to avoid suspicion. And ... right under the noses of the men the state paid to stand watch – because they knew zilch about computers.

This article describes one of the first instances of computer crime, which became a seminal case in the development of legislation for the United States. Readers will gain an understanding for how technology was viewed at the time, and how it has dramatically changed over the last few decades.

2008). It was not until 1986 that the United States passed its first federal law criminalizing the unauthorized access of a computer, the **Computer Fraud and Abuse Act** (see Chapters 3 and 4 for more detail on the revised statutes).

In 1979, Interpol, the world's largest police agency, was the first international organization to address the growing concern of computer fraud: “The nature of computer crime is international, because of the steadily increasing communications, ... between the different countries. International organizations, like Interpol, should give this aspect more attention” (Interpol, 1979; Schjolberg & Tingrett, 2004). It was not until 1983 that an *ad hoc* committee sponsored by the OECD assessed the need for an international response to cybercrime. The OECD is an intergovernmental organization comprised of 29 countries, including the United States, which promotes policy-making among member and nonmember states and the United Nations (Clifford, 2006). The final report recommended a “harmonization of criminal laws” that penalized computer fraud, computer forgery, damage to computer data, copyright infringement, and unauthorized computer access (Schjolberg, 2008).

### Early 1980s: Pre-Forensics/Ad Hoc Phase

By the 1980s, more and more computer crimes were being committed during the Information Age, and law enforcement officers found themselves collecting digital evidence, specifically computers and floppy disks from financial and



**Fig. 14.1**

### Floppy disks

Source: The 8-inch floppy disk was created by IBM's Alan Shugart in 1971. [http://commons.wikimedia.org/wiki/File:8%60%60\\_floppy\\_disk.jpg](http://commons.wikimedia.org/wiki/File:8%60%60_floppy_disk.jpg)

computer fraud investigations. However, law enforcement needed a way to convert computer evidence into “physical” evidence. For example, holding an 8-inch floppy disk (see Figure 14.1) in front of the jury does not give them a sense of its evidentiary value – the jury must be able to *see* the contents of the floppy disk.

The ability to convert computer evidence into “physical” evidence fueled the need for computer forensics, which is the examination of powered-down computer components, also known as **dead-box forensics**. **Computer forensics**, a branch of the forensic sciences, refers to the investigation and analysis of media originating from digital sources in an effort to uncover evidence to present in a court of law (Britz, 2009). However, only government agencies, such as the Internal Review Service (IRS), were developing computer forensic tools at this time, and these tools were not made available to other law enforcement

agencies or industry. This all changed when Norton Utilities released to the public the UnErase tool, which was capable of recovering lost or deleted files (Fernandez et al., 2005; Nelson et al., 2004). Norton did not intend to create a forensic tool, but this product's ability to recover **latent**, or hidden, evidence made an important contribution to the computer forensics field.

**For more information on the history, utility, and processes of UnErase, go online to: <https://www.pcjs.org/blog/2018/12/28/>**



Although there was some progress being made with computer evidence, Charters (2009) states that the early 1980s should be considered **pre-forensics** because there was a lack of formal structure, protocols, training, and adequate tools. This pre-forensics stage is also known as the **Ad Hoc phase** and is considered to be the first stage of evolution for computer forensics. The term Ad Hoc refers to something that has been created because of an immediate need, and because of this immediate need, the approach is usually unmethodical or unprincipled (i.e., not theory-driven). According to Charters (2009), it was during the Ad Hoc phase that corporations began to collect evidence that their computer systems were being “inappropriately” used by employees. According to Shaw et al. (1998), “staff employees pose perhaps the greatest risk in terms of access and potential damage to critical information systems” because they are viewed as trusted members of the organization (p. 3). However, during the Ad Hoc phase, upper management lacked specific company policies defining “appropriate vs. inappropriate computer usage” as well as procedures for due process. Therefore, when these inappropriate use cases did make it to trial, the courts raised questions about the chain-of-custody procedures and accuracy of the computer forensic tools.

In addition, during the Ad Hoc phase, law enforcement officers were analyzing the *original* evidence – rather than a duplicate or backup copy – so any modifications or errors during the computer forensic examination directly affected the accuracy of the evidence. **Accuracy** refers to the integrity of the data, such as whether or not the evidence remains unchanged or has been altered by the computer forensics tool. In addition, the courts were concerned with **chain of custody**, which refers to the chronological documentation of evidence as it is processed during the investigation (i.e., seizure, custody, transfer, and analysis; Britz, 2009). This was one of the most unfortunate things about the Ad Hoc

phase – the fact that cases were lost due to the lack of policies and standardized tools in this new field of forensic science (Charters, 2009).

For example, an employee was fired for violating the company's appropriate use policy when he was caught searching through private personnel files. The employee claimed that he accidentally came across the personnel files, and that just so happened to be the moment his boss walked into the office. After being fired, the employee sued the company for wrongful termination, claiming that law enforcement officers did not follow procedures for collecting and analyzing the computer evidence. For instance, who was in possession of the evidence during transfer and how was the computer evidence stored? Of course, in the 1980s, there were no guidelines or protocols for computer evidence collection. In addition, the attorney argued that there was no proof of the computer forensic tool's accuracy and it was possible that this tool had tampered with the computer evidence. Due to the lack of structure in the *Ad Hoc* phase, cases like this proved difficult to prosecute.

### **Mid-1980s: Structured Phase**

In response to the problems associated with the *Ad Hoc* phase, computer forensics progressed into the **Structured phase** during the mid-1980s. The Structured phase is specifically characterized by the harmonization between computer forensic procedure/policy and computer crime legislation. First, several federal statutes criminalized various forms of hacking (see [Chapter 2](#)) and **wire fraud** (i.e., fraud committed through the use of electronic communication) (see [Chapter 6](#)) (Clifford, 2006). In addition, companies drafted appropriate use policies for their employees as well as due process procedures for investigating violations of these new policies. Finally, the courts pushed the field of computer forensics to develop tools that could withstand courtroom challenges, along with standards for evidence collection (Charters, 2009). During the beginning of the structured phase, most of the computer forensic examinations were confined to a single computer component and suspect. Few law enforcement officers were “trained” in computer forensics (i.e., they were self-declared experts), and the forensic tools were expensive, so the collection and examination of computer evidence was either inaccessible or unaffordable for most law enforcement agencies.

During this time, more and more people began owning a personal computer, cell phone, or other digital device. Therefore, more and more crimes were being committed that involved some form of digital evidence. The way people used technology was continuously changing as well. For example, cell

phones had limited functionality during the early 1990s (e.g., they could not send text messages or connect to the Web) until the development of the BlackBerry and related devices in the late 1990s. Therefore, technological change forced changes in how law enforcement viewed computer evidence.

In response to technological change, a number of professional organizations emerged, such as the Scientific Working Group on Digital Evidence (SWGDE; Whitcomb, 2002). At the inaugural meeting of SWGDE in 1998, Federal Bureau of Investigation and Postal Inspection Service officers created the first definition of digital evidence: “any information of probative value that is stored or transmitted in a binary form” (Whitcomb, 2007, p. 7). It may seem counter-intuitive for the PIS to have such an influential role in digital forensics; however, this agency investigates more than just mail fraud. Shortly thereafter, the first forensic science section on digital evidence was held at the International Association for Forensic Science conference in 1999 (IAFS; Whitcomb, 2007). In addition, the first peer-reviewed journal dedicated to digital evidence, the *International Journal of Digital Evidence*, debuted in 2002. As evidenced, the field of computer forensics became more structured and organized as industry, practitioners, and academia pursued the science behind digital investigations.

Toward the end of the Structured phase, computer forensics evolved into what we now understand to be the field of digital forensics. Computer forensics was no longer a term that accurately represented the various forms of digital evidence. After all, computer forensic examinations extend beyond the traditional forms of computer hardware to include other forms of **digital evidence**, defined as information that is either transferred or stored via a computer (Casey, 2011). Digital evidence may be found on mobile phones, GPS devices, cameras, and networks, to name a few.

Recognizing this growth in digital evidence, an umbrella term was created, digital forensics. **Digital forensics** refers to the analysis of digital evidence, which includes **network forensics** (Internet traffic), computer forensics, mobile-device forensics (e.g., cell phone), and malware forensics (e.g., viruses; see [Chapter 4](#); Casey, 2011). Overall, digital forensics included a whole array of digital devices, and in most cases, the development of new technology (e.g., Xbox, PlayStation 2) required new forensic tools. For example, many gaming consoles, such as Xbox and PlayStation 2, have similar properties to other digital devices in that users can surf the web or use the gaming consoles as storage devices for media.

What these technological advances meant for law enforcement was the fact that the same criminal activities afforded to more “traditional” digital devices

(e.g., mobile phones) were now being committed on less-traditional digital devices (e.g., Xbox). This assortment of digital technology meant law enforcement needed more forensic tools to conduct their investigations. Thus, this surge in forensic tools moves us into the final phase of digital forensics – the Enterprise phase.

### **Early 2000s: The Golden Age**

According to Charters (2009), the **Enterprise phase** of digital forensics – also known as the **Golden Age** (Garfinkel, 2010) – began in the early 2000s. The courts were becoming more and more familiar with the process of collecting and examining digital forensic evidence, and the forensic industry began to develop tools that allowed for the examination of computer evidence. In response to demands by law enforcement, commercial tools were created that allowed for the examination of evidence on-site, that is to say, at the scene rather than back in the laboratory.

During this time, **open-source** digital forensic tools debuted, which are software programs that can be freely used, modified, and shared with anyone (see Altheide & Carvey, 2011). There is a lot of controversy surrounding open-source digital forensic tools because, as part of the distribution terms, the source code must be made available, without discrimination, to the general public (Open Source Initiative, n.d.). In other words, computer criminals and law enforcement (and anyone else) will have access to the source code for open-source digital forensic tools.

**For a list of open-source digital forensic tools, go online to:**  
<https://forensicswiki.xyz/wiki/index.php?title=Tools>

The *source code* is simply the human-readable instructions written by the programmer for how the software works (e.g., Java); this code is then translated into object code so the computer can execute the instructions (Zanero & Huebner, 2010). For **closed-source** or **proprietary software**, usually the source code is not made available to the general public; only the **object code**, which restricts the ability of users to modify and share the software due to copyright infringement, is publicly shared (Zanero & Huebner, 2010). The benefits of open-source digital forensic tools are the ability to identify and fix bugs within the software, and the opportunity to learn more about how the tool works

(Altheide & Carvey, 2011; Zanero & Huebner, 2010). There is an inherent transparency with open-source software compared to the black box of proprietary software, which some argue makes it easier for open-source tools to be admissible in court (Carrier, 2002). Both open-source and closed-source tools will continue to play an important role in digital forensics, especially since crimes increasingly involve at least one digital element (Clifford, 2006; Maras, 2012; Sachowski, 2018).

Think about your own technological devices. You may own a laptop or tablet, and possibly a smartphone, but what about your MP3 player, gaming system, or Wi-Fi-enabled television? It is possible that all of these devices would need to be collected and examined for potential evidence during a digital forensic investigation, and with the globalization of technology and the Internet, there will continue to be an increase in the abundance of digital data that needs to be analyzed for potential evidence. In addition, not only are there more devices, the sizes of the storage systems have increased as well. Thus, the sheer amount of data that needs to be examined is daunting for law enforcement as well as the cost associated with training, certification, and the forensic equipment.

Digital forensics, as a discipline, struggles with training, certification, accreditation, and other educational issues (Losavio et al., 2016; see [Chapter 16](#)). Digital forensic practitioners display their qualifications by either obtaining certification or accreditation for themselves, their laboratory or unit, or by relying on testing and court procedures for displaying their credibility. Typically, the decision between how credibility is obtained depends on what is practical and affordable for the digital forensic practitioner (Sommer, 2018). There is still no agreed upon criteria for what the basic qualifications of a digital forensic practitioner should be. While some states have a standardization for forensic credentialing, there is still no consistency at the federal level (Zahadat, 2019).

### ***End of the Golden Era and the Challenges of New Technologies***

For these reasons, Garfinkel (2010) argues the Golden Age of digital forensics is coming to an end. The future of digital forensics will rely on advancements in scientific research and standards for education and certification. In addition, the future will be shaped by digital evidence derived from nontraditional devices and technology, such as drones, Internet of Things (IoT) devices, and vehicle systems. In addition, the future of digital forensics will be shaped by the ever-changing platforms of social media.

**Fig. 14.2** An unmanned aircraft system (UAS) also known as a drone. The future of digital forensics will involve extracting digital evidence from nontraditional digital devices, such as drones

Source: Image courtesy of [www.Shutterstock.com](http://www.Shutterstock.com)



According to the Federal Aviation Administration (FAA), an **unmanned aircraft system (UAS)**, often referred to as a drone, is an aircraft controlled from an operator on the ground instead of the pilot being onboard (see [www.faa.gov](http://www.faa.gov); see Figure 14.2). In December 2016, there were at least 616,000 registered drones in the United States (Federal Aviation Administration, 2016). However, as of January 2021, this number has increased to over 1.78 million registered drones in the United States (Federal Aviation Administration, 2021). As mentioned previously, digital forensics is an umbrella term that houses different branches of forensics. **Drone forensics** constitutes a subtype of wireless forensics under the broader term, network forensics (Singh, 2015). According to Singh (2015), drone forensics “involves the forensics of the server present at ground level where information is being transferred and stored and the forensics of the drone device” (para 8).

Due to their surveillance capabilities (e.g., aerial views, terrain mobility, audio/video recordings, photography), law enforcement are using drones to assist in their investigations because they may be considered “flying witnesses” (Shaw & Hilton, 2016). For example, footage taken by a drone’s high-definition camera was admitted as forensic evidence in court for a rape case involving two students (Pilkington, 2014). A specific criminal case example of drone forensics

does not exist as of yet, but the courts are discussing the authenticity of evidence from drones, such as audio and video recordings (Shaw & Hilton, 2016). According to Shaw and Hilton (2016), “a picture is a picture, a video a video” (p. 26), so the courts should regard drone-evidence as “no more or less reliable than evidence gathered by any other method” (p. 27).

Just as with drones, digital forensic evidence may exist on nontraditional devices known as the IoT. The **Internet of Things (IoT)** is defined as a “network of physical objects (or ‘things’) that connect to the internet and each other and have the ability to collect and exchange data” (Peyton, 2016, p. 1). These objects are able to interact with each other and the Internet through embedded technology (Oriwoh & Williams, 2015). In 2009, the number of things connected to the Internet surpassed the number of people worldwide. It is estimated that by 2025, there will be up to 21.5 billion connected devices worldwide (Statistica Research Department, 2021).

Like drone forensics, **Internet of Things (IoT) forensics** is a type of wireless forensics. IoT devices encompass a wide-range of sectors, including wearable, smart homes, manufacturing, supply chain, healthcare, energy, agriculture, and vehicles (Eclature, 2020). IoT devices include light bulbs, thermostats, door locks, fridges, cars, smart speakers, and even pacemakers, just to name a few. According to Robots (n.d.), the most popular IoT devices in 2020 focused on home automation (e.g., Smart Lock, Smart Pet Feeder) and greener environment (e.g., Air Pollution Monitor, Thermostat).

The first criminal case involving a smart IoT device was the murder of Victor Collins (McLaughlin & Allen, 2016). On November 22, 2015, James Bates called 911 stating that he found Victor Collins dead in his hot tub. Bates told law enforcement that he had two friends over that night, including Victor Collins, to watch football and drink. Eventually, they all decided to hang-out in the hot tub until around 1:00 a.m. when James Bates went to bed. According to the Arkansas State Crime Lab, Victor Collins’ death was ruled as a homicide by strangulation (Sitek & Thomas, 2016). A witness recalled hearing music streaming that night from Collins’ Amazon Echo, a smart speaker that responds to the name “Alexa” (McLaughlin & Allen, 2016). In addition, Collins owned a smart water meter, which measures the amount of water used hourly (Gilker, 2016).

Both the Amazon Echo and smart water meter were collected by law enforcement. Law enforcement analyzed the smart water meter and learned that an abnormal amount of water was used during a 2-hour window the evening of the murder. Law enforcement believes this data indicates that James Bates cleaned up the murder scene during this 2-hour period (Gilker, 2016). Law enforcement were unable to obtain data from the Amazon Echo, Alexa, so the

Prosecutor's office asked the court to force Amazon to provide data from the Echo for the night in question (see [Box 14.2](#); Swearingen, 2016). Alexa works by passively recording everything you say, although none of the recordings are sent to Amazon unless you use the keyword, Alexa. Only then does Alexa record your command/question, which is then sent to Amazon's cloud servers (Swearingen, 2016). It is possible that the company may either be compelled to provide the data, or may find a reason to voluntarily provide it to law enforcement (see also the FBI-Apple Encryption Dispute discussed in [Chapter 14](#)). Until such time, this presents a challenge to law enforcement agencies as to how to use all possible data points to support a prosecution.



**To read the actual Affidavit for the *State of Arkansas v. Bates* case, please visit:** [http://stopsmartmeters.org/wp-content/uploads/2016/08/SKMBT\\_42316081516000.pdf](http://stopsmartmeters.org/wp-content/uploads/2016/08/SKMBT_42316081516000.pdf)

Finally, as already mentioned, more and more people around the world are using digital devices, so more and more crimes involve some form of digital evidence – usually from multiple devices. However, it is not just about owning a personal device anymore – it is also about your presence on the Internet – specifically on social media.

### Box 14.2 Digital Evidence in Amazon Echo

#### Alexa a Witness to Murder? Prosecutor's Seek Amazon Echo Data



<https://www.bloomberg.com/news/articles/2016-12-28/alex-a-witness-to-murder-prosecutors-seek-amazon-echo-data>

Authorities investigating the death of an Arkansas man whose body was found in a hot tub want to expand the probe to include a new kind of evidence: any comments overheard by the suspect's Amazon Echo smart speaker.

This article discusses the murder investigation of Victor Collins and whether the suspect's Amazon Echo may reveal relevant evidence on the night in question.

According to Kaplan and Haenlein (2010), **social media** is a “group of Internet-based applications that build on the ideological and technological foundations of Web 2.0 (e.g., increased broadband availability and hardware capacity), and that allow the creation and exchange of User Generated Content” (p. 61). **User generated content** is any form of “voluntarily contributed data, information, or media that then appears before others in a useful or entertaining way” (Krumm et al., 2008, p. 10). User generated data includes a variety of social media posts, such as restaurant reviews, images, videos, and blogs. In order for data to be considered user generated content, it must be: (1) published either on a publicly accessible website or available to a select group of people on a social networking site; (2) exhibit a certain level of creative effort; and (3) it needs to be created outside of professional routines and practices (Organization for Economic Cooperation and Development [OECD], 2007). Based on these definitions, social media not only includes social networking sites (e.g., Facebook, LinkedIn), but blogs, virtual social worlds (e.g., Second Life), collaborative projects (e.g., Wikipedia), content communities (e.g., YouTube), and virtual game worlds (e.g., World of Warcraft, RuneScape; Kaplan & Haenlein, 2010). Overall, social media sites create an environment that allows users to communicate and share information with others who are either connected directly (member of site) or indirectly (e.g., friends of friends) within the network (Brunty & Helenek, 2013).

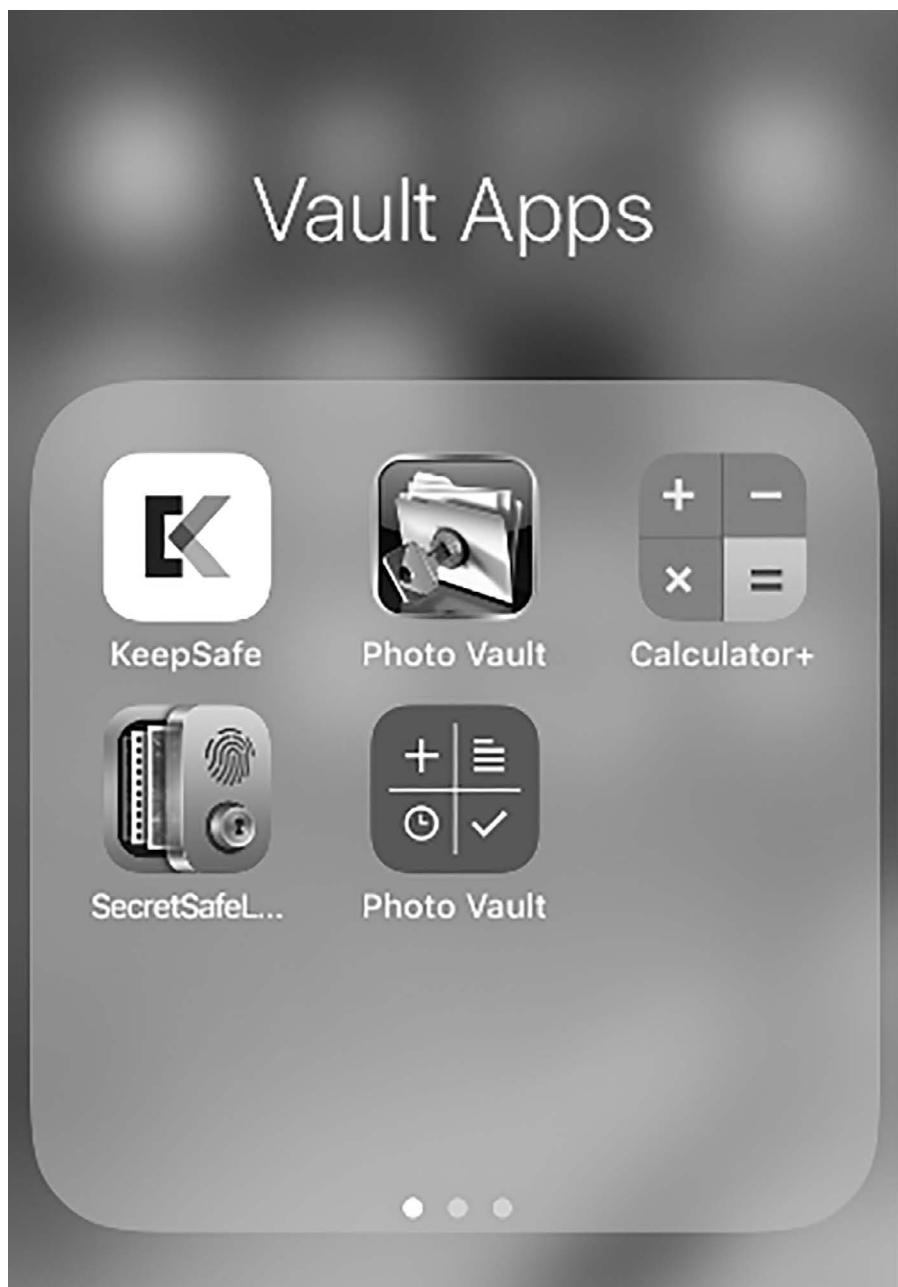
Mobile devices, like smartphones and tablets, allow their users to download applications, known as “**apps**,” that perform certain tasks, such as communicating, gaming, or sharing content (see [Figure 14.3](#)). In 2020, there were more than 1.96 million apps available for download on the Apple App Store and 2.87 million on Google Play Store (Clement, 2020). According to Apptopia, the most downloaded social media app in 2020 was TikTok, with over 82 million, followed by Instagram and Snapchat (Bellan, 2020). There is a vast amount of user generated content and data as a result of our online interactions. As a result, privacy and security concerns have emerged, leading to the development of apps that use end-to-end encryption (e.g., WhatsApp), anonymity (e.g., Confide), or even decoy applications (e.g., Calculator+).

These decoy applications are known as **vault apps**, which secure and “hide” your private data by either disguising themselves by pretending to look like other applications (e.g., Calculator+) or by only displaying information when the user enters a valid password (e.g., Private Photo Vault; Newton, 2018). As shown in [Figure 14.4](#), these vault applications that store photos, for example, might appear as a “calculator” app on a person’s mobile phone. It is possible for malicious actors to use these vault applications to hide content that may



**Fig. 14.3**

Screenshot of the variety of apps on a Pixel 5 phone; example social media apps include YouTube, YouTube Music, Instagram, Snapchat, Twitter, Tiktok, MyFitnessPal, Zero, Fitbit, Bublup, ProtonMail, Blogger, and Discord



**Fig. 14.4**  
Screenshot of the variety of vault apps on an iPhone; examples of photo vault applications include KeepSafe, Photo Vault, Calculator+, SecretSafe, and Purple Photo Vault

be illegal or show illegal activity. For example, a criminal may store sexually explicit images of children, or pictures relating to an illegal sale of drugs, on these vault applications (see [Box 14.3](#)). Therefore, vault applications need to be viewed from not only a user security perspective but also from an investigative anti-forensics' standpoint (Zhang et al., 2017).

### Box 14.3 Criminals and Vault Apps

#### Baraboo Man Charged with Having Child Porn Hidden in Cell Phone Calculator App



[https://madison.com/news/local/crime-and-courts/baraboo-man-charged-with-having-child-porn-hidden-in-cell-phone-calculator-app/article\\_6e34dcaa-c687-5f66-895c-7fea92d6d0fb.html](https://madison.com/news/local/crime-and-courts/baraboo-man-charged-with-having-child-porn-hidden-in-cell-phone-calculator-app/article_6e34dcaa-c687-5f66-895c-7fea92d6d0fb.html)

The agent discovered hidden files on the phone, hidden through a calculator vault app. The smartphone application acts as a typical calculator until numbers are entered as a password, revealing images held within it. In this case, the password was Moliner-Wetzel's birth date.

This article provides an excellent example of the vault app being used by a criminal to hide child sex abuse imagery. In this case, the vault application was disguised as a calculator app.

Regarding social media, digital evidence may be found on the physical device or on the network (Brunty & Helenek, 2013; Seigfried-SPELLAR & Leshney, 2015). However, what further complicates the digital forensic investigation is that mobile applications are an ever-changing and evolving piece of evidence (Billups, 2020). A consistent theme throughout this book is that technology changes faster than what law enforcement or digital forensic tools can keep up with. As a new social media application emerges, it may not be supported by the current digital forensic tools, making it impossible for forensic artifacts to be reliably discovered. As of January 2021, the number of people who own smartphones worldwide was 3.8 billion. The future of digital forensics will rely on our ability to gather digital evidence from these devices, but this will be influenced by whether the digital forensic tools of today can identify the forensic artifacts from the mobile applications of tomorrow (see Billups, 2020).

### Stages of Digital Forensic Investigation

In an attempt to standardize the steps for conducting a digital forensic investigation, **process models** were developed which provided practical guidelines and general procedures to conducting a digital forensic investigation (Casey, 2011; Sachowski, 2018). Standardizing the investigation process generates

consistency in how digital evidence is handled by law enforcement personnel. However, what is interesting is the fact that there is no standard process model used to describe the stages of a digital forensic investigation (see Casey, 2011). Although the terminology is different, there are four common stages in the digital forensic investigation: survey/identification, collection/acquisition, examination/analysis, and report/presentation.

## ***Survey/Identification***

**Survey/identification** is the initial step of a digital forensic investigation. During this stage, law enforcement personnel and digital forensic technicians survey the physical (e.g., home office) and digital crime scenes (e.g., Internet) to identify potential sources of digital evidence. This step is often the most difficult because technology is constantly changing and evolving, and less “obvious” digital devices (e.g., PlayStation vs. desktop computer) may be overlooked for their potential evidentiary value. For example, the Xbox gaming system can be modified to run a different operating system, thereby making it possible to function as a traditional personal computer (e.g., store files, surf the web; see Bolt, 2011; Burke & Craiger, 2007). In 2010, 20-year-old Timothy Hammerstone was arrested for soliciting sexually explicit photos of a 10-year-old boy through his Xbox (see [Box 14.4](#)).

Along with nontraditional digital devices, some sources of potential evidence may be hidden or disguised as nondigital devices, such as the concealed camera in the ballpoint pen or lighter. There are also websites that provide helpful hints for concealing Universal Serial Bus (USB) flash drives in everyday household items (see [Figure 14.5](#)). Finally, surveying the digital crime scene may be difficult because specific cybercrimes, such as hacking and malware, are often committed thousands of miles away from their targeted devices (see [Chapters 3–5](#)). Once the physical and digital crime scenes are surveyed, and potential sources of digital evidence are identified, the digital devices must be searched and seized. This stage of the digital forensic investigation is known as the collection or acquisition phase.

## ***Collection/Acquisition***

The **collection/acquisition phase** of the digital forensic investigation is concerned with the retrieval and preservation of digital evidence (ISO/IEC, 2012). First, digital forensic technicians must document how the digital evidence was

## Box 14.4 Video Game Systems and Digital Evidence

### Folsom Boy, 10, Victimized Through Xbox; Florida Man Arrested



<https://goldcountrymedia.com/news/33624/10-year-old-victimized-through-xbox/>

A 10-year-old Folsom boy who was enticed by \$20 worth of free Xbox Live credits, told his parents recently he had sent nude photographs of himself to a man he met online. ... These game systems allow the users to speak to one another, send text messages and transfer photographs as well as live video feeds.

This article provides an excellent example of the ways that the Xbox gaming system can be abused by cybercriminals. In this case, an individual was able to use the gaming system to acquire sexual images of a minor, and demonstrates why all technology can play a role in cybercrime in some fashion.

retrieved from the digital source (e.g., mobile phone) – that is to say, how the mobile phone was searched and how the digital evidence was seized. For example, during computer forensic investigations, technicians must determine whether to conduct an on-site or off-site search; in other words, whether to seize the digital device and search it on-site or off-site at a forensic laboratory (Maras, 2012). It is important for law enforcement to maintain detailed notes and documentation of the search and seizure process of the digital forensic investigation. In addition, for any crime scene, whether traditional or digital, the evidence must be collected in a manner that is forensically sound and preserves the evidence's integrity. Evidence retrieved from a digital device must be authenticated in order for it to meet admissibility standards for evidence in a court of law (see Chapter 16). The goal of evidence **preservation** is to make a copy of the original data files for examination in a way that minimizes the possibility of any changes being made to the original data files (International Organization for Standardization and the International Electrotechnical Commission; ISO/IEC, 2012; Sachowski, 2018). The process of preserving digital evidence will be discussed further in the next chapter.



Fig. 14.5a  
and 14.5b

Hiding flash drives.

There are websites that provide advice on how to disguise your USB flash drive

Source: (a) [http://commons.wikimedia.org/wiki/File:USB\\_Flash\\_Drive\\_Chapped.jpg](http://commons.wikimedia.org/wiki/File:USB_Flash_Drive_Chapped.jpg); (b) [http://commons.wikimedia.org/wiki/File:USB\\_Flash\\_Drive\\_Lighter.jpg](http://commons.wikimedia.org/wiki/File:USB_Flash_Drive_Lighter.jpg)

## ***Examination/Analysis***

Once a copy of the original data is verified, the **examination/analysis stage** refers to data recovery/extraction and analysis of digital data. First, manual and automated programs should be used to uncover digital evidence, that is to say, recover and restore hidden files, manipulated, and deleted files. Once the data has been restored, the digital forensic technician must analyze the digital data to determine its relevance to the investigation (e.g., Rule 401 of the US Federal Rules of Evidence; see [Chapter 16](#); Sachowski, 2018). By the end of the examination/analysis phase, the digital forensic technician has reconstructed the digital crime scene. This stage will be discussed further in [Chapter 15](#). After this reconstruction, the digital forensic investigation enters its final stage – the report/presentation stage.

## ***Report/Presentation***

The final phase in the digital forensic investigation is the **report/presentation stage**. Here, the findings that are determined relevant to the investigation are finalized in a report. How evidence is determined to be relevant to an investigation will be discussed further in [Chapter 16](#). In addition, this report should reflect complete transparency, meaning each step described in detail so as to leave no mystery in the digital forensics process. Specifically, the digital forensic technicians should be prepared to testify in court regarding the survey/identification (e.g., chain of custody), collection/acquisition (preservation, forensic tools), and examination/analysis (data recovery and reduction) stages of the digital forensic investigation. The report/presentation stage will be discussed further in [Chapter 15](#).

In a perfect world, these four stages would be conducted by a trained digital forensic technician who is responsible for identifying, preserving, analyzing, and reporting the findings of the digital forensic investigation. However, digital forensic training and certification is expensive, and many law enforcement departments do not have the funding or resources available to purchase the necessary forensic equipment. For most law enforcement agencies, it is not plausible to always have a certified digital forensic technician at the scene, just as it is equally implausible for a law enforcement officer to collect all potential sources of digital evidence to be sent to an external forensic laboratory for examination (Cohen, 2007; Sachowski, 2018). For each tier, there are specially trained law enforcement officers who are knowledgeable, to various extents, in the digital forensic process. Since all law

enforcement personnel (e.g., patrol officer, detective) have the potential to come into contact with digital evidence, “each officer has a role to play in the safeguarding and examination of that material” (Cohen, 2007, p. 3; Holt et al., 2015).

## The Role of Digital Evidence

In this Digital Age, technology is inescapable in our daily lives, and those who commit crimes use technology to their advantage. For a crime to be labeled a “computer crime,” the computer must be either the **target** or **tool** for committing the crime. In other words, a hacker may target and take down a specific website whereas child pornography consumers use the Internet as a tool for downloading child sex abuse images. However, the computer may also be an **incidental** to a crime, meaning the computer is either involved in the commission of a crime, or the computer is being used merely as a storage device (Maras, 2012). With the globalization of technology and the Internet, there will continue to be an increase in the abundance of digital devices that need to be analyzed for potential digital evidence. Digital evidence is information that is either transferred or stored in a binary form that is relevant to the crime under investigation (Casey, 2011; Sachowski, 2018).

According to Locard’s Principle of Exchange, when there is contact between two items, there is an exchange of material (Locard, 1934). That is to say, there is an exchange of evidence between the offender and the crime scene – the offender will leave something at the scene of the crime (i.e., fingerprints) as well as take something away from the scene of the crime (e.g., victim’s DNA). Locard’s Principle of Exchange is important because one of the reasons evidence is sought after is to *link* the people, places, and objects involved in the crime. In addition, it is important to obtain evidence in order to provide additional leads, eliminate potential suspects, identify the suspect, corroborate or refute testimony, and, most importantly, prove that a crime has been committed, otherwise known as **corpus delicti** (see Girard, 2011). Digital evidence may be the “link” between the victim and the offender, just like traditional trace evidence (e.g., hair, fibers, blood) in the other forensic sciences. For example, Philip Markoff, otherwise known as the craigslist killer, was arrested after investigators were able to link the IP address used to send an email to the murder victim to Markoff’s home address (see Hansen, 2013).

We are trying to tell a story – the who, what, when, where, why, and how of a criminal or civil offense. In general, a **criminal offense** (state and federal) is the violation of a law in which a crime (e.g., murder, rape) is committed against

the state, society as a whole, or a member of society. In criminal cases, the plaintiff is either the state or federal government since the state is representing not only the victim but also society as a whole. A **civil offense** is a noncriminal offense, usually a dispute, between private parties (e.g., individuals, organizations, or businesses). In addition, the punishment in civil cases usually consists of monetary damages as compensation, as opposed to incarceration, which can only be imposed by criminal law violations (see Allen et al., 2011). Digital evidence may play a role in both criminal and civil cases.

Let's first look at the role of digital evidence in a criminal case – *State of Florida v. Casey Marie Anthony*. In 2008, Casey Anthony was charged with the murder of her daughter, Caylee Anthony. At the trial, the prosecutor argued that Casey Anthony had used chloroform on her daughter before duct-taping her mouth. A computer forensic examiner testified that someone had conducted Internet searches using the keyword “chloroform” on the home computer (Hayes, 2011). This digital artifact was determined to be relevant to the case, therefore admissible as evidence, since it made the prosecutor’s argument that Casey Anthony had used chloroform on her daughter more probable.

On the stand, Casey Anthony’s mother claimed that she was the one who had searched for “chloroform,” and that it was an accident as she had meant to search for “chlorophyll.” In a controversial verdict, Casey Anthony was acquitted of first-degree murder. After the trial, the Orange County Sheriff’s department admitted to overlooking evidence of a Google search for “fool-proof suffocation” methods the day the daughter was last seen alive (see Associated Press, 2012). It is unknown how this uncaptured digital evidence would have otherwise influenced the outcome of the Casey Anthony trial.

In a cannibalism trial in Germany, the digital forensic evidence suggested the victim of a murder was actually a willing participant in his own death (see Davis, 2008; King, 2013). In 2001, 41-year-old Armin Meiwes posted an Internet ad on the Cannibal Café forum for a “well-built 18 to 30-year old to be slaughtered and then consumed.” This ad was answered by 43-year-old Bernd-Jurgen Brandes. Searches of Meiwes’ computer reviewed chat logs between the two men before they set their in-person meeting on March 9, 2001. In one of these chat logs, Meiwes stated, “I would rather kill only those who want to be killed” (King, 2013).

Meiwes videotaped the encounter with Brandes. This video suggested Brandes was a “voluntary victim.” After killing Brandes, Meiwes consumed his flesh for ten months until police were contacted by a college student who saw advertisements for more victims on the Internet, including details about the

killing. According to the police, Meiwes was involved in several cannibal forums and had been in contact with over 400 people from these Internet forums. In addition, Meiwes had received emails from over 200 people who wanted to be killed and eaten. After a retrial, Meiwes was convicted of murder and sentenced to life. Although this was not a traditional cybercrime case, digital evidence revealed a timeline between when the Cannibal Café ad was posted, the chat logs between Meiwes and Brandes, and the additional Internet postings that eventually led police to the Rotenburg Cannibal (Davis, 2008; King, 2013).

**For more information on the Rotenburg Cannibal, go online to:**

<http://www.dailymail.co.uk/news/article-3439299/I-fried-piece-rump-steak-ate-sprouts-German-cannibal-ate-gay-lover-permission-describes-went-killing-eating-him.html>



Next, consider the role of digital evidence in the civil case *Berryman-Dages v. City of Gainesville*. In 2011, Kim Berryman-Dages (the plaintiff) sued the City of Gainesville, Florida (defendant), claiming she was adversely treated and demoted at work (Gainesville Fire Rescue service) due to her gender and sexual orientation. In 2011, Berryman-Dages subpoenaed the computer of a non-party to the case, Ms. Thayer, because Ms. Thayer admitted (although later denied) to sending an anonymous letter to the plaintiff criticizing her sexual orientation. Ms. Thayer was married to the Gainesville Fire Rescue Chief at the time this letter was written and at the time of the demotion. The court ruled that Ms. Thayer must comply with the subpoena and allow a computer forensics expert to search her personal computer for digital evidence of the letter in question (see Berryman-Dages vs. City of Gainesville, 2011).

Overall, as evidenced by these cases, the cyberworld is not that different from the physical world. Digital evidence is just as important as physical evidence in criminal and civil cases. Before law enforcement can examine the digital evidence, they must be able to identify which digital devices at a crime scene may contain evidentiary information. Since the advent of the personal computer, the number of people who own computers has increased. For instance, only 8.2 percent of all households had a computer in the home in 1982 (United States Census Bureau, 2014), compared to 77 percent in 2021 (Pew Research Center, 2021). Additionally, 85 percent of Americans now own a smartphone in 2021, compared to 35 percent in 2011 (Pew Research Center, 2021). Unlike the early years of digital forensics, identifying electronic evidence has become more

complicated for law enforcement officers due to the advancement and increased use of technology in our everyday lives.

### Types of Hardware, Peripherals, and Electronic Evidence

In 2008, the National Institute of Justice released a report entitled *Electronic Crime Scene Investigation: A Guide for First Responders*, which was intended to assist law enforcement with the recognition and collection of electronic evidence. Traditionally, the most common form of digital evidence is the computer system, which consists of hardware, software, and peripheral devices to either input (introduce information to the computer), analyze (process), or output (produce/display information processed by the computer) data (Britz, 2009).

**Hardware** is considered the tangible or physical parts of a computer system (e.g., motherboard). **Software** consists of programs that include instructions which tell computers what to do (e.g., operating systems). **Peripheral devices** are externally connected components that are not considered essential parts of a computer system, such as scanners, printers, and modems. As shown in Figure 14.6, the size and look of computers have changed dramatically over the



**Fig. 14.6** An older model computer

Source: A photo of an old IBM Personal Computer XT released in 1983. <http://commons.wikimedia.org/wiki/File:Museum-Enter-6094770.JPG?uselang=en-gb>

years, from large, desktop computers (e.g., a legacy system) to personal tablets, including the Apple iPad mini, which weighs only 0.75 lb (341 g).

These outdated computer systems, devices, or software are often referred to as **legacy systems** (see Seacord et al., 2003). For example, mainframes are considered the legacy system for the personal desktop computer. Since technology is constantly changing and developing, it may be traditionally easier for law enforcement to identify legacy systems (e.g., desktop computers) compared to their newer counterparts (e.g., tablets). Therefore, it is important that law enforcement remain vigilant of the trends in technology in order to identify both legacy systems and more current technology. In fact, legacy systems have been targeted for cyberattacks due to their high-value data and easier exploitability. Legacy systems are end-of-life (EoL), meaning they no longer receive patches, updates, and/or cannot be upgraded to a new version – this includes security updates (Seetharama Tantry et al., 2017; see **Box 14.5**). Often legacy systems are found in hospital systems in order to meet the demands of digital health and are incredibly attractive targets due to their high value, sensitive data. Even though these attacks are on the rise, investigating these incidents are

## Box 14.5 Legacy Systems and Vulnerabilities

### **Microsoft Issues Rare Legacy OS Patch to Prevent Another WannaCry:**

**Microsoft Issues Rare Legacy OS Patch to Prevent Another WannaCry:** Microsoft released a patch for its outdated Windows XP, and other legacy systems, after finding a vulnerability that would allow an RDP exploit – much like what happened with WannaCry.

<https://healthitsecurity.com/news/microsoft-issues-rare-legacy-os-patch-to-prevent-another-wannacry>



Microsoft released a rare patch for a handful of legacy operating systems that it no longer services after finding a critical flaw, to prevent another global WannaCry cyberattack.

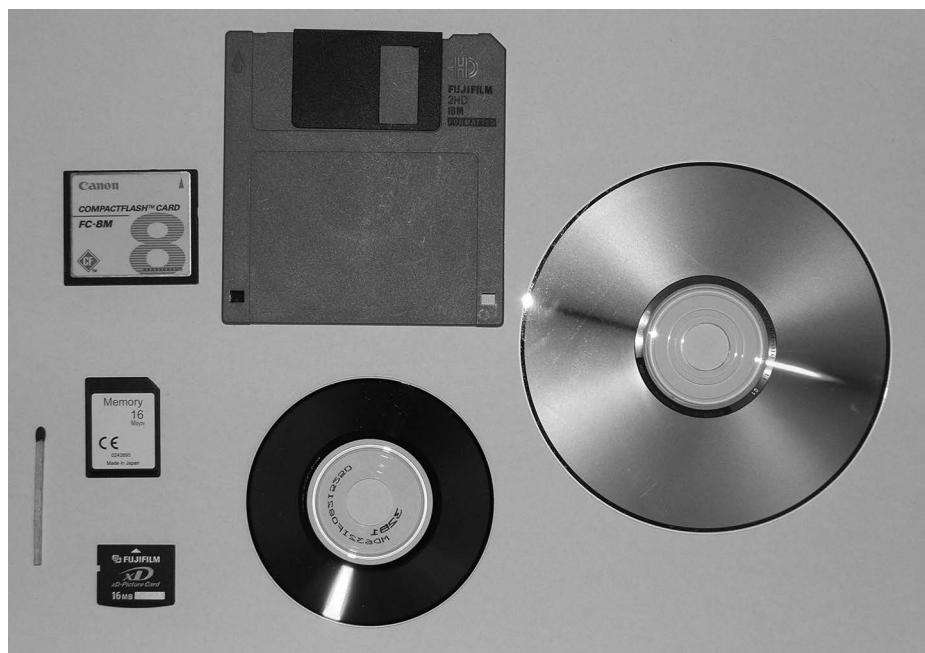
Windows 2003, Windows 7, Server 2008, and XP are no longer maintained by the tech giant and no longer receive patches to shore up security flaws. However, much of the healthcare sector – and some of its medical devices – still heavily use those platforms.

This article provides a great example of the vulnerabilities of legacy systems.

incredibly difficult due to the lack of forensic readiness and infrastructure to replace and relieve impacted systems (Chernyshev et al., 2019).

Along with computer systems, law enforcement officers must be able to identify the various forms of storage device, which include hard drives and removable media (Allen et al., 2011; Sachowski, 2018). First, **hard drives** are data storage devices used for storing and retrieving data. **Internal hard drives** are installed inside the computer, whereas **external hard drives** are portable storage devices located outside of the computer and are usually connected via a USB port. Internal or external hard drives do not need to be connected to a computer in order for them to have evidentiary value. For example, Ryan Loskarn, ex-chief of staff to Senator Lamar Alexander of Tennessee, was charged with possession and distribution of child pornography after the PIS located an external hard drive hidden on the roof of Loskarn's home (Marimow, 2013). According to court documents, investigators saw Mr. Loskarn leaning out of a window from the second floor of his home during the raid. Upon further inspection, investigators found an external Toshiba hard drive on the roof (Marimow, 2013).

Another form of storage device is the removable media device, which is used to store and share digital information. As shown in [Figure 14.7](#), removable storage devices have evolved over the years and include floppy disks, zip disks,



**Fig. 14.7** The evolution of removable storage devices

Source: [http://commons.wikimedia.org/wiki/File:Storage\\_size\\_comparison.jpg](http://commons.wikimedia.org/wiki/File:Storage_size_comparison.jpg)

compact disks (CDs), CompactFlash card, smart media (SM) cards, and USB flash drives, to name just a few.

**USB flash drives**, or **thumb drives**, are one of the most common removable storage devices. They are small, lightweight, and can easily be transported and concealed. Other popular storage devices are MicroSD cards, external hard drives, and removable solid-state drives are popular storage devices that are cheap and durable. Overall, data storage devices may contain a plethora of electronic evidence, but they may also be more difficult to identify due to their small size and portability.

**Handheld devices** are another source of potential electronic information and include mobile phones, digital multimedia devices (e.g., iPod), digital cameras, and Global Positioning Systems or GPS (see [Figure 14.8](#)). Handheld devices are capable of providing communication (e.g., texting), photography (e.g., built-in camera), navigation (e.g., maps), entertainment (e.g., music), and data storage (e.g., word processing documents, contacts).

Many of these devices were initially intended to perform a certain function; for example, Apple released the first iPod in 2001 as a portable music storage device. Unless the crime involved copyright infringement, a basic first responder may not necessarily consider an iPod as a storage device for electronic evidence other than music. Law enforcement and computer forensic technicians should not be fooled by how these tools may be “traditionally” used as criminals have found other ways to use these handheld digital devices. For example, in 2004, the ringleader of a car theft gang in London was arrested due to the incriminating evidence found on his iPod (see [Box 14.6](#)).

Another popular feature of mobile phones and tablet computers is the **app**, which is a software application typically downloaded by the user that performs a certain function, such as gaming, sharing information (pictures), communicating, or providing entertainment. According to Price and Dahl (2016), the best iPhone apps of 2016 include: *Waze*, *Inbox by Gmail*, *Cash*, *Photoshop Fix*, and *Uber or Lyft*. Not only do some apps have chat features (e.g., *Words with Friends*), but research shows people are moving away from traditional text messaging to the use of mobile messaging apps specifically designed for chatting, such as WhatsApp, NextDoor, and encrypted applications like Telegram and Signal. These mobile messaging applications replace the **short message service (SMS)**, which is the traditional method of sending short messages or “texts” between mobile devices through your cell phone provider. Mobile messaging applications allow you to send and receive pictures or text messages without paying for SMS.



**Fig. 14.8** The evolving state of mobile and smartphones. The handheld mobile and smartphone has evolved immensely in size and function

Source: [http://commons.wikimedia.org/wiki/File:Mobile\\_phone\\_evolution.jpg](http://commons.wikimedia.org/wiki/File:Mobile_phone_evolution.jpg)

## Box 14.6 Digital Evidence and Real-World Crime

### iPod Car Theft Ringleader Jailed

[http://news.bbc.co.uk/2/hi/uk\\_news/england/london/3932847.stm](http://news.bbc.co.uk/2/hi/uk_news/england/london/3932847.stm)



The gang “hijacked” identities to drive off Jaguars, Mercedes, BMWs and a Porsche, before selling them. The Vehicle Fraud Unit raided the estate and found a mass of incriminating evidence stored on an iPod.

This article provides an in-depth overview of the ways that digital evidence can demonstrate criminal activity of any sort, whether online or offline. Readers will gather an appreciation for the ways that digital devices provide a record of individual activity in multiple environments and can be invaluable for investigators of all crimes.

Some of these mobile apps are considered anonymous and provide privacy online by masking users’ identities and having messages that “self-destruct,” meaning they are only visible for a short period of time, like SnapChat, Wickr, and Telegram. Overall, these messenger apps are becoming more popular because of the growing concerns over wiretapping and surveillance (i.e., recording phone conversations or reading text messages; Vincent, 2014). Law enforcement and security experts are well aware that these mobile apps are well suited for criminal behaviors, and retrieving digital information during an investigation will prove to be difficult (Mengle, 2013).

**For more information on the ways that offenders are using mobile apps, go online to:** <http://archive.indianexpress.com/news/mumbai-police-worried-as-more-criminals-take-to-chat-apps/1144802/>



As previously discussed, crimes increasingly involve at least one digital element (Clifford, 2006), and any digital device, regardless of its primary function, may be of evidentiary value. For example, a digital device may store digital information (emails) that is relevant to an investigation or be a source of fingerprints or trace evidence. Digital evidence comes in many shapes and sizes and is no longer limited to traditional desktop computers. Instead, storage devices, handheld devices, video game consoles, and computer network devices should

be identified for their *potential* evidentiary value during any criminal investigation. Taken as a whole, the identification of digital devices may be a complicated task for law enforcement as technology continues to become smaller, more compact, and in some cases, disguised.

### Evidence Integrity

As noted, the first step of the digital forensic investigation involves the survey/identification of potential sources of digital evidence. Next, the importance of evidence integrity will be discussed with regards to forensic soundness and authentication. For any crime scene, whether traditional or digital, the evidence must be collected in a manner that is forensically sound and preserves the evidence's integrity. **Forensic soundness** refers to the validity of the method for collecting and preserving evidence. In digital forensics, evidence is forensically sound when it is collected in a way where the data is unaltered, the copied data is an exact duplicate of the original, and the examiner documents every part of the acquisition process (see Sachowski, 2018; Vacca & Rudolph, 2010).

Complete **transparency** is important in the acquisition of evidence. The digital forensic technician is responsible for documenting which tools were used during the forensic examination as well as the date and time of evidence preservation. When the examiner is transparent, it is easier for the courts to determine the **validity** of the process, meaning whether the evidence was collected and preserved in a manner so that an accurate conclusion can be drawn (Sachowski, 2018; Slay et al., 2009). The validity of digital forensics is assessed by whether or not the evidence is admissible in a court of law. The process by which a digital forensics examiner preserves and validates the evidence will be discussed in greater detail in [Chapter 15](#). The admissibility standards for evidence in a court of law will be discussed in greater detail in [Chapter 16](#). For now, remember that it is not the job of a digital forensic examiner to “prove” a suspect’s guilt or innocence. Instead, the number one priority of the digital forensic examiner is to maintain **evidence integrity**, which is the reliability and truthfulness of the evidence.

### Summary

Overall, virtually every crime will involve some form of digital evidence, and it is up to law enforcement to be able to identify the possible sources thereof. However, digital evidence may be collected from not-so-obvious devices, such as flash drives disguised as a teddy bear or bracelet (see [Figure 14.9](#)).



**Fig. 14.9**  
Hidden media examples.  
During a search and seizure, law enforcement may not recognize a teddy bear keychain or bracelet as a USB flash drive  
Source: (a) [http://upload.wikimedia.org/wikipedia/commons/b/be/Teddy\\_USBear\\_%281a%29.jpg](http://upload.wikimedia.org/wikipedia/commons/b/be/Teddy_USBear_%281a%29.jpg); (b) <http://www.shutterstock.com/pic-119772592/stock-photo-usb-flash-drive-bracelet-on-a-white-background.html?src=0gjGHsG2jXkyrz0BhAnqWQ-1-2>. Courtesy of [www.Shutterstock.com](http://www.Shutterstock.com)



With digital devices increasingly being used to target, act as a tool, or provide support for criminal activities, it is important for law enforcement to understand the crime scene in the Digital Age. There is no doubt that technology will continue to evolve, meaning law enforcement must be able to quickly react to the new and different ways technology may be used for nefarious acts. For example, in the near future hackers could remotely hijack an automobile through its Internet-enabled features, and use it to commit a crime, such as a hit-and-run. Law enforcement agencies would need to be prepared to conduct **vehicle system forensics** in a sound and systematic fashion to support a criminal charge (Kennedy et al., 2019; Nilsson & Larson, 2009; Wright, 2011).

Regardless of whether it is a computer, mobile phone, or USB flash drive, digital evidence will only be admissible in a court of law if it is collected in a forensically sound manner. The importance of being forensically sound cannot be reiterated enough, for it can be the deciding factor in any court case, especially in our current, Digital Age.



To see a YouTube video of two hackers hijacking a Jeep, please visit: <https://www.youtube.com/watch?v=MK0SrxBC1xs>

### Key Terms

- Accuracy
- Ad Hoc* phase
- App
- Chain of custody
- Civil offense
- Closed-source software
- Collection/acquisition phase
- Computer as a target
- Computer as a tool
- Computer as incidental
- Computer forensics
- Computer Fraud and Abuse Act
- Corpus delicti
- Criminal offense

Dead-box forensics  
Digital Age  
Digital evidence  
Digital forensics  
Drone forensics  
Enterprise phase  
Evidence integrity  
Examination/analysis stage  
External hard drives  
Florida Computer Crimes Act of 1978  
Forensic science  
Forensic soundness  
Golden Age  
Handheld devices  
Hard drives  
Hardware  
Information Age  
Internal hard drives  
Internet of Things (IoT)  
Internet of Things (IoT) forensics  
Latent  
Legacy systems  
Network forensics  
Object code  
Open-source  
Peripheral device  
Pre-forensics  
Preservation  
Proprietary software  
Process models  
Report/presentation stage  
Short message service (SMS)  
Social media  
Software  
Structured phase  
Survey/identification

Transparency  
Thumb drives  
Unmanned aircraft system (UAS)  
USB flash drives  
User generated content  
Validity  
Vault app  
Vehicle system forensics  
Wire fraud  
Wireless forensics

## Discussion Questions

1. If technology is constantly evolving, will law enforcement and judicial legislation always be “one step behind” the criminal? Are there any crimes that do not leave behind digital evidence?
2. What are some of the problems law enforcement investigators face when collecting digital evidence from a crime scene?
3. Garfinkel (2010) argues that the Golden Age of digital forensics is nearing its end – what do you think is the next stage or era of digital forensics?
4. Maintaining evidence integrity is one of the most important steps in the digital forensic investigation. Provide some examples of how the integrity of evidence can be discredited during a digital forensic investigation. What are some ways that law enforcement can ensure that evidence integrity is maintained during a digital forensic investigation?

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Chapter **15**

# **ACQUISITION AND EXAMINATION OF FORENSIC EVIDENCE**

## Chapter Goals

- Explain the two steps in the data preservation process
- Identify and describe two digital forensic imaging tools
- Understand the differences between physical and logical extraction
- Understand the importance of repeatability and reproducibility as standards for imaging tools
- Differentiate between allocated, unallocated, slack, and free space
- Understand the importance of report objectivity and reducing confirmation bias
- Identify different data files as potential sources of evidence

## Introduction

In 1992, the Colorado-based company Gates Rubber filed a lawsuit against Bando Chemical Industries, accusing them of stealing trade secret information, specifically two computer programs (*Gates Rubber Co. v. Bando Chemical Industry*, 1996). Both companies were competing against one another in the industrial belts market, and Bando Chemical Industries hired several former employees of Gates in 1988. Gates believed that two computer programs were stolen and copied by the former employees, who were now using the computer programs under a different name. Gates sued for copyright infringement, embezzlement of trade secrets, and breach of contract (*Gates Rubber Co. v. Bando Chemical Industry*, 1996).

In 1992, the judge granted Gates's computer forensics expert, Voorhees, access to the defendant's computer in order to examine whether or not the defendant had maliciously deleted files in an attempt to destroy evidence. However, the defendant's computer forensics expert, Wedig, presented testimony that Voorhees failed to maintain the authenticity of the computer evidence. Wedig stated that Voorhees inappropriately copied a computer program (Norton's Unerase) directly onto the defendant's computer, which "obliterated, at random, seven to eight percent of the information which would otherwise have been available [and] no one can ever know what items were overwritten" (*Gates Rubber Co. v. Bando Chemical Industry*, 1996). Wedig argued that by not making an image copy of the hard drive, Voorhees failed to preserve evidence – and the court agreed. In the ruling, the US District Court of Colorado stated, "a party has a duty to utilize the method which would yield the most complete and accurate results"

(*Gates Rubber Co. v. Bando Chemical Industry*, 1996). Essentially, the court mandated that all litigants be required to obtain competent computer forensic examiners in order to preserve and authenticate the integrity of the digital evidence.

It is clear from the *Gates Rubber Co. v. Bando Chemical Industry* (1996) case that some small portion of potential evidence was lost because the plaintiff's computer forensic examiner failed to acquire and examine the defendant's computer hard drive accurately. As a result of faulty procedures, no one will ever know what 7–8 percent of potential evidence was overwritten. By the end of this chapter, you will understand the process by which a digital forensics examiner preserves and authenticates digital evidence. In addition, you will understand how examiners utilize forensic tools to assist in the preservation and extraction of digital evidence. We will explore in detail the examination/analysis phase of the digital forensics process by describing how and where potential evidence may be uncovered from a digital device, including the ability to recover deleted files. Finally, we will conclude this chapter with a discussion of report objectivity and forensic confirmation bias; after all, the integrity of the report is just as important as the integrity of the evidence itself.

## Data Preservation

Data preservation is the first step in uncovering digital evidence and occurs during the collection/acquisition phase of the digital forensic investigation (see [Chapter 14](#)). The goal of evidence **preservation** in digital forensics is to make a copy of the original data files for examination in a way that minimizes the possibility of any changes being made to the original data files (ISO/IEC, 2012; Sachowski, 2018). Just as in any forensic science (i.e., entomology, pathology), it is important to protect the crime scene in order to preserve the integrity of the evidence. Digital evidence needs to be preserved just like other traditional forms of physical evidence, such as blood or hair (see Saferstein, 2010). However, what makes digital forensics unique is the fact that preservation specifically refers to the ability to make a *duplicate* copy of the original digital evidence.

Consider the murder of 30-year-old David Guy of southern England. On July 3, 2012, the torso of David Guy, which was wrapped in a pink shower curtain and stuffed in a plastic bin, was found by a group of students on vacation at Portsmouth beach (BBC News, 2013). On July 8, 2012, David Hilder was charged with the murder and dismemberment of David Guy. The prosecutor's key evidence was DNA samples taken from Hilder's cat, Tinker. The pink shower curtain that wrapped Guy's torso was covered in cat hair, and the police

were able to extract DNA from the cat hair follicles. Tinker's DNA was then compared to two cat DNA databases at the Veterinary Genetics Laboratory at the University of California in the United States and Leicester University's Department of Genetics in the United Kingdom. It was determined that Tinker had an uncommon DNA type, and this case became the first time that cat DNA was used during a criminal trial in the United Kingdom (Bond, 2013). Hilder was sentenced to life in prison on July 30, 2013.

In this example, the crime scene technicians preserved the cat hairs from the pink shower curtain, which ultimately resulted in cat DNA evidence linking Hilder to the murder. However, the word *preserve* in this example does not mean that the crime scene technicians, or even the veterinary geneticists, were able to make a *duplicate copy* of the cat hairs. Instead, the crime scene technicians and geneticists must alter (thereby damaging) the original cat hairs collected at the crime scene in order to test for DNA evidence. Overall, preservation has a different connotation depending on whether you are referring to physical or digital evidence. Digital forensics is unique in some ways when compared to the other forensic sciences since the forensic examination is not limited to the original digital device. Instead, there are forensic tools that are capable of making a duplicate, thereby preserving the original source of digital evidence. This process is known as imaging.

### Imaging

Imaging is the initial step in the preservation process of digital evidence. **Imaging** is the process of making an exact copy (bit-by-bit) of the original drive onto a new digital storage device (Casey, 2011; Maras, 2012; Sachowski, 2018). This new digital storage device should be clean, meaning there is no digital data present or left over that could contaminate the imaging process (Johnson, 2006). The process of cleaning a digital storage device to ensure that there are no remnants of data present is known as **wiping** (Wiles, 2007). When imaging a drive, the digital forensics tool must be forensically sound. To be **forensically sound**, the digital forensics tool must eliminate the possibility of making any changes to the original data source (Casey, 2011). To ensure that no changes are made to the original data source, a write blocker is used. A **write blocker** is a device that allows read-only access to all accessible data on a drive, as well as preventing anything from being written to the original drive, which would alter or modify the original evidence (National Institute of Standards and Technology; NIST, 2004; see [Figure 15.1](#)). Essentially, the imaging system is sending



**Fig. 15.1**  
Write blockers.  
A write blocker is a device that allows read-only access to all accessible data on a drive, as well as preventing anything from being written to the original drive, which would alter or modify the original evidence. Part (a) shows an example of a hardware-based write blocker, Tableau T8. In part (b), a suspect's hard drive is connected to a hardware-based write blocker, which is then connected to the examiner's laptop.

Source: Photos courtesy of Lt Dennis McMillian, the University of Alabama Police Department

**read-only** commands to the drive and not **write** or modify commands (NIST, 2004). There are a number of hardware (external) and software (internal) write blockers on the market (see [www.cftt.nist.gov](http://www.cftt.nist.gov)), although hardware write blockers are often preferred because it is argued that they have a lower failure rate (see Falayleh & Al-Karaki, 2013). There are also flash media, SD card, and mobile phone write blockers to accommodate different storage types. Hardware write blockers are also known as **bridges** since the digital evidence is connected to the examiner's computer through the write blocker (see Figure 15.1; Sachowski, 2018; Wiles, 2007). Once the original data device is imaged, the next step is for the digital forensic examiner to determine whether or not the original and duplicate copies are in fact one and the same.

## Verification

Verification is the last step in the preservation process of digital evidence. **Verification** establishes the integrity of the digital evidence by proving that the duplicate is **authentic**, meaning a true and unaltered copy of the original data source (Casey, 2011; Sachowski, 2018). Digital forensic investigators verify the duplicate copies by comparing **hash algorithm** values (e.g., MD5, SHA). A hash algorithm is a set of calculations that takes any amount of data (input) and creates a fixed-length value (output), known as a **hash**, which acts as a unique reference number for the original data (Liu, 2011; Sachowski, 2018). Hash values are fixed in length and made up of a unique combination of hexadecimal digits (which can be the numbers 0–9 or the letters a–f). These hash values act as digital fingerprints since they are unique to the original data they reference (Liu, 2011). Hash values play an integral part in the verification of digital evidence because they are extremely sensitive to any changes in the original data, even if changing only one bit. The process of creating a hash value from a variable amount of data is known as **hashing**.

In order to verify that the original data was preserved during imaging, a hash value is created for the original drive and its image. If the hash values match, the investigator has *verified* that the original and duplicate copies are one and the same. In other words, the digital forensic examiner can now search the duplicate copy for digital evidence as if searching the original digital device (e.g., cell phone). If during the imaging process any changes occur to the original drive, the hash values will be different indicating that the image is *not* an exact copy of the original drive. Hash values act as a digital fingerprint for both electronic files (e.g., images, documents) and storage media (e.g., hard drive).

For example, the **National Center for Missing and Exploited Children (NCMEC)** established the Hash Value Sharing initiative in 2008, which is a constantly updated list of hash values for known child sex abuse images/videos (see also [Chapter 8](#); Larence, 2011). This list of known hash values is distributed to law enforcement who can cross-check the known hash values with the hash values from their child pornography cases to determine if there are any “new” instances of child sex abuse (i.e., not currently listed by NCMEC).

**For more information on the NCMEC and the CyberTipline, go online to:** <https://www.missingkids.org/gethelpnow/cybertipline>



Currently, the two most common hash algorithms are MD5 and SHA (Casey, 2011). **MD5 (Message Digest Version 5)** is a type of hashing algorithm that takes a large amount of data of arbitrary length (input) and calculates a unique “fingerprint” of this data (known as hashing) expressed as a unique combination of digits and letters of a specified length (output). In this case, an MD5 hash algorithm produces a 128-bit hash value represented in text as a unique string of 32 digits and letters (Casey, 2011; Marcella & Menendez, 2008; Rivest, 1992; Sachowski, 2018; see [Box 15.1](#)).

### Box 15.1 MD5 Algorithm

An example of how the MD5 algorithm works:

- 1 First, the MD5 hash for the original file is calculated. You will receive payment after you murder my brother. 6b605a8f218ac7923e173c8082c52845
- 2 Any exact copies of the file will produce the same MD5 value. Copy 1: 6b605a8f218ac7923e173c8082c52845 Copy 2: 6b605a8f218ac7923e173c8082c52845
- 3 Should any data in the file change, the MD5 value will change as well.

For example:

Copy 1: You will receive payment after you murder my brother.  
6b605a8f218ac7923e173c8082c52845

Copy 2: You will receive payment after you murder my mother.  
21502c8d206b36391a029a7372e87777

Another common hashing algorithm is the **SHA** or **Secure Hash Algorithm**, originally created by the National Security Agency in 1993. Using a different algorithm, SHA follows the same basic principles as MD5 in that an arbitrary amount of information can be uniquely represented by a combination of hexadecimal digits, resulting in a “digital fingerprint.” The original version of SHA, known as SHA-0, was a 160-bit unique value (Eastlake & Jones, 2001). However, the original SHA algorithm was revised to SHA-1 due to unspecified cryptographic flaws (see Biham & Chen, 2004), but there are still concerns about the vulnerability of SHA-1 to **collision** attacks (Bitansky & Degwekar, 2019; Polk et al., 2011; Wang et al., 2005).

In the hashing world, when two different sets of data (input) result in the same hash value (output), a **collision** has occurred (Bitansky & Degwekar, 2019; Wang, 2012). For example, a digital forensics examiner collects two different computers from a crime scene (computers X and Y). Before analyzing the evidence, the examiner images each computer to create a copy (X-copy and Y-copy). The hash values for X and X-copy should match, just as the hash values for Y and Y-copy. However, a collision occurs when hashing a hard drive does not result in a unique “digital fingerprint,” but instead, the same hash value is produced (e.g., X-copy and Y-copy have the same hash value).

If a collision occurs, the digital forensics examiner is unable to verify and authenticate the imaged drive. Research suggests it is theoretically possible for a collision to occur with MD5 and SHA-1 (see Polk et al., 2011; Wang et al., 2005; Xie & Liu, 2013). However, MD5 and SHA-1 hash algorithms are still secure when used together, as the likelihood of both producing collisions has not been produced (Schmitt & Jordaan, 2013; Wang, 2012). In response to these collision concerns, several additional hash algorithms were created and have been approved for use in the digital verification process by NIST alongside MD5 and SHA-1 (i.e., SHA-224, SHA-256, SHA-384, and SHA-512; Wang, 2012).



For more on NIST Hashing Function guidelines, go online to:  
<https://csrc.nist.gov/projects/hash-functions>

Several court cases have verified the use of hash algorithms in digital forensic investigations. For example, in *XPEL Technologies Corporation v. American Filter Film Distributors* (2008), the judge ordered that all of the images made from the seized digital devices “be authenticated by generating an MD5 hash value

verification for comparison to the original hard drive.” In addition, the Third Circuit described the SHA-1 hash value as “more unique to a data file than DNA is to the human body” (*United States v. Beatty*, 2011). The courts have also ruled on the degree of accuracy for the use of hash algorithms in digital forensics. Specifically, in *United States v. Cartier* (2008), the Eighth Circuit ruled that a “theoretical possibility” of a collision is not grounds for excluding digital evidence authenticated with hash values:

In arguing that the hash values do not establish probable cause for a search warrant, Cartier asserts that it is possible for two digital files to have hash values that collide or overlap. The district court heard the factual evidence presented on the issue of hash values at the suppression hearing. Cartier’s expert testified that hash values could collide and that in laboratory settings these values had done just that. However, the government’s expert witness testified that no two dissimilar files will have the same hash value. After hearing all of the evidence presented by both parties, the district court settled the factual dispute about hash values in favor of the view offered by the government. (p. 5)

Overall, the imaging and verification process of data preservation is extremely important in order to maintain the integrity of digital evidence. Hash values will continue to be used as a means for verifying the authenticity of an imaged drive. However, the data preservation process relies on the use of digital forensic tools, many of which are dual purposed in that they both image and hash hard drives (e.g., EnCase, Forensic Toolkit [FTK]). Therefore, data preservation and evidence integrity rely heavily on the validity and reliability of digital forensic tools.

## Digital Forensic Imaging Tools

During the *pre-forensics* era of the early 1980s, few forensic tools were available. In fact, only government agencies were developing computer forensic tools at this time, and these tools were not made available to other law enforcement agencies or industry (see [Chapter 14](#)). In addition, the courts were concerned with the accuracy of the computer forensics tools. During the 1980s, there were few law enforcement officers “trained” in computer forensics (i.e., most were self-declared experts), and the forensic tools that were available were expensive, making the collection and examination of computer evidence either inaccessible or unaffordable for most law enforcement agencies. However, by

the early 2000s, the forensic industry began to develop tools that allowed for the examination of computer evidence. This surge in forensic tools became known as the Golden Age of digital forensics (Garfinkel, 2010).

During this Golden Age, it became even more important for law enforcement to verify that the digital forensic tools were producing reliable evidence in order to meet admissibility standards in a court of law (Garfinkel, 2010; National Research Council, 2009; see [Chapter 16](#)). In response, the NIST, an agency of the United States Department of Commerce, launched the [\*\*Computer Forensic Tool Testing project \(CFTT\)\*\*](#). According to NIST, there are hundreds of digital forensic tools currently being used by law enforcement worldwide, encompassing all manner of general and specialized tools for desktop, laptop, mobile device, and even vehicle forensics (NIST, n.d.). The purpose of the CFTT project is to “provide unbiased, open, and objective means for manufacturers, law enforcement, and the legal community to assess the validity of tools used in computer forensics” (NIST, n.d.). In addition, these test results must be repeatable and reproducible, both of which are needed to assess “trueness and precision” (NIST, 2001, p. 4).

According to NIST (2001), **repeatability** is “where independent test results are obtained with the same method, on identical test items, in the same laboratory, by the same operator, using the same equipment within short intervals of time” (p. 4). In other words, the digital forensics tool replicates the *same* results when using the exact *same* methodology (i.e., exact duplicate of the testing process). On the other hand, **reproducibility** is “where test results are obtained with the same method on identical test items in different laboratories with different operators using different equipment” (NIST, 2001, p. 5). Thus, the digital forensic tool produces the same results even in a *different* testing environment. Both are necessary in order for the tool’s results to be admissible as evidence in a court of law. With so many digital forensic tools available, it is important that law enforcement choose those tools that have been tested for repeatability and reproducibility by NIST as well as accepted by the court.

There are a number of both *commercial* (e.g., EnCase, FTK, WinHex) and *open source* tools (see <http://opensourceforensics.org>) available for digital forensic investigations (see [Chapter 14](#)). Without a doubt, the two most commonly used digital forensic tools are EnCase and FTK. The general acceptance of these two tools by the scientific community was even noted in the court case *United States v. Gaynor* (2008). The defendant in this case was charged with possession and distribution of child pornography. The defendant requested that mirror copies of the seized computer hard drives be made available to his computer

forensics examiner. The Adam Walsh Child Protection and Safety Act (2006; see [Box 15.2](#)), however, prohibited the defense from obtaining copies of the child pornography evidence in order to limit distribution of said illicit materials, so long as the defense has an ample opportunity to examine the evidence at a government facility (*United States v. Gaynor*, 2008).

The defendant argued that the Adam Walsh Act violated his “right to adequately prepare his defense, his right to effective assistance of counsel, and his right to a fair trial” (*United States v. Gaynor*, 2008). The court ruled against Gaynor citing that the government had offered to provide a computer that met the minimum system requirements to run both FTK® and EnCase®. The court

### **Box 15.2 The Adam Walsh Act**

Excerpt from the Adam Walsh Act (2006) – Discovery in child pornography cases. The importance of protecting children from repeat exploitation in child pornography:

- 1 The vast majority of child pornography prosecutions today involve images contained on computer hard drives, computer disks, and related media.
- 2 Child pornography is not entitled to protection under the First Amendment and thus may be prohibited.
- 3 The government has a compelling State interest in protecting children from those who sexually exploit them, and this interest extends to stamping out the vice of child pornography at all levels in the distribution chain.
- 4 Every instance of viewing images of child pornography represents a renewed violation of the privacy of the victims and a repetition of their abuse.
- 5 Child pornography constitutes *prima facie* contraband, and as such should not be distributed to, or copied by, child pornography defendants or their attorneys.
- 6 It is imperative to prohibit the reproduction of child pornography in criminal cases so as to avoid repeated violation and abuse of victims, so long as the government makes reasonable accommodations for the inspection, viewing, and examination of such material for the purposes of mounting a criminal defense.

SEC. 504. PREVENTION OF DISTRIBUTION OF CHILD PORNOGRAPHY USED AS EVIDENCE IN PROSECUTIONS.

Section 3509 of title 18, United States Code, is amended by adding at the end the following: “PROHIBITION ON REPRODUCTION OF CHILD PORNOGRAPHY.”

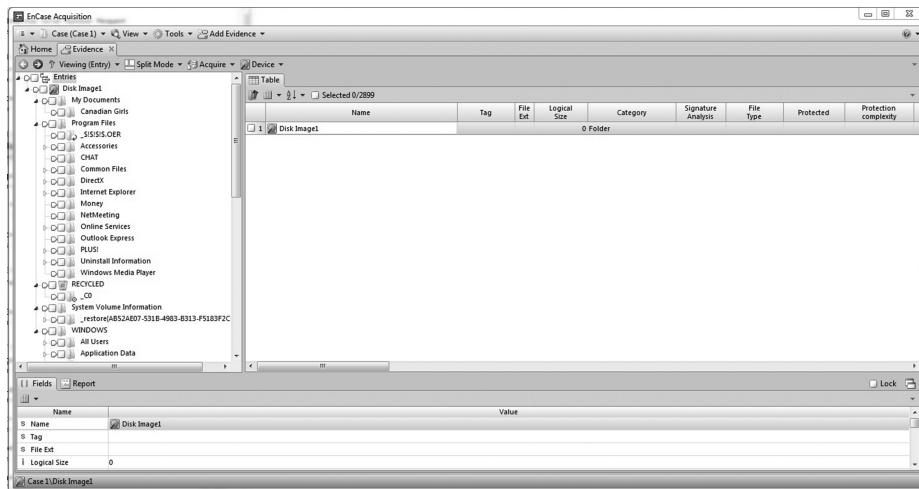
- 1 In any criminal proceeding, any property or material that constitutes child pornography shall remain in the care, custody, and control of either the Government or the court.
- 2 A Notwithstanding Rule 16 of the Federal Rules of Criminal Procedure, a court shall deny, in any criminal proceeding, any request by the defendant to copy, photograph, duplicate, or otherwise reproduce any property or material that constitutes child pornography, so long as the Government makes the property or material reasonably available to the defendant.  
B For the purposes of subparagraph (A), property or material shall be deemed to be reasonably available to the defendant if the Government provides ample opportunity for inspection, viewing, and examination at a Government facility of the property or material by the defendant, his or her attorney, and any individual the defendant may seek to qualify to furnish expert testimony at trial.

cited that EnCase and FTK are the most commonly used digital forensic tools (Leehealey et al., 2012; *United States v. Gaynor*, 2008).

### **EnCase®**

EnCase® is a digital forensics tool created by Guidance Software in 1997 (Ambhire & Meshram, 2012). The tool is considered a leading product in digital forensics, with clients including government agencies (e.g., United States Department of Justice), law enforcement (e.g., Korean National Police, London Metropolitan Police), and industry (e.g., Microsoft, Boeing; Opentext, n.d.).

EnCase is capable of acquiring data from a variety of digital devices, including smartphones, hard drives, and removable media (e.g., thumb drives). This automated tool can image the drive, without altering its contents, and then verify that the image is an exact copy of the original drive. EnCase is capable of searching the unallocated space as well as locating hidden data and deleted files (Maras, 2012). As shown in [Figure 15.2](#), EnCase displays a user-friendly Windows interface (Garber, 2001).



**Fig. 15.2**  
Screenshot  
of EnCase  
Imager created  
by Guidance  
Software  
  
Source:  
Screenshot  
courtesy of Alissa  
Gilbert, a PhD  
student and  
Instructor in the  
Cyber Forensics  
program  
at Purdue  
University.

In the United States, the first court case specifically addressing the validity of EnCase was *State (Ohio) v. Cook* (2002; Guidance Software, 2003). The defendant, Brian Cook, was found guilty of child pornography possession after his brother-in-law, Brian Brown, stumbled across a folder on Cook's computer that contained sexualized images of children. After notifying the Kettering Police Department, a search warrant was executed and the police seized several hard drives, diskettes, and computer peripheral devices from the Cook's residence (*State v. Cook*, 2002). According to court documents, a Detective Driscoll identified over 14,000 pornographic images from a forensic copy of Cook's hard drive that was created using the digital forensics tool, EnCase.

At trial, the defendant challenged the "admission of any materials connected with the mirror image on the basis that the state did not establish the reliability of the mirror image" (*State v. Cook*, 2002, p. 8). The Ohio appellate court upheld the validity of the EnCase software since Detective Driscoll was trained to use EnCase, and he described the process of imaging and verifying the duplicate copy. The Court stated, "there is no doubt that the mirror image was an authentic copy of what was present on the computer's hard drive" (*State v. Cook*, 2002, p. 9). International courts, including Singapore, Australia, and Canada, have also upheld the validity of digital evidence retrieved by EnCase (Guidance Software, 2003; see **Box 15.3**).

EnCase has been involved in a number of high-profile cases. In 2002, San Diego computer forensic examiners uncovered child pornography after examining 50-year-old David Westerfield's computer and removable media files using EnCase (McKay, 2002). The child pornography evidence was

### Box 15.3 The Murder Trial of Ler Wee Teang

**Excerpt from: *Murder Trial of Public Prosecutor v. Anthony Ler Wee Teang (Singapore)***



<https://www.supremecourt.gov.sg/docs/default-source/module-document/judgement/2001-sghc-361.pdf>

On 20 October 2001, SI [Special Investigator] Murad used a special forensic software, Encase Ver 3.15a, to make a complete physical copy of every bit of data located in the hard disk of that same computer.

presented as a possible motive during the trial (Congressional Record, 2005), and in 2003 David Westerfield was sentenced to death for the murder and kidnapping of 7-year-old Danielle Van Dam. In the Richard Reid case, also known as the “Shoe Bomber,” EnCase uncovered a farewell email that was sent from the Al-Qaeda Shoe Bomber to his mother two days before he attempted to blow up United Airlines Flight 63, which was carrying 197 passengers and crew, departing from Paris to Miami (McKay, 2002; Shannon, 2002).



**For more information on how EnCase was used in the Shoe Bomber case, go online to: <http://content.time.com/time/nation/article/0,8599,249418,00.html>**

In addition, the international community has accepted digital evidence from EnCase in both civil and criminal cases (EC-Council, 2017). In Wales, EnCase software uncovered electronic evidence in the case of Dheej Keesoondoyal who was an accountant at BP/Safeway. He set up a fictional company, Global Construction and Electrical Contractors, and created a series of false invoices and authorized payments to the companies in excess of £1.5 m (approximately \$1.86 million); (WalesOnline, 2004). Keesoondoyal was found guilty and sentenced to four years in prison (Guidance Software, 2014).

In India, eight policemen, one civilian, and five terrorists were killed during a terrorist attack on the Parliament of India in New Delhi in 2001 (Guidance

Software, 2014; Negi, 2005). Mohammed Afzal received a death sentence for orchestrating the terrorist attack. EnCase software was used to identify evidence that Afzal's laptop was used to make the fake identity cards that were found on the terrorists' bodies killed in the attack (Guidance Software, 2014; Negi, 2005). Overall, EnCase continues to have a presence in digital forensic cases in both the United States and international community.

**For more information on the Mohammed Afzal case, go to:**

<https://cyberblogindia.in/state-v-mohd-afzal/>



## **Forensic Toolkit® (FTK®)**

FTK® is another commercial software application commonly used in digital forensic investigations, and was created by AccessData. AccessData was founded in 1987 and is considered a pioneer in digital forensics and cybersecurity (AccessData, 2021). Currently, there are more than 130,000 FTK users in law enforcement, government, and industry worldwide (AccessData, 2021.). Like other digital forensic software, FTK is capable of imaging a hard drive, scanning slack space, and identifying steganography; however, it is also capable of cracking passwords and decrypting files (Threat Analysis, 2017).

In its current version, FTK 7 has new capabilities, including Microsoft SQL Server Support, Cloud Based Relational Database Services (RDS) Support for Amazon Web Services (AWS), and a Python Scripting user interface (AccessData, 2018; see [Figure 15.3](#)). In addition, FTK includes Explicit Image Detection (EID) which sorts through the images on a digital device and flags the ones that are more likely to be child pornography by using algorithms that search for flesh tones, certain shapes, and orientations (AccessData, 2014). This feature speeds up the investigation process by allowing computer forensic examiners to identify illicit images more quickly. For example, a one terabyte (1 TB) external hard drive is capable of holding up to a million high-quality photos (the exact number depends on the camera's specifications), which is a lot of images to search through during a digital forensic investigation.

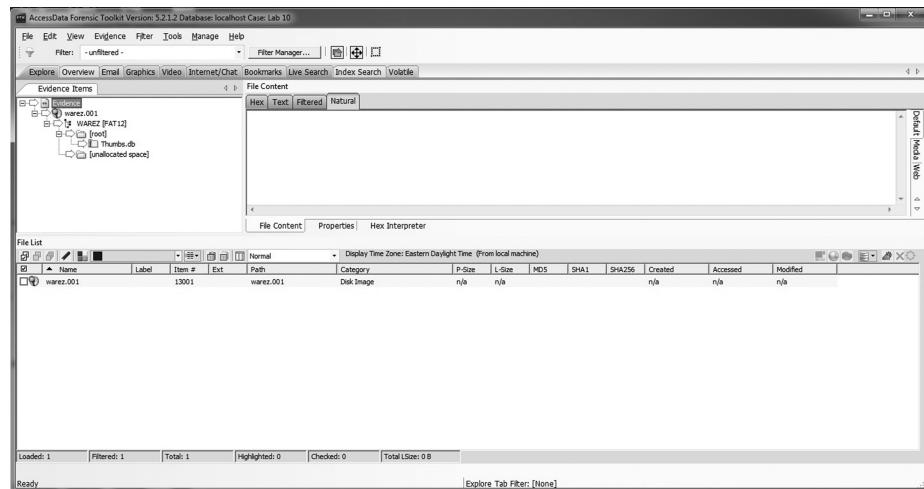
The first court case to establish the validity of FTK was the civil lawsuit *Gutman v. Klein* (2008). During a five-year discovery period, the judge ordered the defendant, Zalman Klein, to assist the opposing counsel with locating all of his personal computers. According to court documents, prior

## Examination of Forensic Evidence

**Fig. 15.3**

Screenshot of Forensic Toolkit (FTK) created by AccessData

Source: Screenshot courtesy of Alissa Gilbert, a PhD student and Instructor in the Cyber Forensics program at Purdue University.



to the date that he was to surrender all of his computers to the opposing counsel's computer forensic examiner, Klein attempted to alter and destroy digital evidence on his laptop. Klein finally turned over his computer to the plaintiff's computer forensic expert, Douglas Vitale, who noticed that the laptop was "hot to touch and a screw was missing from the hard drive enclosure" (*Gutman v. Klein*, 2008). Vitale forensically imaged the defendant's computer using the current version of FTK (vers. 2.2) at that time, and testified that it was an "accepted tool under industry standards to perform the imaging and create a forensic duplicate of the hard drive" (Leehealey et al., 2012, p. 10).

The forensic analysis revealed a number of large-scale modifications to the Klein laptop, including deleted files and altered time/date stamps. In addition, the browser history revealed that the defendant downloaded a file from the Internet that was meant to overwrite space and erase data. During the forensic examination, Vitale's computer battery malfunctioned and saved the imaged hard drive as occurring on January 1, 2000 instead of the actual date, December 8, 2005. In *Gutman v. Klein* (2008), the defense argued that the inconsistent date suggested that the examiner had failed to authenticate the evidence. The court, however, ruled that since the hashes used by FTK matched and chain of custody was maintained, the evidence was authentic despite the inconsistent dates (Leehealey et al., 2012). Since the defendant destroyed and altered evidence, the judge recommended a default judgment, which is an automatic ruling in favor of the plaintiff (*Gutman v. Klein*, 2008).

For more on this case, go online to: <https://www.ediscoverylaw.com/2008/11/magistrate-judge-recommends-default-judgment-in-favor-of-plaintiffs-and-for-defendants-to-pay-all-reasonable-costs-related-to-discovery-dispute/>



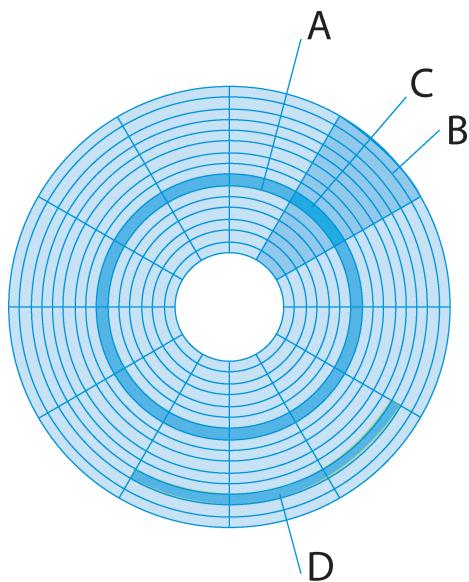
EnCase and FTK are both examples of digital forensic imaging tools, meaning the tools are designed to make an exact copy of the entire hard drive (bit for bit) so the investigator can examine the duplicate rather than the original evidence. To ensure reliability, NIST established specific criteria, as recommendations, for imaging tools used in digital investigations:

- 1 the tool shall make a bit-stream duplicate or an image of an original disk or partition,
- 2 the tool shall not alter the original disk,
- 3 the tool shall be able to verify the integrity of a disk image file,
- 4 the tool shall log I/O errors, *and*
- 5 the tool's documentation shall be correct

(NIST, 2001, p. 4; see Lyle, 2003)

In general, the digital imaging tool must be able to make an *exact copy* (without altering the original) and *verify* that the duplicate and original copy are exactly the same (e.g., compare hash values). Although not required, NIST recommends that two duplicate copies be made so that one is left undisturbed while the other is considered a “working copy” which is examined during the digital forensic investigation.

However, sometimes the hash values for the duplicate and original copy will not match, which is why it is important for the tool to keep an I/O error log. *I/O errors* mean input/output errors, and these errors are often the result of a bad sector on the hard drive. A **sector** is the smallest physical storage unit on a computer disk drive and is almost always 512 bytes (Marcella & Menendez, 2008). Data files are assigned to the different sectors by the file system. **File systems** are simply the way in which data is organized and retrieved on a computer drive, and each piece of data is called a **file** (Bunting, 2008). So, if there is a damaged sector, the imaging tool will not be able to read the data stored in that sector. If the imaging tool is unable to read the sector, it is not possible to copy bit for bit all of the information on the hard drive (see [Figure 15.4](#)). Therefore, bad sectors will result in mismatching hash values.



**Fig. 15.4 (a) and (b)** Diagram of a hard drive, sectors, and clusters

Source: [http://commons.wikimedia.org/wiki/File:Open\\_hard-drive.jpg](http://commons.wikimedia.org/wiki/File:Open_hard-drive.jpg) <http://commons.wikimedia.org/wiki/File:Disk-structure.svg>

- A Data is stored on circular tracks
- B A disk is divided into pie-shaped sectors
- C A sector of a track
- D The part of a track that contains two or more adjacent sectors form a cluster

The hard disk platter is divided into sectors, which is where the data is stored. The data can be read on good sectors (010101), but the data on a bad sector cannot be read.

If the imaging tool maintains an error log identifying the bad sectors, it will be possible for the examiner to verify that the original and duplicate copy are in fact the same despite the mismatching hash values. It is also important for the imaging tool to document the examination process (e.g., time, action performed). Overall, both EnCase and FTK meet the NIST requirements for imaging tools and both have undergone scrutiny in a court of law. Digital forensics tools are not infallible, however, so the examiner should always proceed with caution and verify any spurious results. For example, it may be necessary for one digital forensics examiner to repeat the analyses of another examiner in order to verify the findings independently (Casey, 2011; Sachowski, 2018).

## Uncovering Digital Evidence

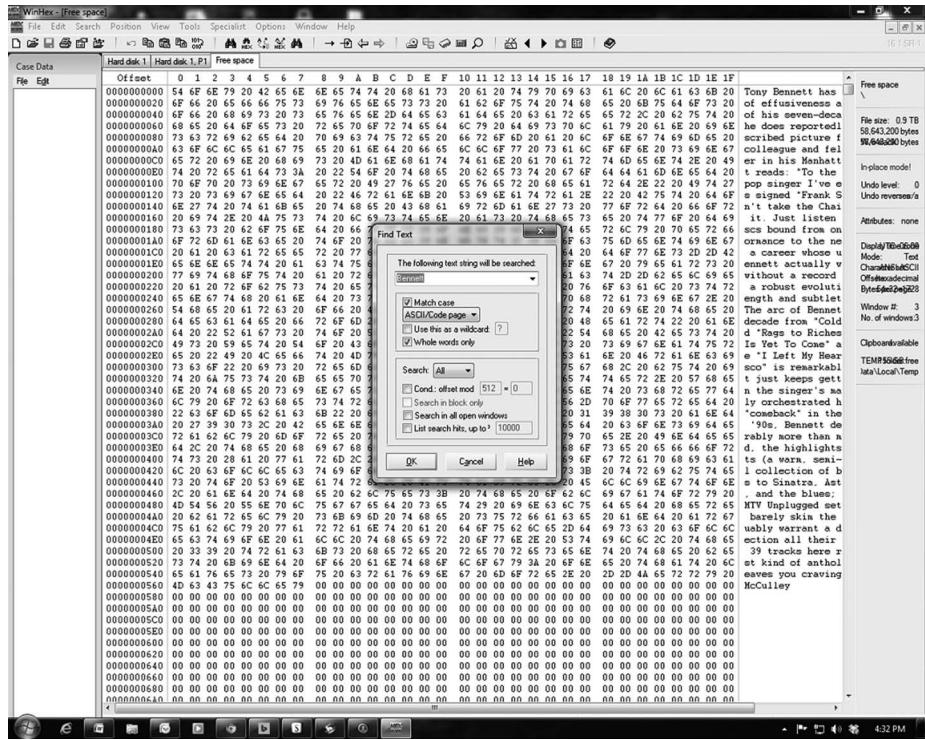
Once the digital drive is imaged and verified, the digital forensic investigation moves into the **examination/analysis stage**. The examination phase of the digital forensic investigation is concerned with the recovery or extraction of digital data. **Data recovery** or **extraction** refers to the process of salvaging digital information (Casey, 2011; Kavrestad, 2020). In general, there are two types of extraction: physical and logical (Britz, 2013; Cahyani et al., 2017; NIJ, 2004).

The **physical extraction** phase identifies and recovers data across the entire physical drive regardless of the file systems present on the drive (Cahyani et al., 2017; NIJ, 2004). As mentioned previously, **file systems** are the way in which data is stored and retrieved on a computer drive, and each piece of data is called a **file** (Bunting, 2008). The file system dictates how the computer manages and keeps track of the name and location of every file on a computer (Maras, 2012). For example, FAT and NTFS are the file systems used by certain Microsoft Windows operating systems (e.g., Windows 98, Windows XP). Overall, a physical extraction pulls all of the digital data from a computer hard drive but does not take into account how the data was stored on the drive. On the other hand, **logical extraction** refers to the process of identifying and recovering data based on the file systems present on the computer hard drive (Cahyani et al., 2017; NIJ, 2004). Each extraction phase involves different methods for acquiring potential digital evidence.

## Physical Extraction

According to the NIJ (2004), there are three methods of physical extraction: keyword searching, file carving, and extraction of the partition table and unused space on the physical drive. When performing a **keyword search**, the digital forensic examiner is able to look for a word or series of words (i.e., phrase) in the entire physical drive regardless of the file systems. For example, the examiner may be able to search for a specific name (e.g., “Donna Smith”) to determine if there is any evidence that the suspect contacted this person. In addition, the digital forensics examiner can conduct a **nested search**, which is a “search within a search” (see Brown, 2003). In this case, once all of the data that contains the name “Donna Smith” is located, the examiner can conduct an additional keyword search (e.g., “murder for hire”) within that data, which further narrows the results. There are several digital forensics tools and software packages available on the market for conducting a keyword search (e.g., Sleuth Kit, Autopsy, FTK; see [Figure 15.5](#)).

File carving is another physical extraction method for data recovery (Kavrestad, 2020; NIJ, 2004). According to Casey (2011), **file carving** is the “process of searching for a certain file signature and attempting to extract the



**Fig. 15.5**  
Keyword searching through forensic software. Example of keyword search for the last name “Bennett” using the digital forensics software WinHex  
  
Source: Screenshot courtesy of Lt Dennis McMillian, the University of Alabama Police Department

associated data” without regard for the file systems (p. 445). This means extracting pieces of information from a larger dataset without taking into consideration how the files were stored on the computer. File carving is a great method for recovering files when the file allocation table is corrupt or a file has been deleted because in both cases there will no longer be an entry in the directory for that file’s location (Beek, 2011; Cantrell & Runs Through, 2020).

Instead of relying on the file system to locate the file, the forensic examiner searches for fragments of the file according to its file signature. A **file signature** is used to identify the content of a file, which in this case describes common file headers. File signatures can be used to locate and salvage deleted files (Cantrell & Runs Through, 2020; Casey, 2011). A **header** is the first few bytes that mark the beginning of a file, whereas the **footer**, also known as the **trailer**, is the last few bytes that mark the end of the file. All files contain a header and usually a footer, whether they are Word documents or JPEG files (see Sammes & Jenkinson, 2000). **Table 15.1** contains a list of common file signatures, also known as **magic numbers**, which can vary greatly in value and length.

**For more information on common file signatures, go online to:**  
[www.garykessler.net/library/file\\_sigs.html](http://www.garykessler.net/library/file_sigs.html)



In the file carving process, the digital forensics examiner will first identify a particular header of interest (e.g., FF D8 FF E0) and then locate the footer (e.g., 00 3B) in order to extract the information in between. By extracting the information in the middle, the examiner is essentially *carving* out a block of data (i.e., a file) from a larger set of raw data. In the example shown in **Figure 15.6**, the examiner was using the forensics software tool WinHex to search for JPEG headers. Common digital forensics tools that are capable of file carving include EnCase, FTK, Scalpel, and Foremost.

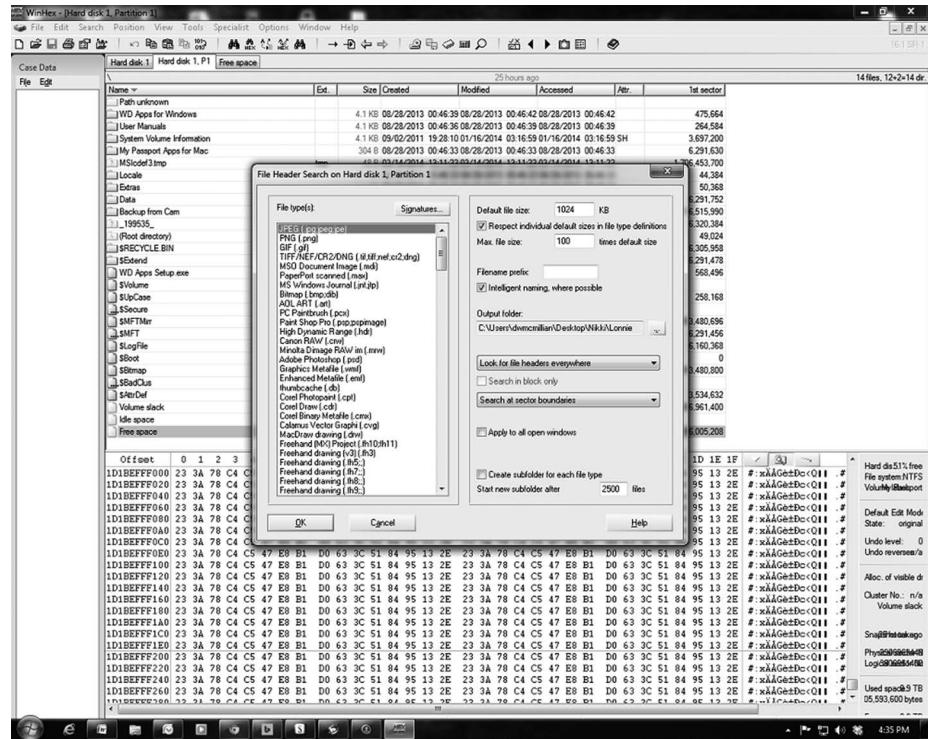
**Table 15.1** Common file signatures

Hex signature	File extension	Description
FF D8 FF	jpg, jpeg	JPEG
4D 5A	Exe	DOS executable file format
25 50 44 46	Pdf	PDF document
52 49 46 46 nn nn nn nn 57 41	wav	Waveform Audio File Format
D0 CF 11 E0	Doc	Microsoft Office documents

## Examination of Forensic Evidence

**Fig. 15.6** File carving example of file header search for “JPEG” with the digital forensics software WinHex

Source:  
Screenshot  
courtesy of  
Lt Dennis  
McMillian, the  
University of  
Alabama Police  
Department



The last method of physical extraction is known as **partition recovery**, which is the process of evaluating the partition table and the unused space on the physical drive (NIJ, 2004). Evaluating the partition tables is considered a physical extraction method because all partition tables conform to a standard layout regardless of the operating system. First, when a hard drive is installed in a computer, it must be partitioned before it can be used. As discussed in Chapter 14, a **hard drive** is simply a data storage device for storing and retrieving data. Before you can begin to store information on a hard drive, it must be organized into **partitions**, which act similar to storage bins in the real world. Partitioning determines how much space is allocated to each storage bin, or partition. Thus, the process of dividing up the hard drive into separate storage spaces, known as partitions, is referred to as **partitioning** (Kavrestad, 2020; Marcella & Guillossou, 2012).

The process of partitioning may be explained by using a house or apartment analogy. An apartment or house is similar to a hard drive in that there is a certain amount of space that is available for storage. The internal space of a dwelling can be divided based on the square footage to create separate rooms that vary in size. In this respect, a house or apartment is essentially *partitioned*. These separate rooms can then be made to “store” different things, so they act like **partitions**.

For example, a house usually has a designated room/space for a kitchen and bathroom, and we tend to store cooking utensils in the kitchen and toiletries in the bathroom. Thus, partitioning is really just the process of creating individual or designated storage space (i.e., partitions) within a larger storage unit (i.e., physical drive).

At the beginning of the data on each disk is a partition table. The **partition table** acts as a reference description for how the operating system has divided the hard drive into partitions (Kavrestad, 2020; Marcella & Guilloussou, 2012). They contain important information, such as the sizes and locations of the partitions and the file systems operating within each of these partitions on the hard drive. These partition tables can reveal to a digital forensics examiner whether or not space on the hard drive is hidden or contains leftover data from prior partitioning. For example, **free space** is that portion of the hard drive that has yet to be assigned to a partition (Kavrestad, 2020; Mandia & Prosise, 2003). Partitions contain both **allocated space** (i.e., written to) and **unallocated space** (i.e., not written to) on a hard drive, and any non-partitioned space on the hard drive is free space. Many of the digital forensics software tools available today automatically identify partitions, which simplifies the partition recovery process for investigators (e.g., EnCase, FTK, NTFS Recovery, Partition Table Doctor).

**For more information, go online to:** [www.symantec.com/connect/articles/maintaining-system-integrity-during-forensics](http://www.symantec.com/connect/articles/maintaining-system-integrity-during-forensics)



## Logical Extraction

As discussed previously, logical extraction refers to the process of identifying and recovering data based on the file systems present on the computer hard drive (NIJ, 2004). Unlike the physical extraction method, logical extraction takes into consideration the operating system (e.g., Windows XP) and file systems (e.g., NTFS) installed on the drive. During logical extraction, data may be retrieved from a variety of sources, such as active files, deleted files, file slack, and unallocated file space (Kavrestad, 2020; NIJ, 2004). In addition, logical extraction may recover digital evidence from hidden files, password-protected files, encrypted files, and steganography.

**Active files** are existing files that are currently available on a hard drive, meaning they have not been deleted. On the other hand, a **deleted file** is a file whose entry has been removed from the computer's file system (e.g., FAT) so

### Box 15.4 Example of Partition Recovery

Ryan Jaye is a child pornography user who stores all of his images and videos on his computer hard drive. In an attempt to conceal his crimes, Ryan Jaye created two partitions on his 80 GB hard drive so that his day-to-day non-criminal activity would be separate from his child pornography activity. The hard drive was partitioned so that 60 GB were dedicated to non-criminal activities whereas 20 GB were dedicated to his child pornography collection. Unfortunately for Ryan, law enforcement was well aware of his criminal activity. When Ryan Jaye became suspicious that he had been discovered, he decided to delete the second partition that contained all of the child pornography. By deleting the second partition, this space was no longer accounted for by the partition table, and Ryan believed that he had concealed his crimes.

With an authorized warrant in hand, law enforcement seized Ryan Jaye's computer in order to conduct a digital forensic investigation. The digital forensics investigator, Chat Stellar, examined the imaged hard drive using digital forensics software to identify the partition table. However, the partition table revealed only one partition (60 GB), leaving 20 GB of the hard drive unaccounted for. Luckily for law enforcement, when a partition is deleted, the data within that partition remains until it is overwritten. Therefore, since Chat Stellar was able to identify space on the hard drive which was unaccounted for, it is likely that further forensic analysis would be able to recover the deleted partition.

Overall, understanding how a partition table can reveal information about the layout of a suspect's hard drive is extremely important as a physical extraction method for uncovering digital evidence.

that this space is now marked as usable again. As noted in [Figure 15.4](#), a **sector** is the smallest physical storage unit on a computer disk drive, and a **cluster** is two or more consecutive sectors. It is the job of the computer's file system to allocate space (i.e., sectors) to store information (see [Box 15.4](#)).

The space allocated to these clusters is fixed in length depending on the operating system, but the files saved to these clusters rarely equal the same size of the allocated space. Consider a file that is 800 bytes in size. As previously discussed, a sector usually stores 512 bytes of data. So, two sectors would be needed in order to store an 800-byte file. If two consecutive sectors are not

available, the file system must allocate the data to another sector on the drive. A file that is stored in nonconsecutive sectors is considered to be **fragmented** (Kavrestad, 2020; Marcella & Menendez, 2008). As with the example, the 800-byte file is smaller than the two sectors allocated to store its data (512 bytes + 512 bytes = 1024 bytes). Therefore, this leftover space between the end of the file and the end of the last storage unit for that file is known as **file slack** or **slack space** (Kavrestad, 2020; Scientific Working Groups on Digital Evidence and Imaging Technology, 2011). In other words, file slack or slack space is the leftover area not used between the current allocated file and the end of the last cluster in which the file is stored. In the current example, there would be 224 bytes of slack space.

As noted earlier, file systems dictate how the computer manages and keeps track of the name and location of every file on a disk. For example, **FAT32 (File Allocation Table)** is the type of file system used in older versions of Windows operating systems (e.g., Windows 98, Windows ME), whereas **NTFS (New Technology File System)** is the later file system for the Windows NT operating systems (e.g., Windows NT 3.1, Windows XP; Marcella & Menendez, 2008). FAT32 identifies where on the hard drive a particular file is stored, or which clusters have been allocated to that file. Compared to the older versions (e.g., FAT12, FAT16), FAT32 manages the space on a hard drive more efficiently by using smaller cluster sizes, which reduces slack space (Britz, 2013; Kavrestad, 2020).

In contrast, NTFS offers better security since it can restrict access to specific partitions or files on a hard drive, making it more difficult to recover files (Kavrestad, 2020; Marcella & Menendez, 2008). However, NTFS creates a **Master File Table (MFT)**, which contains information about all of the files and folders on a drive. The MFT can provide valuable information to a forensic examiner, including file type, size, and the data/time of creation and modification (Carrier, 2005; Kavrestad, 2020).

To better understand sectors, clusters, and file slack, consider the two-car garage analogy. A two-car garage can be considered a cluster that is made up of two separate garages (sectors). In this two-car garage, we can fit different models of vehicles, all of which vary in size. In fact, an individual could choose to store one or two larger vehicles or several smaller vehicles, such as motorcycles or dirt bikes. The space allocated to the two-car garage remains the same; the only thing that changes is what is being stored in the garage. So, if an individual can only afford to buy one car, there will be space left open in the two-car garage. This leftover space is the “file slack” or “slack space” in this analogy.

Intuitively, it makes sense why a digital forensics examiner would be interested in the active files and deleted files on a hard drive. However, why would a digital forensic examiner be interested in this *leftover* space on a hard drive? The file slack can be a rich source of information because this leftover space does not remain *unused*. The computer's operating system wants to use all available space in a cluster, so it will either write random bits of data (known as padding) or store whatever bits of old data remain in the unused sectors. In general, file slack can be broken down into either RAM slack or drive slack (Barrios & Signori, 2010).

If there is unused space between the end of the last file and the end of the sector, the operating system will store bits of information from its **Random Access Memory (RAM)**. The RAM is considered “working memory” because it stores that part of the data that is currently being used by the computer. In addition, RAM is considered **volatile** in nature, meaning the data disappears when the computer is powered off (Maras, 2012; see **Box 15.5**). When randomly selected data from RAM is stored in the file slack, it is known as **RAM slack** (Barrios & Signori, 2010; Kavrestad, 2020). In contrast to RAM, RAM slack is not volatile since these random bits of data are written to the hard drive. Thus, it is possible for RAM slack to contain important information, such as network login names and passwords.

If there is any unused space between the start of the next sector and the end of the cluster, the operating system uses this space as **drive slack** by storing old information that was once available on the storage device (Barrios & Signori, 2010). The operating system does not write any new information to that space, so old information that was once stored there will remain until those sectors are filled with new file data. For example, the drive slack could contain fragments of deleted word processing documents or old emails. Thus file slack is a gold mine of information in digital forensics because it contains either randomly dumped

### Box 15.5 Data Sectors

In this example, the cluster contains four sectors. Each sector is able to hold 512 bytes of data. So, if the file system assigns a data file that is larger than 512 bytes of data, the file will be stored in the consecutive sectors.

Cluster			
Sector 1 (512 bytes)	Sector 2 (512 bytes)	Sector 3 (512 bytes)	Sector 4 (512 bytes)

## Box 15.6 Slack Space

As shown in this example, a data file was stored in Sector 1 and in part of Sector 2. The unused space from the end of the data file to the end of the cluster is known as slack space or file slack. There are two types of slack space: RAM slack and drive slack. The remaining space between the end of the data file and the end of Sector 2 is called RAM slack, and from the beginning of the next sector to the end of the last sector is known as drive slack (see Barrios & Signori, 2010).

Cluster				
Slack space				
Data file		RAM slack	Drive slack	Drive slack
Sector 1		Sector 2	Sector 3	Sector 4

information from the computer's memory (i.e., RAM slack) or remnants of previously deleted files (i.e., drive slack; see **Box 15.6**; Kavrestad, 2020).

Data may also be retrieved from unallocated space in the partitioned hard drive during a logical extraction. **Unallocated space** is the unused portion of the hard drive that the operating system can write to (Casey, 2011; Kavrestad, 2020), and may best be thought of as unallocated clusters (Mallery, 2007). Essentially, unallocated space is that part of the hard drive that is not currently storing any files, but unallocated space is not empty per se. When a file is deleted, the entry in the file system that used to reference the now deleted file is removed so that the operating system is aware that this space is now unallocated. During this process the actual file is not deleted, just the entry in the file system. The "deleted" file, or parts of it, will remain in the unallocated space until it is completely written over by a new file. Therefore, it may be possible to extract information from deleted files that have yet to be overwritten in the unallocated space of a hard drive (Kavrestad, 2020; Mallery, 2007). There are several forensic tools available for logical extraction of the unallocated space of a hard drive, such as WinHex, EnCase, FTK, and DataLifter.

**For more information on how deleted files are created and stored on your computer, go online to:** <https://www.giac.org/paper/gsec/1020/secure-file-deletion-fact-fiction/102029>



Logical extraction may also recover digital evidence from hidden files, password-protected files, encrypted files, and steganography. **Hidden files** are files that have been manipulated in such a way as to conceal the contents of the original file (Britz, 2013). For example, an individual attempting to hide a file might try to alter the file extension. **File extensions** are that part of the file's name that tells the operating system what program to use when you want to open it (Kavrestad, 2020; Savage & Vogel, 2009). Common file extensions are .doc (Microsoft Word documents), .pdf (Adobe portable document format), and .mp3 (MP3 audio file).

One easy way to conceal or hide a file is to change the file extension so that the operating system will use the wrong program to open the file, resulting in an error. To conceal a Microsoft Word document (.doc), the file extension could be manually changed from .doc to .mp3 (MP3 audio file). If someone double-clicks on the file to open it, the operating system will fail to open the file because it treated it as an audio file rather than a Word document. Since files also contain a file header or signature appearing at the beginning of the file, it identifies the file type to the operating system. File headers can be identified and compared to the file extensions using basic digital forensics tools. Any files with mismatched headers and extensions can then be flagged for further analysis.

According to Casey (2011), two of the greatest obstacles for digital forensics examiners are password-protected and encrypted files. **Password-protected files** are locked files that require a password to gain access, which prevents other people from opening or modifying these files (Britz, 2013). For password-protected files, digital forensics examiners use specialized cracking dictionaries and software in order to circumvent the protection, such as AccessData's Distributed Network Attack (DNA) and Password Recovery Toolkit (PRTK; Casey 2011; Wiles, 2007). Unfortunately, efficient password cracking can require expensive hardware and methodology that is not available to forensic practitioners. There may be password cracking techniques on the horizon, such as Probabilistic Context-free Grammars (PCFG) password guessing and Markov models to greatly improve cracking passwords (Aggarwal et al., 2018).

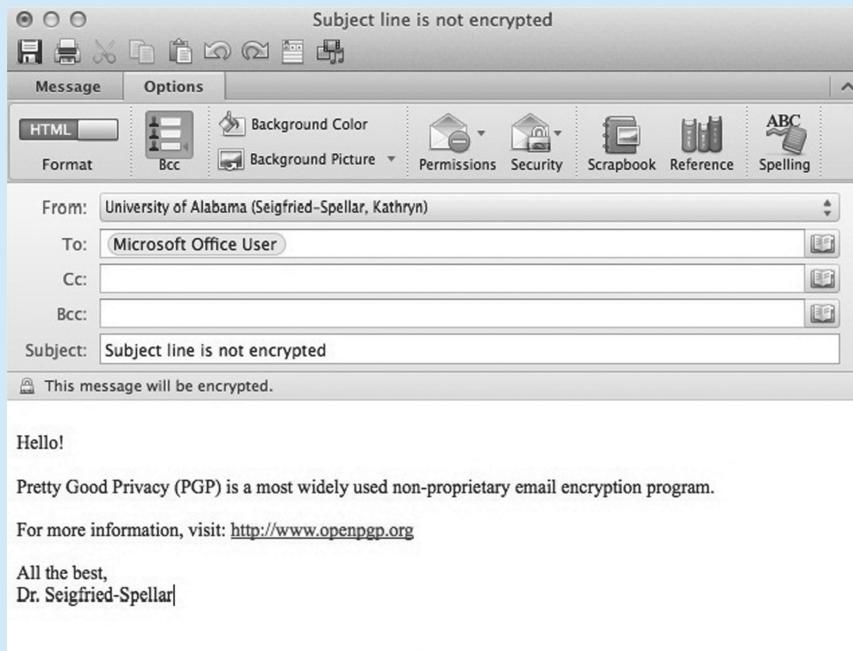
Similar to password-protected files are encrypted files in that both are concerned with privacy. **Encryption** is the process of transforming information (plaintext) so that it is no longer legible (ciphertext) by using a mathematical algorithm (Casey, 2011; Kessler, 2000; Sammons, 2012). In other words, **plaintext** (i.e., the legible message) is transformed into **ciphertext** (an illegible message) through the use of a **cipher**, which is a mathematical formula (algorithm) that uses a set of rules for transforming the message (Kavrestad, 2020; Kessler, 2000).

Most encryption programs require an **access key**, which is essentially a password that unlocks the file so that the same algorithm that encrypted the information is now used to decrypt it (see **Box 15.7**). By entering the access key, the same algorithm used to encrypt the illegible message (ciphertext) now decrypts it back into the original legible message (plaintext).

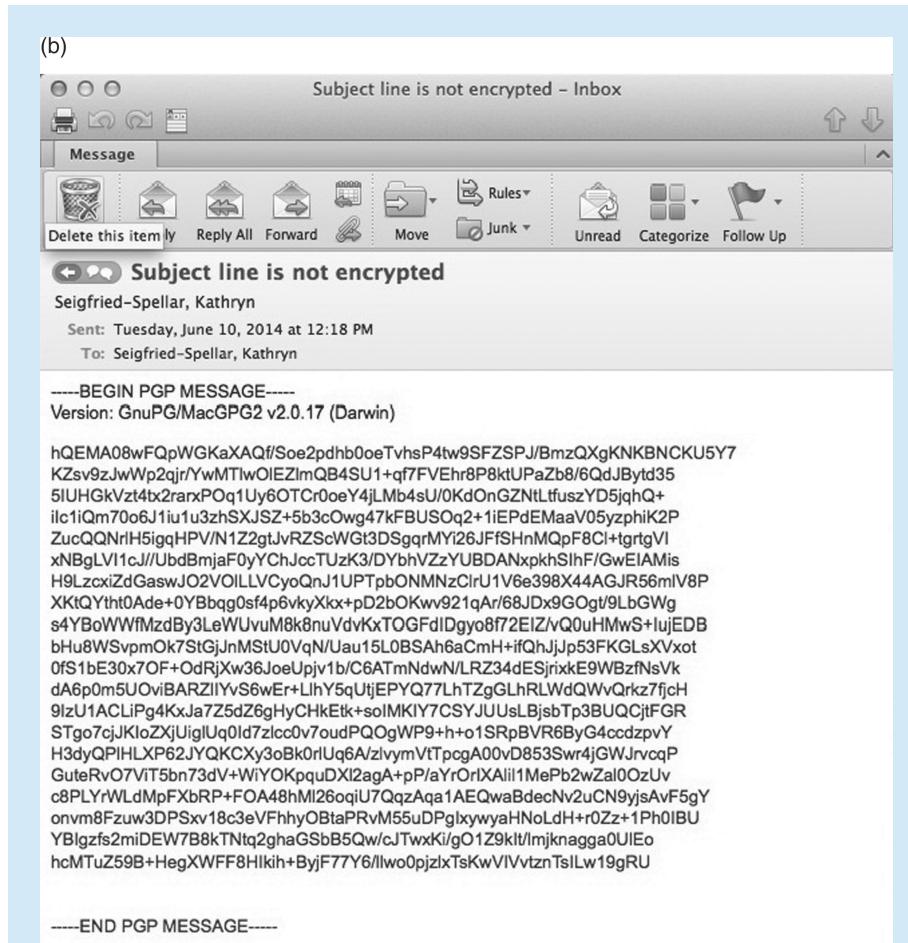
Using encryption is not uncommon; it is commonly used by businesses (e.g., banks) and government agencies (e.g., NSA), both of which have vested interests in protecting privacy. The strength of encryption programs varies, and sometimes digital forensics examiners can use specialized programs to break encryption. However, there are encryption programs that have proven resilient

### Box 15.7 An Example of Encryption

The plaintext message (original) states, “Hello! Pretty Good Privacy (PGP) is the most widely used non-proprietary email encryption program.” However, once the plaintext message is encrypted, it is illegible (ciphertext). Notice the subject line is not encrypted. In order to decrypt the message, you will need to enter the access key to unlock the decryption.



**Figure 15.7a** The plain text message



**Figure 15.7b** The message once encrypted using PGP

and remain unbreakable, leading some countries to consider whether a suspect can be compelled by a court of law to provide the encryption key (see [Chapter 16](#) for more detail).

Finally, **steganography** is the practice of hiding information in such a way that others are not aware that a hidden message exists (Kessler, 2004). Steganography is different from encryption because the goal of steganography is *secrecy* rather than *privacy* (i.e., hidden data vs. illegible data). The primary purpose of steganography is to hide a secret message within a transport medium such as an image or video file. This transport medium is known as a **carrier** (Kessler, 2004). The process of steganography involves replacing bits of useless or unused data in a file with bits of different, invisible data. Once the carrier medium has

the secret message embedded it becomes the **steganography medium**, and only those individuals with the appropriate knowledge and software can reveal the secret message hidden within the carrier. There are a number of software programs available for creating steganographic images (see Johnson, n.d.), as well as mobile phone apps.

Steganography can be used to conceal a variety of criminal activities, such as stolen credit card information, child sex abuse images, or terrorist plots. For example, a child pornography user may covertly send child sex abuse images via email by embedding the illicit images within neutral images, such as images of a cat. In this example, the neutral image of the cat is the carrier, and becomes steganography once the child pornography image is embedded within the carrier. There are a range of digital forensics tools available for detecting steganography to assist forensic examiners, including iLook Investigator, Stegdetect, StegoHunt, Xsteg, and Foundstone. Steganography is difficult to detect, even with the tools available, so the most effective method to detect stego is the human eye (Yari & Zargari, 2017).

**For more on the use of steganography, go online to:** [http://www.washingtonpost.com/wp-dyn/content/article/2010/06/30/AR2010063003108\\_pf.html](http://www.washingtonpost.com/wp-dyn/content/article/2010/06/30/AR2010063003108_pf.html)



Overall, uncovering digital evidence is a time-consuming process to ensure that all possible data is recovered using both physical and logical extraction methods. Not including active files, there is a mountain of data that can be extracted from the allocated, unallocated, and free space of a hard drive. Digital forensics examiners not only extract data from active files, but they recover data from deleted partitions, hidden files, encrypted files, and file slack. Now that the data has been recovered, the digital forensics examiner must be able to reconstruct the digital crime scene. The process of reconstructing the digital crime scene leads to the analysis phase.

## Data Analysis

The analysis phase of the investigation refers to the interpretation and reconstruction the digital crime scene (Casey, 2011; NIJ, 2004). This process is not an easy task due to the large amounts of data uncovered during a digital forensic

investigation. For example, a **1 terabyte (1 TB)** hard drive is essentially one trillion bytes. As discussed in [Chapter 12](#), a byte is a unit of digital information. Since a computer traditionally uses one byte of space to represent a single character (e.g., a single letter such as “a”), if a single word processing document holds 5,000 characters per page, a 1 TB hard drive could hold 220 million pages of text (Baier, 2011/2012)!

In addition, if it were possible to print 20 sheets of text per minute, it would take approximately 21 years to print all of the documents on a 1 TB hard drive. If all these printed pages could be stacked it would be over 13 miles tall (Baier, 2011/2012). Currently, a 1 TB hard drive costs less than \$100, and companies are even manufacturing 1 TB USB flash drives as well as 6 TB hard drives.

The large data volume issue is further compounded for networks where 100s or 1000s of computers and other systems are interconnected over various technologies. That is, there is a vast amount of data being created and transmitted on a daily basis by large-scale computer networks (Goodison et al., 2015; Hansen et al., 2018; Rogers & Seigfried-Spellar, 2016). It is estimated that the total amount of data generated will reach 163 ZB (163 billion TB) by the year 2025 (Reinsel et al., 2017). This will result in 3.3 ZB of traffic over the Internet backbone (Cisco, 2017) with up to 100× this amount flowing over private enterprise networks per annum. This creates a major challenge for the ability to capture that amount of network traffic as well as an additional challenge to have the ability to perform any useful analysis. According to Garfinkel (2002), there are organizations that “routinely record some or all of the traffic on their external Internet connections” (para 9). This defines an explicit need for tools capable of dealing with large volumes of data.

The rapid rise in technology consequently has led to data overflow and the Big Data problem (Khan et al., 2018). The issues and challenges associated with Big Data are often characterized by the “Vs of Big Data.” Initially, the Big Data problem could be summarized by 3 Vs (Laney, 2001); however, researchers over time have included additional Vs (Dean & Ghemawat, 2008; Gandomi & Haider, 2015; Khan et al., 2018; Schroeck et al., 2012). In fact, some researchers have extended the characteristics to as many as 51 Vs (Khan et al., 2019).

Overall, the overarching challenges associated with Big Data can be summarized by the following 3Vs: Volume, Velocity, and Variety. Volume refers to the size of the dataset, which continues to grow faster than our traditional computational abilities. Velocity refers to the speed at which data is generated. Variety refers to the type and organization of data. Extending this current state of tools, having forensically sound processing and

processes, and dealing with the exascale “big data problem” is necessary for the continued advancement of admissible evidence within the courtroom (Goodison et al., 2015).

After recovering the data during the examination phase, the next step is data reduction and filtering which occurs during the analysis phase. By reducing the dataset, the digital forensics examiner only interprets those files relevant to the investigation. Filtering may involve removing duplicate files, searching for keywords, or grouping data based on file types (Casey, 2009). For example, a digital forensics examiner may search for and group together image file types (e.g., JPEG, GIF, BMP) when investigating a child pornography case. In addition, file hashes can be used to eliminate duplicate data (Kavrestad, 2020; Pollitt & Whitledge, 2006).

As discussed previously, a hash value is a number generated by an algorithm to substantiate the integrity of digital evidence (Scientific Working Groups on Digital Evidence and Imaging Technology, 2011). However, a hash value can also be used to identify unique or duplicate files. A hash value can be created for every file, and is a unique number similar to a digital fingerprint. If two files have the same hash value, they are duplicates or exact copies of one another, which can be filtered out as nuisance data.

Hash values can also be compared to datasets that contain known hash values for specific files, such as illicit materials (e.g., child pornography), steganography, or proprietary software. For instance, the [National Software Reference Library \(NSRL\)](#) is supported by the DHS and NIST (NIST, 2019). According to NSRL, a typical desktop computer may contain between 10,000 and 100,000 files, so by using a repository of known hash values, a forensic examiner can reduce the number of files that need to be manually examined.

The process of filtering the dataset and removing non-user-created files (e.g., operating system, program files) is sometimes referred to as [de-NISTing](#). The term de-NISTing comes from the fact that the known hash values for these noise files are maintained and published by NIST’s NSRL (see Waxse, 2013). Overall, filtering the dataset for known hash values not only reduces the number of files that need to be examined but also increases the efficiency of the investigation (NIST, 2019).

The ultimate goal of data reduction and filtering is creating the smallest dataset with the highest potential of containing relevant digital evidence (Casey, 2011). The criteria for including and excluding data is extremely important otherwise potential digital evidence may be discarded or overlooked during the filtering process. The final result of the examination/analysis phase is a reconstruction of

the digital crime scene, so any disregarded evidence could significantly impact the findings of an investigation (Kavrestad, 2020).

## Reporting of Findings

The final stage in the digital forensic investigation is the report/presentation phase. In the **report/presentation stage**, the findings that are determined to be relevant to the investigation are finalized in a report. How evidence is determined to be relevant to an investigation will be discussed further in **Chapter 16**, and essentially refers to evidence that pertains directly to the facts of a case. Only relevant evidence should be included in the final report, rather than hypothetical or theoretical evidence (see Beebe & Clark, 2005; Kavrestad, 2020; Sachowski, 2018). In addition, this report should reflect complete transparency, meaning each step described in detail so as to leave no mystery in the digital forensics process. Specifically, the digital forensic technicians should be prepared to testify in court regarding the survey/identification (e.g., chain of custody), collection/acquisition (preservation, forensic tools), and examination/analysis (data recovery and reduction) stages of the digital forensic investigation.

Along with transparency, the digital forensic examiner should remain objective when drawing conclusions from the digital evidence. According to the Association of Chief Police Officers of England, Wales, and Northern Ireland, “a digital forensic practitioner must be aware of their duty of impartiality and that they must communicate both the extent and the limitations of the digital forensic evidence” (Williams, 2012, p. 12). All conclusions made by the examiner should be supported by objective evidence to limit confirmation bias. **Confirmation bias** is the tendency to accept information that confirms our beliefs while rejecting information that contradicts those beliefs (Goodwin, 2009). Humans are naturally drawn to information that matches our belief systems, leading people to ignore conflicting information. If a digital forensics examiner believes that a suspect is guilty, prior to examining the evidence, it is plausible that potential evidence exonerating a suspect may be overlooked or evidence may be labeled as incriminating even when it is not.



For more information on issues of evidence, go online to: [https://www.huffpost.com/entry/forensic-evidence\\_b\\_3178848](https://www.huffpost.com/entry/forensic-evidence_b_3178848)

Kassin et al. (2013) use the term **forensic confirmation bias** to “summarize the class of effects through which an individual’s preexisting beliefs, expectations, motives, and situational context influence the collection, perception, and interpretation of evidence during the course of a criminal case” (p. 45). The authors make a number of proposed reforms for reducing bias in the forensic laboratory and in the courtroom. For example, forensic examiners should not receive irrelevant information that may taint their evaluation of the evidence. A digital forensics examiner does not need to know that the suspect confessed to downloading Internet child pornography. The fact that the suspect confessed should have no bearing on whether evidence is present or absent on a hard drive.

In addition, Kassin et al. (2013) recommend that an independent forensics examiner verify the findings of the initial examination. This independent forensic examiner should also be completely unaware, or **blind**, to the conclusions reached by the initial examiner. Finally, the authors conclude that any forensic science education or certification should include training in basic psychology and, more specifically, the influence of confirmation bias (Kassin et al., 2013). Overall, the final report should reflect not only the integrity of the evidence but also the integrity of the forensic examiner.

## Summary

This chapter began with a review of the case of *Gates Rubber Co. v. Bando Chemical Industry* (1996) identifying the importance of data preservation. A small error, such as forgetting to use a write blocker or create a duplicate image, could result in a loss of potential evidence. In addition, the Casey Anthony case is a perfect example of how uncaptured data (e.g., Google search for “fool-proof suffocation” methods) may have influenced the outcome of the trial. The Orange County Sheriff’s department admitted to overlooking evidence of a Google search for “fool-proof suffocation” methods the day the daughter was last seen alive (see Associated Press, 2012).

There are a number of mistakes that can be made during the perseveration and acquisition phases. It is also important to consider how examiner objectivity can be maintained and avoid forensic confirmation bias. If the court questions the integrity of the examiner or the forensic laboratory, evidence may be deemed inadmissible in a court of law. The digital forensic investigation process is constantly under scrutiny, and the validity of digital forensics is assessed by whether or not the evidence is admissible in a court of law.

## Key Terms

1 Terabyte (1 TB)  
Access key  
Active files  
Authentic Blind  
Bridges  
Carrier  
Cipher ciphertext  
Cluster  
Collision  
Computer Forensic Tool Testing project (CFTT)  
Confirmation bias  
Data recovery  
Deleted files  
De-NISTing  
Drive slack  
EnCase®  
Encryption  
Examination/analysis stage  
Extraction  
File  
File allocation table (FAT)  
File carving  
File extensions  
File signature  
File slack  
File systems  
Footer  
Forensic confirmation bias  
Forensic Toolkit® (FTK)  
Forensically sound  
Fragmented  
Free space  
Hard drive  
Hash

Hash algorithm  
Hashing  
Header  
Hidden files  
Imaging  
Keyword search  
Logical extraction  
Magic numbers  
Master file table (MFT)  
Message Digest Version 5 (MD5)  
National Institute of Standards and Technology (NIST)  
National Software Reference Library (NSRL)  
Nested search  
New Technology File System (NTFS)  
Partition recovery  
Partition table  
Partitions  
Partitioning  
Password-protected files  
Physical extraction  
Plaintext  
Preservation  
RAM slack  
Random access memory (RAM)  
Read-only  
Repeatability  
Report/presentation stage  
Reproducibility  
Sector  
Secure Hash Algorithm (SHA)  
Slack space  
Steganography  
Steganography medium  
Trailer  
Unallocated space

Verification  
Volatile  
Wiping  
Write  
Write blocker

## Discussion Questions

1. The data preservation stage of the collection/acquisition phase of the digital forensic process involves careful planning on the part of the examiner. Identify five ways in which the digital evidence can be tainted during the data preservation process.
2. A fellow classmate is confused about the following terms: slack space, clusters, and sectors. The book provided the analogy of a two-car garage to assist readers with these different terms. Create a different analogy to explain these different terms to your classmate.
3. It is extremely important that digital forensic examiners are able to verify the authenticity of the digital evidence. Explain whether the courts should be concerned with the use of hash algorithms for verifying the authenticity of digital evidence.
4. Provide two examples of how confirmation bias could influence the integrity of a case. What are some ways we can limit the influence of forensic confirmation bias?

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Chapter **16**

**LEGAL  
CHALLENGES  
IN DIGITAL  
FORENSIC  
INVESTIGATIONS**

## Chapter Goals

- Explain the Fourth and Fifth Amendments as they relate to cases involving digital forensics
- Understand the process of conducting a warrant vs. warrantless search and seizure
- Describe the different standards of proof
- Identify and describe exceptions to the warrant requirement for a search and seizure
- Identify and describe the different standards of reliability and admissibility for expert witness testimony and scientific evidence
- Understand whether digital forensics meets standards for admissibility in court

## Introduction

In April 1991, Kevin Poulsen was arrested and charged with several computer hacking crimes, including telecommunications and computer fraud (*United States v. Poulsen*, 1994). Additional espionage charges were brought against Poulsen for illegal possession of classified government secrets were filed after computer tapes were found in a storage locker rented under his name. He claimed the computer tapes were illegally obtained and, therefore, could not be used as evidence in the espionage case (*United States v. Poulsen*, 1994).

According to court documents, Poulsen rented a storage locker from the Menlo-Atherton Storage Facility in April 1987. Poulsen was 71 days behind in rent and owed the company \$155.50 for the storage locker. In January 1988, Menlo mailed a notice to Poulsen (who provided a false address and name on the rental agreement) stating that if the rent were not paid in full within 14 days, Menlo would terminate Poulsen's right to the storage unit.

In February 1988, after not receiving rental payment in full, the manager of Menlo removed the contents of Poulsen's locker but noticed "a large amount of telecommunications equipment and manuals that apparently belonged to Pac-Bell" (*United States v. Poulsen*, 1994, para 7). Since the manager of the storage facility believed the telecommunications equipment was stolen, he contacted the police department and gave the detectives permission to seize all of the contents of Poulsen's locker.

When PacBell investigators examined the computer tapes, they contained classified military secrets including “air tasking orders, which list targets that the United States Air Force will attack in the event of hostilities” (*United States v. Poulsen*, 1994, para 16). Poulsen filed a motion in 1993 to suppress the computer evidence retrieved from the storage unit on the basis that seizing evidence from his storage locker violated his Fourth Amendment right to privacy and unlawful search and seizure. The US government argued that the “renter does not have a legitimate expectation of privacy in the contents of a rental unit if the rent is not paid” (*United States v. Poulsen*, 1994, paras 29–30).

In 1994, the Ninth Circuit Court for California ruled that the computer evidence tapes were admissible and Poulsen did not have an expectation of privacy regarding the contents of his storage locker. Specifically, the court agreed that Poulsen’s expectation of privacy for the storage unit was terminated when he failed to pay the full amount of his rent as stated in the signed rental agreement (*United States v. Poulsen*, 1994). In 1996, Poulsen’s espionage indictment was dropped, but he served five years in prison for the other crimes he committed.

Though Poulsen went on to become the investigations editor for the technology magazine *Wired*, the court’s ruling in the *United States v. Poulsen* (1994) case became an important decision that affected his sentencing. The computer tapes were the sole evidence for the espionage charges. If this evidence were not admitted, it would have substantially hindered the ability of the government to bring charges against Poulsen. As a result, the admissibility of digital evidence has the ability to significantly impact the outcome of a trial.

This chapter highlights the legal issues surrounding digital forensic evidence in the courtroom. The chapter begins by exploring two constitutional rights in the United States often challenged in cases involving digital forensic evidence: the right to privacy (Fourth Amendment) and the right against self-incrimination (Fifth Amendment). Next, the standards for admissibility of digital evidence in criminal cases in the United States is examined along with a brief discussion of some international responses (e.g., United Kingdom, Ireland, India, Canada, and the Philippines) to issues that are being faced globally, including key disclosure laws and the reliability of expert witness testimony. Finally, the chapter concludes with a discussion of the admissibility and reliability standards for digital forensic examiners providing expert testimony in the courtroom.

## Constitutional Issues in Digital Investigations

The **United States Constitution** was adopted on September 17, 1787 (Levy, 2001) and is the highest form of law within the nation. It mandates that all state judges must follow federal law when a conflict arises between state and federal law. The first ten amendments of the US Constitution are known as the **Bill of Rights** and were ratified on December 15, 1791 (Levy, 2001). For an **amendment**, meaning an addition or alteration, to be made to the United States Constitution, two-thirds of the members from both the House of Representatives and the Senate must approve it and three-fourths of the states must ratify it.

With that in mind, the Fourth Amendment and Fifth Amendment are arguably the most influential to cases involving digital forensics, yet these amendments were written during a time without concern for the influence of digital technology on the law. As discussed throughout this textbook 12, almost every criminal investigation now involves some form of digital evidence. Therefore, the Constitution is constantly being reinterpreted and challenged in this Digital Age of technology. The following section will discuss the legal issues surrounding the Fourth Amendment and Fifth Amendment as they relate to cases involving digital evidence.

### **The Fourth Amendment**

The **Fourth Amendment** is often summarized as the **right to privacy**; yet, there is no explicitly stated “right to privacy” in the United States Constitution or Bill of Rights (del Carmen & Hemmens, 2017). Instead, the Fourth Amendment limits the government’s ability to search and seize evidence without a **warrant**. In other words, it prohibits unlawful search and seizure but only applies to law enforcement officers, and not private individuals so long as they are not acting as an agent of the government (James et al., 2014). Overall, the Fourth Amendment may be viewed as a *narrow* rather than *general* right to privacy (see del Carmen & Hemmens, 2017). The amendment reads:

The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no Warrants shall issue, but upon probable cause, supported by Oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.

Thus, the Fourth Amendment begins with a clause protecting a person’s body, home, and other belongings from unlawful search and seizure by any government

agency. It also indicates that probable cause is required in order to issue a warrant. However, the Fourth Amendment does not explicitly define what constitutes unlawful search and seizure, probable cause, or one's "effects" or belongings. For example, results from a survey of 750 companies around the globe suggested that 93 percent were using some form of cloud storage in 2020 alone (MSV, 2020).

**Cloud storage** is like a virtual warehouse where people can store data on a network (e.g., Dropbox, iCloud, and Google Drive). So, is the data stored "in the cloud" (e.g., pictures stored in Dropbox) considered private and/or protected under the Fourth Amendment? These are the types of questions facing the courts, which must determine how to interpret and apply the Fourth Amendment in this Digital Age.

## Privacy

Since the right to privacy is not overtly outlined in the Constitution, the courts were left to decide when privacy was protected under the Constitution. One of the most influential cases that defined one's right to privacy was *Katz v. United States (1967)*. In 1965, Charles Katz was convicted of conducting illegal gambling operations across state lines. Agents from the Federal Bureau of Investigation (FBI) placed a warrantless wiretap on the public phone booth that Katz was using to conduct his gambling operations, which allowed them to listen only to Katz's conversations that related to the illegal gambling operations. Evidence from the warrantless wiretap was used to convict Katz of illegal gambling (see [Figure 16.1](#)).

Katz appealed his conviction, arguing that the public telephone booth was a constitutionally protected area so the warrantless wiretap violated his Fourth Amendment right to unreasonable search and seizure (*Katz v. United States*, 1967). Therefore, any evidence obtained from the warrantless wiretap should be inadmissible in court. In contrast, the federal agents argued that the evidence was admissible since they did not need a warrant to wiretap a public telephone booth. In 1967, the US Supreme Court ruled that the warrantless wiretap did violate Katz's Fourth Amendment right to unlawful search and seizure, so any evidence obtained because of the wiretap was inadmissible in court. Most importantly, the US Supreme Court ruled that Katz had a constitutionally protected reasonable expectation of privacy (*Katz v. United States*, 1967). As stated in the opinion:

What [Katz] sought to exclude when he entered the booth ... was the uninvited ear. One who occupies [a telephone booth], shuts the door behind him, and pays the toll that permits him to place a call is surely entitled to assume that his conversation is not being intercepted.

**Fig. 16.1**

An example of an old pay phone. Although this pay phone is “public,” *Katz v. United States* (1967) ruled that a person who enters a phone booth, and closes the door, has a reasonable expectation of privacy, so a warrantless wiretap would violate the Fourth Amendment.

Source: <http://www.shutterstock.com/pic.mhtml?id=13525399&src=e709roJoBPLR0DOiYV6IQ-1-29>. Image courtesy of [www.Shutterstock.com](http://www.Shutterstock.com).



In the concurring opinion, Justice Harlan outlined two criteria for when there is a reasonable expectation of privacy: the person must have exhibited an actual expectation of privacy, *and* the expectation must be one that society is prepared to recognize as reasonable (*Katz v. United States*, 1967). In addition, the Fourth Amendment protects people and not places, so the question was not if the public phone booth was constitutionally protected but whether the person making the phone call had a reasonable expectation of privacy (*Katz v. United States*, 1967). For example, if a person is talking on your cell phone while in a university classroom waiting for class to start, they would not be protected by the Fourth Amendment because it would be *unreasonable* to assume that they have an *expectation of privacy* if they are conversing in the open where it can easily be overheard by the other students. Based on the *Katz v. United States* (1967) ruling, the first part of the Fourth Amendment is often referred to as the reasonableness clause, meaning a search is constitutional if it does not violate a person's *reasonable* and *legitimate* expectation of privacy (Neubauer & Fradella, 2019).

## Search and Seizure

As discussed previously, the second clause of the Fourth Amendment restricts the government's ability to search and seize evidence without probable cause to issue a warrant. The second clause of the Fourth Amendment is often referred to as the warrants clause, indicating a warrant or signed document issued by a judge or magistrate authorizes a specific course of action. The Fourth Amendment specifically refers to a search warrant, which is a signed document by a judge or magistrate authorizing law enforcement to conduct a search (Neubauer & Fradella, 2019).

A search warrant is different from an arrest warrant, which is a signed document by a judge or magistrate authorizing law enforcement to take the person into custody (Neubauer & Fradella, 2019). A search is specifically defined as the “exploration or examination of an individual’s home, premises, or person to discover things or items that may be used by the government as evidence in a criminal proceeding,” and seizure is defined as “the exercise of control by the government over a person or thing because of a violation of the law” (del Carmen & Hemmens, 2017). Therefore, when law enforcement officers conduct a search and seizure, they are identifying and collecting potential evidence to be used in the court of law.

In *United States v. Jacobsen* (1984), the Supreme Court defined the meaning of search and seizure. This case involved a damaged cardboard box that exposed several bags containing a white powdery substance. After seeing the contents of the box, the employees of the freight company contacted the Drug Enforcement Administration (DEA) to investigate. When an agent arrived, he tested the white powdery substance onsite and determined it was cocaine. Based on the results of the field test, the DEA agent then obtained a warrant to search the address where the box was being shipped. After a sting operation on the shipping destination, Bradley and Donna Jacobsen were convicted of possession with intent to distribute cocaine (*United States v. Jacobsen*, 1982). They appealed their conviction, arguing that the Fourth Amendment required the DEA agent to obtain a search warrant *before* testing the white powder. The Supreme Court disagreed and held that the defendants' Fourth Amendment rights were not violated because the initial invasion of privacy occurred as a result of private action rather than governmental action.

In addition, the US Supreme Court stated that a search occurs when an “expectation of privacy that society is prepared to consider reasonable is infringed,” and a seizure of property occurs when there is “some meaningful interference with an individual’s possessory interests in that property” (*United States v. Jacobsen*, 1984). In this case, the search and seizure were reasonable and did not violate the defendant’s expectation of privacy since the unsealed, damaged box was compromised. The employees of the freight company also opened the damaged, unsealed box and discovered the suspicious white powder and then invited the DEA to inspect the contents of the box. Therefore, the warrantless search and seizure was legal since there was no expectation of privacy. The conduct of the agent was reasonable given the prior knowledge, shared by a private third party, that the box contained a suspicious white powder (*United States v. Jacobsen*, 1984). That is to say, the agents can reenact the original private search without violating any expectation of privacy, so long as they do not exceed the scope of the private search (*United States v. Jacobsen*, 1984).

There are three basic requirements for a warrant (see [Box 16.1](#); Bloom, 2003; del Carmen & Hemmens, 2017; Neubauer & Fradella, 2019). First, a warrant must be signed by a neutral and impartial judge or magistrate who does not have a vested interest in whether the search warrant should be issued. Second, the Fourth Amendment specifically requires that there must be probable cause, supported by oath and affirmation, to issue a warrant. **Probable cause** means there must be adequate reasons or justifications, rather than mere suspicion, to conduct a search. According to *Brinegar v. United States* (1949), “probable cause

deals with probabilities. These are not technical; they are the factual and practice considerations of everyday life on which reasonable and prudent men, not legal technicians, act" (175). In general, to issue a warrant, there must be probable cause to support the belief that both a crime has been committed and that evidence of a crime will be found (see *Brinegar v. United States*, 1949).

### **Box 16.1 A Fictional Search Warrant for Electronic Devices**

Fictional search warrant, from the Tippecanoe High Tech Crime Unit, to search a home for electronic devices.

STATE OF INDIANA                  ) IN THE SUPERIOR \_\_ COURT  
                                         )  
                                         ) SS:  
 COUTY OF TIPPECANOE    ) OF TIPPECANOE COUNTY  
                                         79D\_\_1701-MC\_\_\_\_\_

#### **SEARCH WARRANT**

To Any Police Officer of the

(Lafayette Police Department  
 (West Lafayette Police Department  
 (Tippecanoe County Sheriff's  
 Department  
 (Tippecanoe County Prosecutors Office  
 (Indiana State Police  
 (Purdue University Police Department  
 (Indiana Excise Police  
 (Indiana Department of Natural  
 Resources

Greetings:

Whereas there has been filed with me an Affidavit of Probable Cause, you are therefore commanded in the name of the State of Indiana with the necessary and proper assistance in the daytime or in the nighttime to enter into and upon the premises described in said affidavit, to wit:

12345 Main ST, Somewhere, IN 99999 a one-story house with blue siding and white trim

AND

A gray 1967 Ford Shelby Mustang GT500 registered to Thomas J. Egen  
(IN plate # "DRFALLS")

AND

The person of Thomas J. Egen, W/M DOB: 2/30/1972, SSN:  
XXX-XX-1234

Tippecanoe County, in the State of Indiana, and there diligently search  
for and seize:

To search for and seize all electronic devices capable of internet activity, or capable of transferring and/or storing electronic data (such as desktop computers, laptops, iPhones, iPod touches, iPads, Blackberries, cell phones, routers, USB hard drives, mobile devices, thumb drives, CD/DVDs, floppy disks) and to forensically search said devices and components of said devices for all files (active or deleted) for any images, photographs, or videos of child pornography; any internet searches (including browser history, cache, cookies, and downloads) for child pornography; electronic data showing user activity or documentation of viewing, storing, producing, and/or transferring of any child pornography including emails; evidence of child molestation or other sexual offenses involving minors, and electronic data showing the identity of the user of said devices.

As described in the probable cause affidavit and that you bring the same, or any part thereof found on such search, forthwith before me to be disposed of according to law.

Given under my hand and seal this \_\_\_\_\_ day of January, 2020.

---

Judge/Magistrate of Tippecanoe County

Fictional search warrant courtesy of Investigator Sean Leshney of the Tippecanoe County High Tech Crime Unit

Probable cause may be viewed as a standard of proof on a continuum of probability ranging from mere suspicion to almost complete certainty (del Carmen & Hemmens, 2017). For example, in a criminal case, the prosecution must show the jury and/or judge there is proof beyond all reasonable doubt that the person on trial committed the crime. In other words, believing that the defendant *probably* committed the crime or is *most likely* guilty is not the same

thing as being almost 100 percent certain, or in other words, beyond a reasonable doubt. This high standard of proof makes it less likely that an innocent person will be convicted. In contrast, a civil case requires only a preponderance of the evidence standard of proof. Essentially, it must be more likely than not that the accused committed whatever acts to which they are charged.

As previously discussed, the Fourth Amendment requires probable cause in order to obtain a search warrant. The probable cause is usually presented as an **affidavit**, which is a written, or occasionally verbal, statement to which the law enforcement officer has sworn an oath to the magistrate that the information is true and factual (del Carmen & Hemmens, 2017; Neubauer & Fradella, 2019). Finally, the warrant must explicitly state what crime was committed, the location to be searched, and the specific items that are to be seized (Bloom, 2003). Essentially, warrants should be carefully constructed and detailed so that the law enforcement officers executing the warrant can “identify the items with reasonable certainty, and are left with no discretion as to which property is to be taken” (Neubauer & Fradella, 2019). However, there are a number of exceptions to the rule, meaning not all searches and seizures require a warrant.

### **Exceptions to the Rule**

In general, the US Supreme Court has ruled that a warrant is only required if the search violates a person’s reasonable expectation of privacy (*Illinois v. Andreas*, 1983). In addition, a warrantless search may be constitutional even if it does violate a person’s reasonable expectation of privacy, so long as it falls within an established exception to the rule (*Illinois v. Rodriguez*, 1990). There are a number of exceptions to the warrant requirement of a search and seizure: search incident to arrest, consent searches, motor vehicle searches, border searches, open fields, plain view, and third-party disclosure, to name a few (see Neubauer & Fradella, 2019).

For example, a person may be searched and any evidence seized once they have been arrested. The process of searching a person who has been arrested for a crime is known as a search incident to arrest. In *United States v. Robinson* (1973), the court ruled that a search incident to arrest is not only an exception to the warrant requirement but is also viewed as a reasonable search under the Fourth Amendment. Searches incidental to arrest protect officers by allowing them to search for weapons or instruments to escape on the arrested person as well as ensure that potential evidence is not going to be destroyed (see *United States v. Robinson*, 1973).

In *United States v. Finley* (2007), the defendant appealed his conviction on possession and intent to distribute methamphetamine arguing that his Fourth Amendment rights were violated since law enforcement conducted a warrantless, post-arrest search of his cell phone, which was retrieved from his pants pocket. The search revealed text messages and call records related to narcotics use and trafficking, which were presented as evidence during his trial. The Fifth Circuit court ruled that searching the cell phone did not violate Finley's Fourth Amendment rights since it occurred post-arrest and the cell phone was retrieved from his pants pocket (i.e., search incident to arrest).

Since cell phone data can be altered or changed, the officers were searching for potential evidence in order to prevent its destruction (*United States v. Finley*, 2007). In contrast, *State v. Smith* (2009) ruled that the warrantless search of a cell phone seized incident to arrest violates the Fourth Amendment when the “search is unnecessary for the safety of law enforcement officers and there are no exigent circumstances” (line 171). **Exigent circumstances** refer to emergency situations that allow law enforcement officers to conduct a warrantless search when they believe people are in danger or potential evidence will be destroyed (see McInnis, 2009).

The US Supreme Court, however, recently unanimously ruled in *Riley v. California* (2014) that police will not be allowed to search cellular devices without a warrant after a person has been arrested (Bekiempis, 2014). Prior to this decision, there were no specific standards for cell phone seizure. In fact, law enforcement officers were seizing cell phones and imaging them during traffic stops in some states. There are digital forensic tools available that are portable and allow law enforcement to extract cell phone data (see [Figure 16.2](#)). For example, in 2012, Noe Wuences was pulled over by an Oklahoma City police officer because the license plate tag was improperly displayed (*United States v. Zaavedra*, 2013). The driver consented to a search of the vehicle and 9.5 lb of methamphetamine was found hidden inside. Also, located inside the car were two cell phones.

The officer proceeded to conduct a warrantless search of the cell phones using a Cellebrite device, which extracted information including contacts, phone history, text messages, and pictures. During trial, Wuences submitted a motion to suppress any evidence retrieved from the cell phones because the search violated his Fourth Amendment rights (*United States v. Zaavedra*, 2013). Since prior courts ruled that law enforcement may search a cell phone seized during a traffic stop so long as there is probable cause to believe the phone contains evidence of a crime (see *United States v. Garcia-Aleman*, 2010) and are



**Fig. 16.2**  
Cellebrite  
Cellebrite  
Universal Forensic  
Extraction  
Device (UFED)  
is a portable  
device used  
for forensically  
extracting data  
from cell phones.  
According to  
the Cellebrite  
brochure, the  
Cellebrite UFED  
allows for the  
“complete  
extraction of  
existing, hidden,  
and deleted phone  
data, including  
call history,  
text messages,  
contacts, images,  
and geotags”

Source: See [www.cellebrite.com](http://www.cellebrite.com).  
Photo courtesy of  
Marcus Thompson,  
Law Enforcement  
Coordinator and  
Instructor for  
Purdue University’s  
Cyber Forensics  
program

recognized tools of the drug trade (see *United States v. Oliver*, 2004), the Northern District of Oklahoma court ruled that Wuences's Fourth Amendment rights were not violated.



**For more on cell phone privacy ruling, go online to: <https://epic.org/amicus/cell-phone/riley/>**

This new ruling by the Supreme Court in *Riley*, however, demonstrates that the opinion regarding cell phones has changed (Bekiempis, 2014). Previously, the courts traditionally viewed cell phones as an electronic version of a phone book, which contained only contact information (phone numbers, addresses). Now, cell phones are essentially mini-computers that contain a lot more information than mere phone numbers and addresses. For example, the iPhone 12 can have as much as a 256 GB storage capacity, with additional capacity via cloud storage enabling the device to hold tens of thousands of pictures and video.

As discussed in [Chapter 14](#), smart phones function similarly to computers in that they allow web browsing, emailing, video conferencing, and a variety of apps for data entry and editing. According to Professor Kerr of George Washington University: "It's misleading to even think of them as phones; they are 'general purpose computers' that have a bunch of apps, one of which is a telephone function" (Totenberg, 2014, para 8). As a consequence, the court stipulated in its ruling that cell phones "with all they contain and all they may reveal, they hold for many Americans the privacies of life" (Bekiempis, 2014). Thus, police must obtain appropriate warrants prior to conducting a search of a cell phone seized incident to an arrest. In addition, law enforcement may submit a search warrant, court order, or subpoena to a social media provider in order to obtain data records (See [Box 16.2](#); Nelson et al., 2015; Seigfried-Spellar & Leshney, 2015).

The Canadian Supreme Court concurred with this argument when they ruled that during a search of any premises, additional court authorization is needed to search any computers or cell phones found onsite (*R v. Vu*, 2013). Thus, law enforcement officers may seize computers or cell-phones during a search, but must obtain additional court authorization to search the electric devices. In that respect, the Canadian Supreme Court argued that a cell phone or computer was not the same thing as a dresser drawer or filing cabinet. If conducting a legal search of physical property, law enforcement is allowed to

## **Box 16.2 A Fictional Search Warrant for an Email Account**

Fictional search warrant, from the Tippecanoe High Tech Crime Unit, for data related to an email account.

STATE OF INDIANA ) IN THE SUPERIOR\_\_ COURT  
 ) SS:  
COUTY OF TIPPECANOE ) OF TIPPECANOE COUNTY  
 79D\_-1701-MC-\_\_\_\_\_

## **SEARCH WARRANT**

(Lafayette Police Department  
(West Lafayette Police Department  
(Tippecanoe County Sheriff's  
Department  
(Tippecanoe County Prosecutors  
Office  
(Indiana State Police  
(Purdue University Police Department  
(Indiana Excise Police  
(Indiana Department of Natural  
Resources

## Greetings:

Whereas there has been filed with me an Affidavit of Probable Cause, you are therefore commanded in the name of the State of Indiana with the necessary and proper assistance in the daytime or in the nighttime to enter into and upon the premises described in said affidavit, to wit:

The Gmail account [XXXXXXXXXXXX@gmail.com](mailto:XXXXXXXXXXXX@gmail.com) using services held by Google, Inc., Attn: Custodian of Records, 1600 Amphitheatre Parkway, Mountain View, CA 94043, FAX: 650-253-0001

Tippecanoe County, in the State of Indiana, and there diligently search for and seize:

To search for the Google Account of “[XXXXXXXXXX@gmail.com](mailto:XXXXXXXXXX@gmail.com)” to obtain all basic user identity information; general subscriber records;

profile information, phone numbers, all devices (MEID,IMEI,ESN) connected to the account, IP address logs; all emails (active, deleted, sent, received, and drafts) in all folders from January 1, 2015 to present; Google Wallet information, all contacts, including address book and Google Talk List; all instant messages and/or chats; and all files and/or stored media stored on the account's Google Drive for any date.

As described in the probable cause affidavit and that you bring the same, or any part thereof found on such search, forthwith before me to be disposed of according to law.

It is ORDERED that the owner of the named account not be notified of this legal demand has it the compromise the law enforcement investigation and/or cause the tampering/destruction of evidence. Reference: Enter Agency Case number (Description of Type of Investigation)

The search warrant results and Affidavit of Business Records can be mailed/returned to:

Enter Law Enforcement Officer contact info and address

Given under my hand and seal this \_\_\_\_\_ day of \_\_\_\_\_, 2017.

---

Judge/Magistrate of Tippecanoe County

Fictional search warrant courtesy of Investigator Sean Leshney of the Tippecanoe County High Tech Crime Unit.

search inside dresser drawers and filing cabinets, even if the drawers are closed. Computers and cell phones are different than filing cabinets; for instance, they may be connected to a network whose data is not technically part of the premises being searched (*R v. Vu*, 2013). As a result, perceptions on the status of cell phones and legal searches are evolving and will continue to evolve over the next few decades.

Other exceptions to the warrant requirement are the search of open fields and the plain view doctrine. Open field searches do not require a warrant since an open field (i.e., property not adjacent to one's home, such as fields or water) cannot be considered "persons, houses, papers, or effects" as stated by the Fourth Amendment (see *United States v. Hester*, 1924). The plain view doctrine allows law enforcement officers to conduct a search and seizure for evidence that may

not be in the search warrant but is in plain view and its incriminating nature is immediately apparent. For example, in *Horton v. California* (1990), law enforcement executed a warrant for stolen property in the home of Terry Horton, who was suspected of armed robbery. Although the warrant only authorized the search and seizure of stolen property, the law enforcement officer discovered, in plain view, then seized the weapons, as potential evidence related to the armed robberies. The judge ruled that a warrantless seizure of evidence (e.g., weapons), while executing a legal search warrant (e.g., stolen property), does not violate the Fourth Amendment since the discovery of said evidence was in plain view (see *Horton v. California*, 1990).

There is a current exception to the plain view doctrine. In *United States v. Carey* (1999), the defendant argued that his Fourth Amendment rights were violated after a detective searched for evidence on a computer that was outside the scope of the original warrant. Patrick Carey was being investigated for possible sale and possession of cocaine. After providing consent, the defendant's computers were taken to the police station and a warrant was obtained by the officers allowing them to search the files on the computers for "names, telephone numbers, ledger receipts, addresses, and other documentary evidence pertaining to the sale and distribution of controlled substances" (*United States v. Carey*, 1999, pp. 1265–1267).

While searching the computer, the detective identified a JPEG file that constituted an image of child pornography. After finding this image, the detective admitted in court that he abandoned his search for drug trafficking evidence in pursuit of evidence related to child pornography. The detective spent approximately 5 hours downloading over 200 files in search of child pornography (*United States v. Carey*, 1999). Since the Fourth Amendment requires that a search warrant specify the location and items to be seized, the defendant argued that the original warrant was transformed into a "general warrant." However, the government argued that the child pornography images fell within the plain view doctrine.

The Tenth Circuit court rejected the government's argument citing the *Coolidge v. New Hampshire* (1971) ruling that "the plain view doctrine may not be used to extend a general exploratory search from one object to another until something incriminating at last emerges" (line 466). In addition, the detective was not seizing the files themselves, but the content *within* the files. In this case, the content was not in plain view.

The court ruled that the discovery of the first child pornography image was admissible (the initial discovery), while all subsequent images discovered were

beyond the scope of the original warrant. As a result, the contents of a computer file are not considered in “plain view” since they must be opened in order to view them. This case established that when evidence is discovered (e.g., child pornography JPEG) related to a different crime (e.g., child pornography possession) outside the scope of the original warrant (searching for evidence related to drug trafficking), the investigator must stop the search entirely, and obtain a new warrant based on the newly discovered evidence.

Finally, the role of consent is one of the most relevant exceptions to the warrant requirement. Fourth Amendment rights may be voluntarily waived, meaning a search without probable cause or a warrant may occur if a person who has authority over the place or items to be searched provides consent (Neubauer & Fradella, 2019). A *consent search* is made when an individual gives permission, voluntarily and without deceit, to law enforcement to conduct a search. Problems arise when the person providing the consent is not the same person who is being searched.

Courts in the United States have ruled that law enforcement may obtain permission from third-party members so long as they share a common authority over the place or property being searched (see *Illinois v. Rodriguez*, 1990). In addition, the Supreme Court ruled that a warrantless search of a premise does not violate the Fourth Amendment if it occurred under the apparent authority principle (del Carmen & Hemmens, 2017), which states that if the police obtain consent to search a premise from someone whom they *reasonably believe* shares a common authority over said premises, it does not violate the Fourth Amendment even if the third-party member did not actually have the authority to give consent.

A number of cases have challenged the exception to the warrant requirement as a result of third-party consent to search another person’s computer or electronic devices. For instance, in ***United States v. Smith (1998)***, the defendant, David Smith, was convicted of possession and distribution of child pornography. The case began when Cindy Ushman contacted police and alleged that the computer contained child pornography images. The police received consent from Cindy Ushman to enter the premises to search for and seize the defendant’s computer.

The child pornography evidence was retrieved from a computer that was located in the bedroom of his house, which he shared with Cindy Ushman and her two daughters. The defendant argued that the evidence was inadmissible since the search of the computer was conducted illegally because the consent given by Cindy Ushman did not extend to the bedroom which is where the computer was kept. Cindy Ushman, however, testified that the computer was

not password protected, was used by the entire family, and was kept in a common area accessible to other family members. Based on this information, the Supreme Court ruled that a roommate has the legal authority to provide consent to a search and seizure of items and spaces that are shared with the defendant (*United States v. Smith*, 1998).

In a hypothetical example, even though Kathy shares the same dormitory room as Joelle, she would only be able to provide consent to law enforcement if she also has access to and uses Joel's computer as well. So if Kathy has joint access to Joelle's computer, Kathy also has a shared common authority over said computer. But if Kathy uses a password to protect her computer, or locks it away in a desk drawer, and Kathy does not know the password or have a copy of the key, she no longer shares a common authority over the computer. In this case, Kathy would be unable to provide legal consent for law enforcement to search for and seize Joelle's computer since it is secured.

In general, the courts have ruled that roommates, apartment managers, spouses, and employees/employers may provide consent to law enforcement if they have a shared authority over the space or objects to be searched (see del Carmen & Hemmens, 2017). Parents can give consent to search a child's computer so long as the child is dependent on the parents, meaning the child is a minor and is not paying rent. If the child is a legal adult (over the age of 18 years in the United States), parents are not able to provide legal consent to search the child's room without a warrant so long as the child is paying rent to the parents (see *United States v. Rith*, 1999; *United States v. Whitfield*, 1991).

## The Fifth Amendment

As discussed in [Chapter 15](#), two of the greatest obstacles for digital forensics examiners are password-protected and encrypted files (Casey, 2011; Kavrestad, 2020). Password-protected files are locked files that require a password to gain access, which prevents other people from opening or modifying these files (Britz, 2013; Kavrestad, 2020). Encryption is the process of transforming text, such as an email, through the use of mathematical algorithms so that it is no longer legible to others (Casey, 2011; Kessler, 2000; Sammons, 2015). Most encryption programs require an access key, which is essentially a password that unlocks the file so that the same algorithm that encrypted the information is now used to decrypt it. Digital forensics examiners can use specialized programs to break encryption and crack passwords. There are, however, some encryption and password-protected files that have proven resilient and unbreakable.

Many countries are considering whether a suspect can be compelled by a court of law to provide an encryption key or password. In the United States, this specifically becomes a Fifth Amendment issue. The Fifth Amendment of the United States constitution reads:

3 person shall be held to answer for a capital, or otherwise infamous crime, unless on a presentment or indictment of a Grand Jury, except in cases arising in the land or naval forces, or in the Militia, when in actual service in time of War or public danger; nor shall any person be subject for the same offense to be twice put in jeopardy of life or limb; nor shall be compelled in any criminal case to be a witness against himself, nor be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use, without just compensation.

In general, the Fifth Amendment lists specific constitutional rights protected within the criminal justice system (Garcia, 2002). First, a person accused of a crime must be indicted by a **grand jury**, a group of people who determine whether or not there is enough evidence to formally charge the individual with a crime. Second, the **double jeopardy clause** states that an individual is protected from being prosecuted or punished twice for the same crime. For example, in 1995, OJ Simpson was found not guilty of murdering his ex-wife Nicole Brown Simpson and her friend Ron Goldman. Even if evidence resurfaced that proved OJ Simpson was guilty, the Fifth Amendment states that that he could not be charged and prosecuted twice for the same crime due to the double jeopardy clause (see [Box 16.3](#)).

Next, the Fifth Amendment protects criminal defendants from self-incrimination, meaning giving a statement that might expose oneself to punishment for a crime (Garcia, 2002). This section of the Fifth Amendment is known as the self-incrimination clause. During a trial, the defendant may “plead the Fifth,” so they do not have to answer any questions or provide testimony that might be self-incriminating. As a result of *Miranda v. Arizona* (1966), the Fifth Amendment was extended to not only include trial testimony but also statements made while in police custody. In the United States, the police are required to read the suspect his/her *Miranda* rights before questioning:

You have the right to remain silent. Anything you say can and will be used against you in the court of law. You have the right to talk to a lawyer and have him or her present with you while you are being questioned. If you

### Box 16.3 Double Jeopardy

#### Double Jeopardy: Getting Away with Murder

<http://abcnews.go.com/US/double-jeopardy-murder/story?id=14230469&singlePage=true>



OJ Simpson may be the most famous name associated with double jeopardy. In 1995, Simpson was acquitted in the killing of his ex-wife Nicole Brown Simpson and her friend Ron Goldman. 11 years later ... Simpson was writing a book tentatively titled “If I did it” ... which left people wondering why Simpson could not be re-tried for the murders if he confessed or if new details came to light.

This article explains double jeopardy and provides examples of recent cases in which the public wanted someone tried a second time.

cannot afford to hire a lawyer, one will be appointed to represent you before any questioning, if you wish.

*(Miranda v. Arizona, 1966)*

If a suspect waives his/her Miranda rights, any statements made to the police by the suspect may be used as evidence in a court of law. However, *Griffin v. California* (1965) ruled that exercising Fifth Amendment rights to not testify should not be used as evidence of guilt. Essentially, if you decide to “plea the Fifth” and not testify or answer any questions, your silence cannot be used against you as evidence of your guilt.

Fourth, the due process clause states that the government cannot deprive someone of “life, liberty, or property” without due process, meaning the government must follow rules and procedures for conducting legal procedures to limit arbitrary decisions (see Garcia, 2002; Wasserman, 2004). Finally, the last section of the Fifth Amendment is referred to as the just compensation clause and states that any property taken by the government must be for public use and the owner must be fully reimbursed its market value (see Schultz, 2009). Overall, the Fifth Amendment provides several different protections against the federal government, but the most relevant clause surrounding digital investigations is the right against self-incrimination.

## ***Protection Against Self-Incrimination***

In order for personal statements to be protected under the Fifth Amendment, they must be compelled, testimonial, and incriminating in nature (*Fisher v. United States*, 1976). Any statements made voluntarily (i.e., not compelled) are not protected under the Fifth Amendment. In addition, the statement must be testimonial, meaning oral or written communication, rather than physical evidence (e.g., blood samples, fingerprints; see *Doe v. United States*, 1988). However, there are gray areas as to types of physical evidence that may be protected under the Fourth and Fifth Amendments. For example, at a federal level, the Supreme Court has not interpreted the Fourth Amendment to include **radio-frequency identification (RFID)**. RFID is a technology that uses radio waves at different frequencies to transfer data between tags and readers (US Food & Drug Administration; FDA, 2018). RFID technology has several uses in the healthcare sector, such as out-of-bed detection, fall detection, and equipment/personnel/medication tracking (FDA, 2018). In addition, **RFID** is also used in subcutaneous human implants – a microchip the size of rice (Herbert, 2006; see [Figure 16.3](#)). According to the American Civil Liberties Union (ACLU), privacy concerns around RFID could allow for the tracking of individuals (Smith, 2008). Future case law and further advancements in human implants will likely dictate future use of implants as compulsory evidence. Some states have made judgments regarding employees who have implants and their privacy rights, but these states are not consistent and do not have a federal effect (Turner, 2020).

Finally, the Fifth Amendment protects individuals from making statements that are incriminating, meaning statements that imply one's guilt or provide evidence that can be used against them in a court of law. This clause becomes extremely important when a suspect is compelled to provide the encryption key or password to an electronic device that may contain incriminating files. For example, in 2007, Sébastien Boucher crossed the Canadian border into the United States and the officers found a laptop computer in the back seat of his car (*In re Boucher*, 2007). The officer searched the computer and found approximately 40,000 files that contained child pornography. After arresting Boucher, the examiner identified a hard drive that was protected by the encryption software, Pretty Good Privacy (PGP), which requires an encryption key or password to unlock the drive (see [Chapter 15](#); *In re Boucher*, 2007). In addition, a computer forensics expert from the United States Secret Service claimed it would take approximately two years to break the PGP encryption. The grand jury subpoenaed Boucher for the encryption key to unlock the computer drive.



**Fig. 16.3**  
RFID human microchip implant used to access an exterior door of a building, implanted in the web of the user's hand

Source: Image courtesy of Brock Warner, a PhD student and biohacker at Purdue University's Department of Computer and Information Technology

A subpoena is a court order requiring a person to appear before a grand jury or produce documents (Neubauer & Fradella, 2019).

Boucher argued that providing the encryption key violated his Fifth Amendment right against self-incrimination. The United States District Court of Vermont had to determine if Fifth Amendment privilege applied to this case. First, the court agreed that the act of requesting a subpoena involved *compulsion* since it requires compliance. In addition, the court agreed that providing the password would be *incriminating* since the government argued that the computer contained child pornography.

The last requirement was the most difficult to determine: whether the communication was considered testimonial. As discussed previously, testimonial refers to nonphysical evidence, so the court acknowledged that the contents (e.g., files) of the laptop computer were not privileged under the Fifth Amendment. In addition, the prosecutor acknowledged that if Boucher provided the encryption key to the grand jury it would be testimonial (*In re Boucher*, 2007). Instead of providing the password, the prosecutor argued that Boucher could simply enter the password into the computer while no one was observing or recording said password, which would still allow access to the hard drive without violating Boucher's Fifth Amendment rights (*In re Boucher*, 2007).

The Court ruled in favor of Boucher, stating that the act of entering a password or encryption key is testimonial (*In re Boucher*, 2007):

Entering a password into a computer implicitly communicates facts. By entering the password Boucher would be disclosing the fact that he knows the password and has control over the files. (p. 9)

Essentially, the password is not a physical form of evidence. Compelling Boucher to provide his encryption key was tantamount to having the grand jury require Boucher to “display the contents of his mind to incriminate himself” (*In re Boucher*, 2007, p. 16).

The government appealed and revised the original subpoena in *In re Boucher* (2009) stating that they were not specifically seeking the password for the encrypted hard drive. Instead, they simply wanted Boucher to provide an unencrypted version of the hard drive to the grand jury. In this instance, the Court ruled in favor of the prosecutor since the law enforcement officer already knew that there was child pornography on the computer after Boucher initially opened the hard drive and showed him. They argued that since the government already knows that the drive exists, and the type of files that are on the drive,

Boucher's Fifth Amendment rights cannot be violated when he produces an unencrypted version of the hard drive (*In re Boucher*, 2009).

Similar cases have led to contradictory conclusions. For instance, Ramona Fricosu was compelled to provide the encryption key to her Toshiba laptop so that law enforcement could execute a previously authorized search warrant (*United States v. Fricosu*, 2012). During the investigation, the defendant acknowledged that she was the sole owner of the computer and that the computer possibly contained information the authorities were searching for. Based on this evidence, the Court ruled that producing an unencrypted version of the laptop did not violate Fricosu's Fifth Amendment rights since she acknowledged to law enforcement that the computer was hers and that it might contain incriminating information (*United States v. Fricosu*, 2012).

The *In re Doe* (2012) case, heard in the Eleventh Circuit Court, ruled that the government wrongly charged John Doe with contempt of court when he refused to comply with a subpoena compelling him to provide the encryption key to his computer. In this case, the court lacked independent evidence that the encrypted hard drives contained incriminating evidence. Charging John Doe with contempt of court for refusing to provide his encryption key violated his Fifth Amendment rights to protection against self-incrimination (*In re Doe*, 2012).

**For more on how the Fifth Amendment applies to encryption in the United States, go online to:** <http://arstechnica.com/tech-policy/2012/02/appeals-court-fifth-amendment-protections-can-apply-to-encrypted-hard-drives/>



## Key Disclosure

Based on the current court cases in the United States, a person may be compelled to provide the encryption key or password for an electronic device so long as the government has independent evidence, not just mere suspicion, that the encrypted drive contains incriminating evidence. There is not, however, any specific key disclosure law in the United States. A key disclosure law is legislation that mandates a person to provide encryption keys or passwords to law enforcement for digital forensic investigations (see Westby, 2004).

In the United States, there is an intense debate on whether a third-party, such as the manufacturer, may be ordered by the court to assist in the decryption

and/or unlocking of a suspect's electronic device (Goel, 2016; Perez & Hume, 2016). This issue gained national and international attention as a result of the **San Bernardino shooting case**, which became known as the **FBI-Apple encryption dispute**. On December 2, 2015, Syed Rizwan Farook and Tashfeen Malik shot and killed 14 and wounded 22 in a terrorist attack at the Department of Health's holiday party in San Bernardino, California; the suspects fled the scene and were later killed in a shoot-out with law enforcement the same day (see Keneally & Shapiro, 2015).

During the investigation, the FBI recovered Farook's work phone, specifically an iPhone 5C, model A1532; however, the phone was locked using a four-digit pin (*In re Order Compelling Apple*, 2016). On February 16, 2016, Magistrate Judge Sheri Pym ordered Apple to provide three forms of technical assistance:

- Allow the government to enter more than ten passcodes without the risk of the data being wiped after the tenth incorrect try (i.e., shut off the auto-erase function),
- Automate the entry of those passcode combinations rather than have to enter them manually, and
- Try back-to-back passcode attempts without the gradually increasing delays between attempts that are currently programmed into the system.

It was not the first time that Apple was ordered to assist the government in unlocking an iPhone, but it was the first-time Apple was asked to write and install software on a specific device, which would assist the government during investigations (see Thompson & Jaikaran, 2016). In response, Apple immediately released a statement opposing the judge's order that same day (see **Box 16.4**).

On February 19, 2016, the United States Department of Justice filed a motion to compel Apple to comply with the February 16, 2016 court order (*In re Government's Motion to Compel*, 2016). Apple filed a formal motion opposing the court's order (*In re Apple Inc's Motion to Vacate*, 2016) on February 25, 2016 citing it violated First and Fifth Amendment rights (Benner et al., 2016).

The first hearing to settle the debate between Apple and the Department of Justice was set for March 22, 2016. The Department of Justice applied for a continuance on March 2nd, citing an outside party demonstrated a possible method for unlocking the iPhone. They claimed they needed time to test this method, and if it worked, it would eliminate the need for Apple's assistance in the case (*In re Government's Ex Parte*, 2016). On March 28th, the Department of

## Box 16.4 Apple, the FBI, and iPhone Security Features

### Excerpt from Apple's "Message to Our Customers"

Full letter available at: <http://www.apple.com/customer-letter/>



#### A Message to Our Customers:

The United States government has demanded that Apple take an unprecedented step which threatens the security of our customers. We oppose this order, which has implications far beyond the legal case at hand.

....

We have great respect for the professionals at the FBI, and we believe their intentions are good. Up to this point, we have done everything that is both within our power and within the law to help them. But now the US government has asked us for something we simply do not have, and something we consider too dangerous to create. They have asked us to build a backdoor to the iPhone.

Specifically, the FBI wants us to make a new version of the iPhone operating system, circumventing several important security features, and install it on an iPhone recovered during the investigation. In the wrong hands, this software – which does not exist today – would have the potential to unlock any iPhone in someone's physical possession.

The FBI may use different words to describe this tool but make no mistake: building a version of iOS that bypasses security in this way would undeniably create a backdoor. And while the government may argue that its use would be limited to this case, there is no way to guarantee such control.

...

#### A Dangerous Precedent

Rather than asking for legislative action through Congress, the FBI is proposing an unprecedented use of the All Writs Act of 1789 to justify an expansion of its authority.

The government would have us remove security features and add new capabilities to the operating system, allowing a passcode to be input

electronically. This would make it easier to unlock an iPhone by “brute force,” trying thousands or millions of combinations with the speed of a modern computer.

The implications of the government’s demands are chilling. If the government can use the All Writs Act to make it easier to unlock your iPhone, it would have the power to reach into anyone’s device to capture their data. The government could extend this breach of privacy and demand that Apple build surveillance software to intercept your messages, access your health records or financial data, track your location, or even access your phone’s microphone or camera without your knowledge.

Opposing this order is not something we take lightly. We feel we must speak up in the face of what we see as an overreach by the US government.

We are challenging the FBI’s demands with the deepest respect for American democracy and a love of our country. We believe it would be in the best interest of everyone to step back and consider the implications.

While we believe the FBI’s intentions are good, it would be wrong for the government to force us to build a backdoor into our products. And ultimately, we fear that this demand would undermine the very freedoms and liberty our government is meant to protect.

Tim Cook, Apple CEO

Justice officially withdrew its legal action against Apple citing it was successful in accessing the stored data on Farook’s iPhone and no longer needed Apple’s assistance in the case (*In re Government’s Status Report*, 2016).

The Department of Justice never revealed the identity of the outside party, but FBI Director James Comey stated the government “paid a lot” for the tool – approximately \$1.3 billion (Barrett, 2016). A lawsuit was filed under the *Freedom of Information Act* by several news organizations (i.e., Associated Press, USA Today, Vice Media) to compel the FBI to provide information regarding the purchase of the iPhone access tool (*News Organizations vs. FBI*, 2016). Since the Department of Justice dropped its case against Apple, it is unknown how the courts would have ruled. There is no doubt that another case will renew this debate on whether a third-party, such as the manufacturer, may be ordered by the court to assist in the decryption and/or unlocking of a suspect’s electronic device (see [Chapter 2](#) for more detail).

**For more information on the lawsuit filed under the Freedom of Information act against the FBI, visit:** <https://assets.documentcloud.org/documents/3109606/16-Cv-1850-Dkt-No-1-Complaint.pdf>



Unlike the United States, there are several countries that have specific key disclosure laws that require a suspect to provide all encryption keys and passwords during a digital investigation (see Koops, 2013; Madsen & Banisar, 2000), such as the United Kingdom's Regulation of Investigatory Powers Act (RIPA). This law mandates key disclosure so long as law enforcement obtains signed authorization from a high-ranking official (e.g., judge, chief of police) using a specialized form known as a Section 49 request (Madsen & Banisar, 2000).

**For more on Section 49 requests, go online to:** <http://www.washingtonpost.com/wp-dyn/content/article/2007/10/01/AR2007100100511.html>



In addition, the Australian Cybercrime Act 2001 inserted a new section into the Crimes Act 1914 giving law enforcement the ability to compel a person to provide all encryption keys or passwords when investigating a computer-related crime (James, 2004). Failure to comply with this law may result in a six-month jail sentence. In Malaysia, the Communications and Multimedia Act 1998 allows law enforcement conducting a search to compel a suspect to provide all encryption keys or passwords in order to search the computerized data (The Commissioner of Law Revision, 2006). Similar to Australian law, a person in Malaysia who refuses to provide the encryption keys could be fined and/or imprisoned for six months.

In India, the punishment is even harsher according to Section 69 of the **Information Technology Act of 2008** in that a person may be sentenced to seven years in prison for failure to assist an agency with the decryption of information or failure to provide information stored on a computer (Information Technology Act, 2008). Although a few countries have implemented key disclosure mandates, there are many more that have no policies at all regarding

lawful access to encrypted or password-protected electronic devices (e.g., Argentina, Czech Republic, Greece; see Koops, 2013).



**For a world map of encryption laws and policies, go online to:**  
<https://www.gp-digital.org/world-map-of-encryption/>

Overall, there are no consistent guidelines on how the law should balance one's privilege against self-incrimination and diminishing obstruction of justice for cases involving encrypted or password-protected digital devices. With the rise in encryption use, there is no doubt that law enforcement will continue to face the challenge of overcoming encryption and password-protected devices (see Chapter 15). However, even if a suspect is compelled to provide the encryption key or password, the evidence derived must still be admissible in a court of law.

## Admissibility of Evidence in Court

### Overview

As discussed in Chapter 15, it is important for law enforcement to verify that the digital forensic tools are producing reliable evidence in order to meet admissibility standards in a court of law (Garfinkel, 2013; National Research Council, 2009). Digital forensics tools must be able to replicate the same results when using the exact same methodology (i.e., repeatability). Also, they must be able to yield the same results even in a different testing environment (i.e., reproducibility; see NIST, 2003). Both are necessary in order for the digital evidence to be admissible in the court of law. In addition, the digital forensic technician is responsible for documenting which tools were used during the forensic examination as well as the date and time of evidence preservation.

Digital forensic technicians should be prepared to testify in court regarding all stages of the digital forensic investigation (see Chapter 15). If the examiner lacks transparency, all of these stages could be scrutinized in a court of law. Transparency of the digital forensics process makes it easier for the courts to determine the validity of the process, and by extension easier to determine whether the digital evidence is admissible in a court of law.

Admissibility is the process of determining whether evidence will assist the fact finders (e.g., judge) through their decision-making process. The judge

determines whether the digital evidence is admissible in court based on different standards for evaluating the relevance and reliability of the evidence. Evidence is considered relevant when it can make the fact presented in a case more or less probable, and evidence that does not tend to prove or disprove a presented fact in a case is deemed irrelevant, therefore inadmissible (Federal Rules of Evidence 2010, pp. 401–402; Neubauer & Fradella, 2019). Reliability refers to the accuracy of the evidence deemed relevant to a case.

In the United States, the civil case of *Lorraine v. Markel American Insurance Company* (2007) established guidelines for assessing the admissibility of digital evidence. Jack Lorraine and Beverly Mack were suing Markel American Insurance Company for damages that were covered by the insurance policy after their yacht was struck by lightning. After electronic evidence consisting of emails was ruled inadmissible, the judge highlighted five evidentiary issues when assessing the admissibility of electronic evidence: relevance, authenticity, not hearsay or admissible hearsay, original writing rule, and not duly prejudicial (*Lorraine v. Markel American Insurance Company*, 2007). These issues are addressed individually by the Federal Rules of Evidence (FRE), which govern the admissibility of evidence in federal court proceedings in the United States.

First, FRE 401 defines relevance as the tendency to make the fact being presented in a case more or less probable. Second, authenticity refers to the ability to prove that the evidence is genuine. According to FRE 901, “the proponent must produce evidence sufficient to support a finding that the item is what the proponent claims it is.” In cases involving digital evidence (e.g., emails, web postings, digital photographs), authenticity is often challenged since electronic evidence can easily be deleted, corrupted, or modified (see *Lorraine v. Markel American Insurance Company*, 2007). Third, hearsay is considered second-hand evidence, meaning it is testimony not based on a first-hand or personal knowledge (FRE 801). Testimony that is hearsay is inadmissible because there is no way to validate its truthfulness.

The fourth consideration is referred to as the original writing rule. According to FRE 1001–1008, the original writing rule states that the original evidence, rather than a duplicate, is generally required unless the duplicate can be authenticated and proven that its contents are the same as the original. The original writing rule is sometimes referred to as the best evidence rule (see [Chapter 15](#)). Lastly, FRE 403 states that evidence is not admissible, even if it is relevant, if it could unfairly bias, confuse, or mislead the fact finders (i.e., unfair prejudice; see [Box 16.5](#)).

## Box 16.5 An Excerpt from the US Federal Rules of Evidence

### United States Federal Rules of Evidence 401–403

#### ARTICLE IV. RELEVANCY AND ITS LIMITS

##### Rule 401. Definition of “Relevant Evidence”

“Relevant evidence” means evidence having any tendency to make the existence of any fact that is of consequence to the determination of the action more probable or less probable than it would be without the evidence.

##### Rule 402. Relevant Evidence Generally Admissible; Irrelevant Evidence Inadmissible

All relevant evidence is admissible, except as otherwise provided by the Constitution of the United States, by Act of Congress, by these rules, or by other rules prescribed by the Supreme Court pursuant to statutory authority. Evidence which is not relevant is not admissible.

##### Rule 403. Exclusion of Relevant Evidence on Grounds of Prejudice, Confusion, or Waste of Time

Although relevant, evidence may be excluded if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury, or by considerations of undue delay, waste of time, or needless presentation of cumulative evidence.

Overall, *Lorraine v. Markel American Insurance Company* (2007) outlined the importance of several legal issues when determining the admissibility of electronic evidence in the United States. Other countries have developed admissibility standards for electronic or digital evidence (e.g., Canada, Germany, United Kingdom, Philippines; see Bidgoli, 2006; Xue-Guang, 2011). For example, in 2002, the Supreme Court of the Philippines amended the Philippine Rules of Electronic Evidence (PREE) to both criminal and civil court cases (Supreme Court Resolution, 2002). The PREE specifically outline the admissibility rules for electronic evidence compared to the Philippine Rules of Evidence (PRE), which is a separate standard for non-electronic evidence. The PREE has similar

criteria to the United States FRE for assessing the admissibility of electronic evidence, including the best evidence rule and an authenticity standard.

In India, the **Information Technology Act of 2000** was created to specifically address the increased use of technology to commit crimes (see [Chapters 3, 5, 6, and 9](#); Karia & Karia, 2012; Karia et al., 2015). In response to the Information Act of 2000, other amendments occurred to existing statutes, including the **Indian Evidence Act of 1872** (Karia et al., 2015). The Indian Evidence Act of 1872 was ill-equipped for dealing with the increased number of documents that were being saved digitally as well as the presence of meta-data as evidence (Karia et al., 2015).

In 2000, the Indian Evidence Act was amended to include the phrase “electronic records” in the definition for “evidence” (Section 3), and in Section 17, the phrase “electronic records” was included in the definition of admission. However, it was not until the case of *Anvar vs. Basheer & Others* (2014) when the Supreme Court ruled that electronic records could not be admitted as *prima facie* evidence without authentication (Karia et al., 2015). Essentially, electronic evidence, without a certificate as stated under Section 65B of the Evidence Act cannot be proved by oral evidence (see [Box 16.6](#)). In addition, the opinion of the expert under Section 45A of the Evidence Act cannot be resorted to make such electronic evidence admissible. Overall, the court recognized that digital evidence may be tampered with and altered, so “... safeguards are taken to ensure the source and authenticity” (*Anvar vs. Basheer & Others*, 2014, p. 7), and according to Acharya (2014), “*Anvar* does for India what Lorraine did for the U.S. federal courts” (para 23).

## **Box 16.6 Indian Evidence Act of 1872**

### **An Excerpt from the Indian Evidence Act of 1872 (Section 65A and 65B)**

#### **Section 65A: Special provisions as to evidence relating to electronic record**

The contents of electronic records may be proved in accordance with the provisions of Section 65B.

#### **Section 65B: Admissibility of electronic records**

- 1 Notwithstanding anything contained in this Act, any information contained in an electronic record which is printed on a paper, stored,

recorded, or copied in optical or magnetic media produced by a computer (hereinafter referred to as the computer output) shall be deemed to be also a document, if the conditions mentioned in this section are satisfied in relation to the information and computer in question and shall be admissible in any proceedings, without further proof or production of the original, as evidence of any contents of the original or of any fact stated therein or which direct evidence would be admissible.

- 2 The conditions referred to in sub-section (1) in respect of a computer output shall be the following, namely:
  - (a) the computer output containing the information was produced by the computer during the period over which the computer was used regularly to store or process information for the purposes of any activities regularly carried on over that period by the person having lawful control over the use of the computer;
  - (b) during the said period, information of the kind contained in the electronic record or of the kind from which the information so contained is derived was regularly fed into the computer in the ordinary course of the said activities;
  - (c) throughout the materiel part of the said period, the computer was operating properly or, if not, in respect of any period in which it was not operating properly or was out of operation during that part of the period, was not such as to affect the electronic record or the accuracy of its contents; and
  - (d) the information contained in the electronic record reproduces or is derived from such information fed into the computer in the ordinary course of the said activities.
- 3 Where over any period, the functions of storing or processing information for the purposes of any activities of any regularly carried on over that period as mentioned in clause (a) of sub-section (2) was regularly performed by computer, whether-by a combination of computers operating over that period; or
  - (a) by different computers operating in succession over that period; or
  - (b) by different combinations of computers operating in succession over that period; or
  - (c) in any other manner involving the successive operation over that period, in whatever order, of one or more computers and one or more combinations of computers.

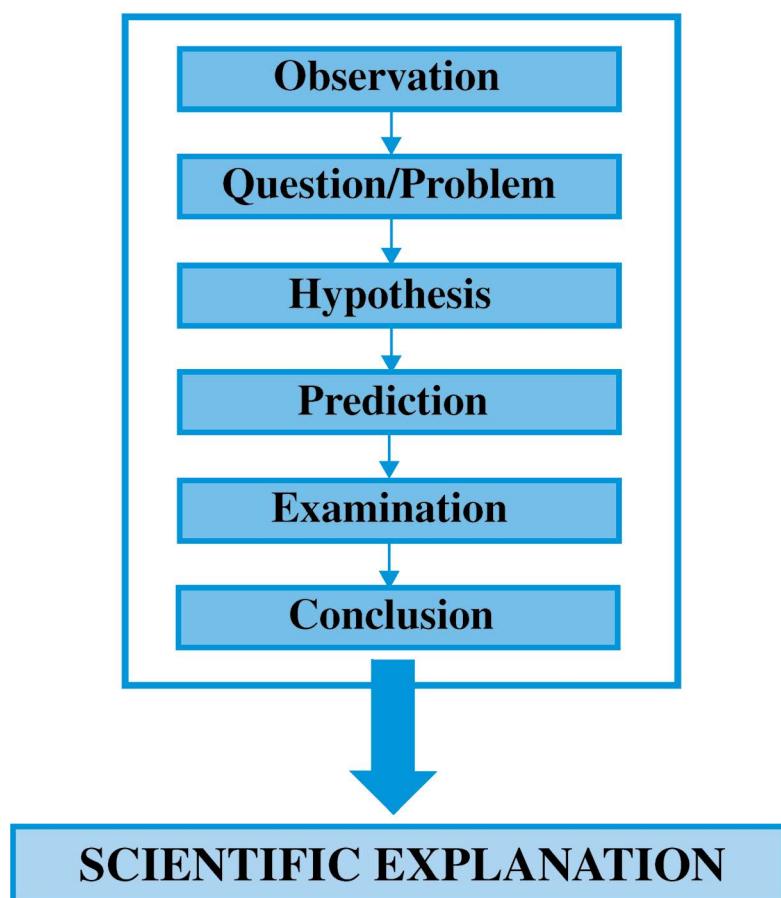
All the computers used for that purpose during that period shall be treated for the purposes of this section as constituting a single computer; and references in this section to a computer shall be construed accordingly.

- 4 In any proceedings where it is desired to give a statement in evidence by virtue of this section, a certificate doing any of the following things, that is to say,
  - (a) identifying the electronic record containing the statement and describing the manner in which it was produced;
  - (b) giving such particulars of any device involved in the production of that electronic record as may be appropriate for the purpose of showing that the electronic record was produced by a computer;
  - (c) dealing with any of the matters to which the conditions mentioned in sub-section (2) relate, and purporting to be signed by a person occupying a responsible official position in relation to the operation of the relevant device or the management of the relevant activities (whichever is appropriate) shall be evidence of any matter stated in the certificate; and for the purpose of this sub-section it shall be sufficient for a matter to be stated to the best of the knowledge and belief of the person stating it.
- 5 For the purposes of this section,
  - (a) information shall be taken to be supplied to a computer if it is supplied thereto in any appropriate form and whether it is so supplied directly or (with or without human intervention) by means of any appropriate equipment;
  - (b) whether in the course of activities carried on by any official, information is supplied with a view to its being stored or processed for the purposes of those activities by a computer operated otherwise than in the course of those activities, that information, if duly supplied to that computer, shall be taken to be supplied to it in the course of those activities;
  - (c) a computer output shall be taken to have been produced by a computer whether it was produced by it directly or (with or without human intervention) by means of any appropriate equipment.

Along with these general admissibility criteria, there are specific standards set for the admissibility of scientific evidence in the United States. Scientific evidence is information derived from the scientific method that is relevant to the facts of a case. The scientific method is a “process that uses strict guidelines to ensure careful and systemic collection, organization, and analysis of information” (Saferstein & Roy, 2021). The scientific method occurs in the following stages: observation, hypothesis, prediction, experimentation, and conclusion (Casey, 2011; see [Figure 16.4](#)).

First, the scientific method begins with an observation followed by a question worth investigating. For example, consider the hypothetic case of Jai Max who is suspected of being a child pornography user after his wife overheard a conversation about viewing illicit images on the Internet. Law enforcement officers execute a legal search warrant and seize his laptop computer. Based on the facts of the case, the digital forensic examiner may ask whether or not there is evidence of Internet child pornography on the laptop. Next, a hypothesis is

**Fig. 16.4** The scientific method. Following the scientific method in a digital forensic investigation will increase the likelihood of the examiner coming to an objective, valid conclusion as to whether the relevant findings refute or support the original hypothesis, such as whether a crime was committed



generated, which is a reasonable explanation as to what might have occurred or why. In this case, the examiner may hypothesize that Jai Max was surfing the Internet and downloaded child pornography images.

Based on the hypothesis, a prediction is a specific statement as to how you will determine if your hypothesis is true. For example, the digital forensic examiner may predict that Internet artifacts (e.g., browser history) and image files (e.g., JPEG) will be found on the suspect's hard drive. Based on these predictions, the examiner will test the hypothesis by conducting a digital forensic examination and analysis of the imaged hard drive in search of evidence that will either support or refute the hypothesis (see [Chapter 15](#)). This stage is meticulously constructed in order to limit any bias or distortion of the evidence (see Saferstein & Roy, 2021). The final stage of the scientific method is drawing a conclusion, which is an overall summary of the findings derived from the examination. This conclusion will either support or refute the original hypothesis and should be objective and transparent. In the hypothetical case of Jai Max, the digital forensic examiner will conclude whether or not there is evidence of child pornography use on the suspect's hard drive.

In the United States, there are traditionally three standards for assessing the admissibility of scientific evidence from expert testimony: *Frye*, *Daubert*, and *FRE 702*. Each of these standards will be discussed in greater detail as it pertains to scientific evidence derived from digital forensic investigations.

### **The Frye Standard**

In [\*Frye v. United States \(1923\)\*](#), the defendant, James Alphonso Frye, appealed his conviction of second-degree murder on the basis that the defense wanted to provide expert witness testimony on the results of a systolic blood pressure deception test. In *Frye*, the technology in question was a precursor to what is commonly referred to as the polygraph or lie detector test. The theory was that the rise in blood pressure is evidence that the person is lying, concealing facts, or guilty of a crime (*Frye v. United States*, 1923). The defense also offered to conduct the lie detector test in the courtroom. However, the prosecution argued that:

... while courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.

*(Frye v. United States, 1923)*

In its ruling, the District of Columbia Court of Appeals upheld the lower court's decision that the expert witness's testimony regarding the results of the lie detector test was not admissible. Therefore, the *Frye* standard states that scientific evidence is only admissible if it is generally accepted as reliable by the scientific community (*Frye v. United States*, 1923).

To determine if the evidence meets the *Frye* standard, the proponent of the evidence would have to present a collection of experts to testify on whether the technique or issue being presented is generally accepted by the relevant scientific community (Saferstein & Roy, 2021). Although quickly accepted as the standard for admitting expert testimony, legal scholars became concerned as to whether this standard was sufficient or flexible enough to recognize novel or controversial scientific breakthroughs that have not yet gained general acceptance in the scientific community (see Smith & Bace, 2002; *United States v. Downing*, 1985; Watson & Jones, 2013). Despite these concerns, a few state court jurisdictions in the United States still adhere to the *Frye* standard of scientific evidence (e.g., Alabama, California, and Illinois). However, Rule 702 of the FRE replaced the *Frye* standard in the federal and some state jurisdictions.

### ***Federal Rules of Evidence 702***

Created in 1975, Article VII of the FRE outlined specific guidelines for the admissibility of expert witnesses' testimony in Rule 702. The original version of **FRE 702** stated:

... if scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise (1975).

In the United States, Rule 702 superseded the *Frye* standard at the federal level (Marsico, 2005). Many state jurisdictions were confused as to whether this standard was an addition to or replacement of the *Frye* standard. In addition, the original FRE 702 standard was rather ambiguous as to how the court was to determine whether someone was *qualified* to be an expert witness. In 1993, the debate on the admissibility standard for scientific expert witness testimony all changed with the landmark case *Daubert v. Merrell Dow Pharmaceuticals*.

## The Daubert Standard

In 1993, the US Supreme Court ruled on a case where the plaintiffs, two minors and their parents, sued Merrell Dow Pharmaceuticals claiming that the drug Benedictine caused the children's birth defects since it was ingested during pregnancy by the mothers (*Daubert v. Merrell Dow Pharmaceuticals*, 1993). The case was eventually heard by the US Supreme Court. Both sides presented expert witness testimony. Merrell Dow Pharmaceuticals presented an expert's affidavit, which summarized the published scientific literature and concluded that the drug did not have a history of causing human birth defects. This expert witness testimony was ruled admissible by the court.

When the plaintiffs presented eight experts who testified that the drugs did in fact cause birth defects in animal research, the court ruled that this evidence was inadmissible because it did not meet the FRE 702 standards for admissibility. Specifically, the US Supreme Court ruled, "general acceptance is not necessary precondition to the admissibility of scientific evidence under the Federal Rules of Evidence" (*Daubert v. Merrell Dow Pharmaceuticals*, 1993).

In addition, *Daubert v. Merrell Dow Pharmaceuticals (1993)* held that any scientific expert testimony presented in federal court must undergo a reliability test. This reliability test is an independent judicial assessment, which is determined by the trial judge, and is known as a Daubert **hearing**. The Supreme Court's intention through this test was to end the "battle of the experts." In addition, the US Supreme Court stated that the FRE imply that the judge acts as a **gatekeeper**, meaning the person responsible for assessing both the relevancy and reliability of the scientific evidence. In other words, "the responsibility of a judge in a Daubert hearing is to determine whether the underlying methodology and techniques that have been used to isolate the evidence are sound, and whether as a result, the evidence reliable" (Watson & Jones, 2013). By acting as a gatekeeper, the trial judge is responsible for keeping junk science out of the courtroom.

*Daubert v. Merrell Dow Pharmaceuticals (1993)* suggested four criteria for determining whether the *relevant* scientific evidence, theory, or study is reliable, therefore admissible, in court:

- 1 Testing: Has the theory or technique been empirically tested?
- 2 Publication: Has the theory or technique been subjected to peer review and publication?

- 3 Error Rate: What is the known or potential rate of error?
- 4 Acceptance: Has the theory or technique been generally accepted within the relevant scientific community?

These criteria for determining the reliability and admissibility of scientific evidence became known as the **Daubert standard**. In the *Daubert v. Merrell Dow Pharmaceuticals* (1993) ruling, the Supreme Court did not specify whether some or all of these criteria are required in order for the scientific evidence to be admissible in court. Instead, it is up to the trial judge to determine which criteria are applicable to the scientific technique, theory, or study being examined at the *Daubert* hearing.

Initially, the *Daubert* standard only applied to scientific evidence. However, in 1997, the court ruled in ***General Electric Co. v. Joiner (1997)*** that not only was the scientific evidence itself under review but the methodology and reliability of an expert's reasoning process are also vulnerable to scrutiny under *Daubert*. The court has judicial discretion when determining if "there is simply too great an analytical gap between the data and the opinion proffered" for it to be admissible as scientific evidence in court (***General Electric Co. v. Joiner, 1997***).

In 1999, the *Daubert* standard was extended to *all* expert testimony that involves scientific, technical, or other specialized knowledge in ***Kumho Tire Co. v. Carmichael (1999)***. In this case, the judge stated that since Rule 702 of the FRE does not make a distinction between "scientific, technical, and other specialized knowledge," then the *Daubert* standard applies to each of these expert disciplines to assess reliability and admissibility. Overall, the current interpretation of the *Daubert* standard is really a summary of these three cases, *Daubert v. Merrell Dow Pharmaceuticals* (1993), *General Electric Co. v. Joiner* (1997), and *Kumho Tire Co. v. Carmichael* (1999), which are sometimes referred to as the ***Daubert trilogy*** (Berger, 2000).

In 2000, Rule 702 of the FRE was amended to include the *Daubert* standard for determining the reliability and admissibility of expert witness testimony. In its most recent version, amended in 2011, Rule 702 of the FRE now states that a witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if:

- 1 the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;
- 2 the testimony is based on sufficient facts or data;
- 3 the testimony is the product of reliable principles and methods; and
- 4 the expert has reliably applied the principles and methods to the facts of the case.

Overall, in the United States, the *Daubert* standard has had a significant impact on the way expert witness testimony is evaluated in the federal courtroom, as well as in most states. However, some states still apply the *Frye* standard or have adopted a standard of their own. Regardless, the field of digital forensics must be prepared to be scrutinized in the courtroom.

### ***International Response to Daubert and Frye***

The *Daubert* and *Frye* standards have spurred international recognition for the need to keep junk science out of the courtroom. According to the [Law Reform Commission](#) of Ireland (2008), the legal reform in the United States (i.e., *Frye* and *Daubert*) has been the “main catalyst for reform internationally … for developing admissibility criteria based on the reliability of evidence” (pp. 104–105). The Law Reform Commission of Ireland is an independent statutory body established by the Law Reform Commission Act of 1975. The primary role of the Law Reform Commission is to review and conduct research to determine if the law needs to be revised or simplified, and, specifically, one of the Law Reform Commission’s projects was to evaluate the standards and procedures for evaluating scientific evidence (Law Reform Commission, 2008).

In 2008, the *Consultation Paper on Expert Evidence* was released by the Law Reform Commission. In this report, the Commission summarized the case law from several countries that appeared to be moving toward a *Daubert*-like standard for assessing the reliability of expert witness testimony (e.g., Australia, England, and Wales). The report also weighed the advantages and disadvantages of implementing a reliability test for Irish courts similar to the *Daubert* standard in the United States. Overall, the Law Reform Commission recommended that Ireland also adopt a reliability test for assessing the admissibility of all expert testimony (see Law Reform Commission, 2008).

### **Admissibility of Digital Forensics as Expert Testimony**

According to Casey (2011), the digital forensics tools and techniques have successfully withstood the courts’ assessment of reliability and admissibility as scientific evidence. However, the ever-changing growth in technology makes it difficult to test and evaluate the variety of digital forensic tools in a quick and efficient manner. For example, as discussed in [Chapter 14](#), NIST, an agency of the United States Department of Commerce, launched the Computer Forensic

Tool Testing project (CFTT) to “provide unbiased, open, and objective means for manufacturers, law enforcement, and the legal community to assess the validity of tools used in computer forensics” (NIST, n.d.). In addition, CFTT determines whether the results of the tools are repeatable and reproducible, both of which are needed to assess “trueness and precision” (NIST, 2003, p. 4). According to NIST, there are myriad different digital forensic tools currently in use by law enforcement worldwide (NIST, n.d.).

Although these goals clearly reflect the *Daubert* standards, the major weakness of the CFTT project is the *amount of time* required to conduct these empirical evaluations (Flandrin et al., 2014). Therefore, “by the time the results are publicly available, the version of the tested tool might be deprecated” (Flandrin et al., 2014, p. 2). In addition, the time required to test the tools, as well as the fact many of these tools’ source codes are proprietary, make it difficult to determine known error rates (Carrier, 2003; Casey, 2019; Meyers & Rogers, 2004). Still, the two most common digital forensics imaging tools, EnCase® and Forensic Toolkit®, along with others have met the *Daubert* standard for admissibility (see [Chapter 15](#); Casey, 2019; Guidance Software, Inc., 2003; Leehealey et al., 2012). For example, the general acceptance of EnCase and FTK by the scientific community was noted in the court case *United States v. Gaynor* (2008). In addition, EnCase and FTK have been extensively tested by the CFTT project.

Finally, not only is the actual digital forensic evidence being reviewed, but the credentials of the digital forensic examiner or expert also fall within the *Daubert* reliability test. This includes the digital forensic examiner’s education, experience, training and professional credentials. This may be a problem in the field of digital forensics, which does not have a set standard for certifying digital forensic examiners (Casey, 2019; Meyers & Rogers, 2004). In fact, there is a wide variability of certifications available for digital forensic examiners. There are currently a number of professional certifications available, both vendor neutral (e.g., GIAC Certified Forensic Analyst) and vendor specific (i.e., tool specific, such as EnCase® Forensic Training Series; Ryan & Ryan, 2014). Thus, there is no standardized list of certifications or qualifications required in the digital forensics discipline in order to be considered a digital forensics professional or expert.

Although the field of digital forensics is in its infancy, it has quickly gained recognition as a legitimate sub-discipline within the forensic sciences (see [Chapter 14](#)). For example, the American Academy of Forensic Science (AAFS) formally recognized the field of digital forensics in 2008 with the creation of the

Digital and Multimedia Sciences section – the first section added to the AAFS in 28 years.

In addition, a number of peer-reviewed journals have emerged, including the *Journal of Digital Forensics, Security, and Law*, *Digital Investigation*, *IEEE Transactions on Information Forensics and Security*, and the *International Journal of Digital Crime and Forensics*. Thus, the peer recognition and publication prong of the *Daubert* standard has clearly gained momentum within the past decade for the field of digital forensics.

Being well versed on the extensive body of case law and federal regulations pertaining to the role of digital evidence is a difficult task. In a study by Losavio et al. (2006), state general jurisdiction judges from around the country were surveyed to gain insight as to exactly what they know about digital forensics. Losavio et al. (2006) found that the judges in the study admitted to a low level of understanding and training with digital evidence in the courtroom.

At the same time, judges displayed an eagerness to gain understanding through effective training methods. Since then, several government agencies and public-private partnerships have emerged around the country to address this gap in judicial experience. One of the most successful programs is the **National Computer Forensics Institute (NCFI)**, a division of the United States Secret Service located in Hoover, Alabama. The NCFI is a training center operated by the United States Secret Service's Criminal Investigative Division and the Alabama Office of Prosecution Services with the mission of providing high-quality, hands-on experience to law enforcement personnel around the country (see [www.ncfi.usss.gov](http://www.ncfi.usss.gov)). In fact, they offer three courses designed for prosecutors and judges regarding digital forensic analyses at no cost. Overall, with the Internet's growth and the corresponding increase in technology-facilitated crime, it is essential and inevitable that training and educational programs emerge for all members of the criminal justice system.

## Summary

This chapter highlighted the challenges that digital evidence and investigators may face in presenting evidence at trial. The issue of compelling information sharing via key disclosure is also challenging, with no real global standard in place. These factors all demonstrate that the entire digital forensics process is under scrutiny, and the validity of digital forensics is assessed by whether or not the evidence is admissible in a court of law. Overall, technology is constantly changing so it is inevitable that national and international case law and federal regulations will change as well.

### Key Terms

Access key  
Admissibility  
Affidavit  
Amendment  
Apparent authority principle  
Arrest warrant  
Authenticity  
Best evidence rule  
Beyond a reasonable doubt  
Bill of Rights  
Cloud storage  
Communications and Multimedia Act 1998  
Compelled  
Conclusion  
Cybercrime Act 2001  
Daubert hearing  
Daubert standard  
Daubert trilogy  
*Daubert v. Merrell Dow Pharmaceuticals* (1993)  
Double jeopardy clause  
Due process clause  
Encryption  
Examination  
Exigent circumstance  
FBI-Apple encryption dispute  
Federal Rules of Evidence (FRE)  
Fifth Amendment  
*Fisher v. United States*, 1976  
Fourth Amendment  
FRE Rule 401  
FRE Rule 702  
FRE Rule 801  
FRE Rule 901  
Frye standard

*Frye v. United States* (1923)  
Gatekeeper  
*General Electric Co. v. Joiner* (1997)  
Grand jury  
Hearsay  
Hypothesis  
*In re Boucher* (2007)  
Indian Evidence Act of 1972  
Information Technology Act of 2000  
Information Technology (Amendment) Act of 2008  
Incriminating  
Just compensation clause  
*Katz v. United States* (1967)  
Key disclosure law  
*Kumho Tire Co. v. Carmichael* (1999)  
Law Reform Commission  
National Computer Forensic Institute  
Observation  
Open field searches  
Original writing rule  
Password-protected files  
Philippine Rules of Electronic Evidence (PREE)  
Plain view doctrine  
Prediction  
Preponderance of evidence  
Probable cause  
Radio-frequency identification (RFID)  
Reasonable expectation of privacy  
Reasonableness clause  
Regulation of Investigatory Powers Act (RIPA)  
Relevant  
Reliability  
Right to privacy  
San Bernardino Case  
Scientific evidence  
Scientific method

Search  
Search and seizure  
Search incident to arrest  
Search warrant  
Section 49 request  
Self-incrimination  
Self-incrimination clause  
Seizure  
Standard of proof  
Subpoena  
Testimonial  
Traffic stop  
Unfair prejudice  
United States Constitution  
*United States v. Fricosu* (2012)  
*United States v. Smith* (1998)  
Warrant  
Warrants clause

### Discussion Questions

1. There are a number of exceptions to the warrant requirement for a search and seizure. Identify five different exceptions to this rule and create a different scenario for each that would involve the search and seizure of electronic evidence.
2. Identify the four criteria for determining whether digital forensic expert testimony is admissible in court according to the Daubert standard. Assess each of these criteria and explain whether or not digital forensic evidence should be admissible in court.
3. There are inconsistencies between national and international laws on a variety of legal issues associated with digital forensic investigations. Describe two of these inconsistencies and discuss whether or not a universal, international law or policy is possible regarding the treatment of digital forensic evidence in court.

4. Create two different scenarios involving third-party consent to conduct a search and seizure. In the first scenario, the third-party member is not legally able to provide consent to law enforcement. In the second scenario, the third-party member is able to provide consent to law enforcement to conduct a search and seizure. Finally, do you agree with the current interpretation of the apparent authority principle? Explain.

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Chapter

17

# THE FUTURE OF CYBERCRIME, TERROR, AND POLICY

## Chapter Goals

- Identify future trends in cybercrime offending and victimization
- Recognize the prospective impact that new technologies will have on human behavior
- Understand the ways that the proliferation of social media may influence the nature of involvement in terror and extremist movements worldwide
- Assess the ways that criminological theory can be improved with respect to cybercrime
- Understand the ways that law enforcement strategies may need to adapt to online spaces
- Recognize how digital forensics will evolve with technology generally

## Introduction

The range of cybercrimes discussed throughout this book illustrates the complexity of these offenses and the unique ways that technology is being used by criminals to hide themselves, make it easier to engage in crimes on and offline, and connect with others. Since technology is constantly changing, it is difficult to know when or how offenders will adopt a new mode of offending based on access to the Internet.

This issue was exemplified on December 11, 2016, when John Rayne Rivello, using the twitter handle @jew\_goldstein, sent an animated gif, or Graphic Interchange Format image, to journalist Kurt Eichenwald's twitter account (Kang, 2017). A gif is a series of images that are strung together to create a short animated scene, typically featuring cats, celebrities, or scenes from popular films. In this case, Rivello created a gif that acted as a strobe light to flash bright lights on and off in the hopes of causing Eichenwald, an epileptic, to have a seizure. In addition, the images contained the message "you deserve a seizure for your posts," suggesting the sender intended to cause Eichenwald harm (Kang, 2017).

Rivello was angry at Eichenwald, an investigative journalist who had worked for *New York Times*, *Vanity Fair*, and *Newsweek*, for his critical stories detailing the potential criminal activities of Donald Trump throughout the presidential election. Eichenwald's work drew a great deal of fire from Trump supporters online who would frequently spam him with anti-Semitic messages and death threats. Rivello felt that Eichenwald deserved to be punished for his comments

and even texted friends saying “Spammed this [gif] at [Eichenwald] let’s see if he dies” (Kang, 2017).

Upon seeing the gif, Eichenwald had an 8-minute seizure that caused him to lose control of his bodily functions and left him incapacitated for several days (Kang, 2017). Eichenwald’s wife subsequently contacted police and the FBI to investigate the sender. The FBI’s investigation subsequently led them to identify Rivello, despite his use of a disposable cell phone and twitter account with no identifying information. Rivello was charged with cyberstalking with the intent to kill or cause bodily harm, which is a rare set of charges to pursue with a cybercrime case. A grand jury in Texas hearing the case supported the notion that the GIF constituted a deadly weapon in the course of the assault because it was clearly designed to affect Eichenwald’s physical condition. A federal judge later ruled that the light waves emitted from the GIF image could be considered physical contact as the light was directed at Eichenwald and caused his physical injury. Rivello was also initially charged with committing a federal hate crime on the basis that he decided to attack Eichenwald on the basis of his religious identity. Federal charges were later dropped, and the state trial was postponed indefinitely because of the COVID-19 pandemic. Rivello eventually had to pay Eichenwald \$100,000 in civil damages (Charles, 2020).

The use of an online image to cause real world harm is relatively rare, making this entire case relatively unprecedented. This case demonstrates the difficulty that is present in forecasting the future of cybercrime. There are a range of factors that will influence any trends in cybercrime, including the popularity of a given technology, the recognition among offenders of how to use these devices, and the ability for law enforcement to investigate these offenses. This chapter will attempt to consider all of these issues in order to provide some context for the future of cybercrime from the standpoint of offenses, researchers, and policing. We will also discuss the challenges inherent in legislating against cybercrimes in an increasingly borderless world.

**For more information on one of the first instances of individuals using the Internet as a means to cause physical harm to others in the real world, go online to:** <http://www.news.com.au/technology/anonymous-attack-targets-epilepsy-sufferers/news-story/702ed0bbf0b49dd63aaee33f295ba1d4>



## Considering the Future of Cybercrime

Since multiple forms of cybercrime have been observed for more than 30 years, it is unlikely that they will ever cease due to legislative or policing efforts. Instead, there is greater value in considering the ways that the platforms used by offenders will change in the near future. As our technology use patterns change, so too will the practices of cybercriminals to better exploit vulnerable populations.

One key change has been in the use of so-called **trusted platforms** as a means for hackers to gain access to, and compromise, targets. Specifically, they gain access to a seemingly secure or trustworthy source for software or critical system updates, and then compromise that service. In turn, hackers can then use that pathway to gain access to sensitive networks and spread malware, steal files, and more (see [Box 17.1](#)). This type of attack was observed in the spread of the NotPetya malware in 2018 (see [Chapter 10](#)), which spread through attackers infecting a key piece of tax software used by companies in Ukraine.

The benefit of compromising a trusted service lies in the fact that the hackers' true targets may not question the security of that service. Instead, they will

### Box 17.1 Understanding Why Hackers Target Trusted Services

#### Supply Chain Attacks Show Why You Should Be Wary of Third-Party Providers



<https://www.csionline.com/article/3191947/supply-chain-attacks-show-why-you-should-be-wary-of-third-party-providers.html>

The risks associated with a supply chain attack have never been higher, due to new types of attacks, growing public awareness of the threats, and increased oversight from regulators.

This article highlights the clear value for hackers in targeting the so-called software supply chain, constituting the various vendors that service companies' financial, processing, and other needs around the world. When an attacker can affect those service providers, they are then able to affect multiple targets simultaneously. This article also explains how companies can improve their response to benefit the broader cybersecurity landscape.

largely assume that it is doing its due diligence to remain secure and remain connected to its infrastructure for updates and services. This sort of thinking was likely why hackers compromised a US IT company called **SolarWinds** in early 2020 and used its platform as a backdoor into multiple sensitive government agencies (Jibilian & Canales, 2021). Evidence suggests that the attackers, most likely operating with nation-state backing, compromised SolarWinds' software and added malware to one of its system updates that was thought to have affected up to 18,000 of their customers (Jibilian & Canales, 2021). Once installed, that malware provided attackers with access to those companies, including various government agencies and major corporations. The attackers were thought to have had access to these targets for months, and it is still not clear how deep the attackers may have been able to penetrate into sensitive systems and access data held across both public and private entities (Jibilian & Canales, 2021).

**For more on a timeline of the SolarWinds hack, go online to:**

<https://www.csoonline.com/article/3613571/the-solarwinds-hack-timeline-who-knew-what-and-when.html>



Similarly, the rise of various creator-driven subscription sites like OnlyFans, AVN Stars, Just for Fans (JFF), and Unlockd may be transformative for the production of online pornography. As noted in [Chapter 7](#), individuals can easily set up profiles on these sites to receive payment for the production of adult lewd and more serious pornographic content (see [Box 17.2](#) for detail). They can produce content on a rotating basis depending on subscription models and advertise their profiles through various social media platforms like Instagram, Snapchat, and Twitter.

Such practices are largely legal, though they create opportunities for other forms of cybercrime, such as intellectual property theft through the distribution of created content without their authorization (Cole & Cox, 2020). In addition, some creators may attempt to use these sites to solicit sex for money, which may violate their terms of service. In addition, it is possible that individuals under the age of 18 create accounts on these sites as a means to make money (Tenbarge, 2020). Such activities would, however, constitute the production of child pornography which is highly illegal and heavily policed. As a consequence, sites like Instagram and TikTok have begun to delete user posts or content that

## Box 17.2 Understanding the Role of OnlyFans in Sex Work

### Sex Workers Pivoted to OnlyFans, But There Are a Lot of Amateurs There Too



<https://www.marketplace.org/shows/marketplace-tech/sex-workers-pivoted-onlyfans-there-are-lot-amateurs-there-too/>

In theory, anyone can use OnlyFans. But it's home to a lot of adult content, and sex workers have found themselves learning how to be creators and battling for attention among all kinds of other would-be influencers.

This article highlights the challenges for individuals seeking to use OnlyFans as a platform to earn a living, whether through the production of legitimate adult content or other activities. The author emphasizes the unique dynamics that make it difficult for individual content creators to gain followers and how little individuals may actually make as a result.

potentially involve this content, such as nude or sexually explicit content (Moss, 2021). Though proactive policing efforts on the part of social media sites helps to minimize harm to the public, they may not completely eliminate the use of their platforms for illicit sex work.

The COVID-19 pandemic has also created opportunities for cybercriminals to exploit victims through various scams that will likely continue to be relevant over the next decade. The persistence of the virus and need for testing and vaccinations around the world provide scammers with immediate opportunities to draw in people of all ages. For instance, there is evidence that vendors on both Open and Dark Web sites are selling fraudulent vaccination cards to the public for individuals who want to move through the public with minimal restrictions while avoiding the need to receive the vaccine themselves (Cerullo, 2021). Some vendors are also selling vaccines by the does, though it is not clear if the product is the legitimate medical product, properly stored and produced, or an adulterated dose (Tidy, 2021).

Hackers have also used the opportunity created by the large number of people working from home to target vulnerable systems. For instance, a hacker group called Evil Corp. monitored Virtual Private Network (VPN) login sites

used by employees at various companies to then infect those systems and gain access to corporate networks (BBC, 2020a). Fraudsters have also used opportunities afforded by the pandemic to steal funds from people through a number of different schemes (Smith, 2021). For instance, some cybercriminals have set up phishing schemes related to COVID-19 testing programs, sending text messaging indicating that the recipient must take an online COVID-19 test. Should the person click through the link the scammer provides, they are then asked to enter in sensitive personal information, including their US social security number, credit card or banking information, and other information (Smith, 2021). The practices of cybercriminals will likely continue to evolve in tandem with the pandemic and adjust to the ebb and flow of infections and changes in human behavior.

**For more on COVID-19 scams, go online to:** <https://www.ftc.gov/coronavirus/scams-consumer-advice>



## How Technicways Will Shift with New Technologies

As evident throughout this book, human beings readily adapt their social habits and methods of engaging with the world to fit with available technologies. This process of behavioral changes based on technological changes is referred to as technicways and can lead to large-scale institutional changes based on evolutions in behavior (see Chapter 1; Odum, 1937). For instance, individuals now use email and electronic communications to connect with others rather than traditional hand-delivered mail through a postal service. How technicways will continue to lead to behavioral change is not immediately apparent, though it will most likely stem from the success or failure of several new technologies that are becoming available to consumers over the next few years.

There is particular concern over the security of Internet-connected devices that can be controlled through applications on smartphones or web browsers, creating what some refer to as the **Internet of Things (IoT)**, or all non-computing devices connected together via the Internet (Curtis, 2013). For instance, smart watches, Internet-enabled security cameras, smart doorbells and security systems, web-based baby monitors, thermostats, televisions, and even vehicle components are all IoT devices (Braddock, 2020). Even more concerning is the fact that many IoT devices like televisions, web cameras, and appliances do not have much by way of security features to protect them from

compromise (Marotti, 2019). Instead, they are largely only as secure as the user-name and passwords used to manage your account and access to the applications.

The use of IoT devices also creates security risks that cut across physical and virtual environments. For instance, running an app on your phone that allows you to access and control home security settings in effect turns the device into a set of keys (Curtis, 2013). If you were to lose your phone, an individual who picks it up could be able to remotely control the security of your home. Similarly, controlling the heating and cooling system of your home through a wireless device means that hackers could potentially access these systems remotely (Braddock, 2020). As a result, there have been several reports of individuals whose smart thermostats and security systems were remotely accessed by hackers and used to speak to the residents or threaten them (Marotti, 2019).



**For more on the difficulties of securing a variety of IoT devices, go online to: <https://www.intellectsoft.net/blog/biggest-iot-security-issues/#>**

The rise of the COVID-19 pandemic has also introduced opportunities for hackers to gain access to sensitive health data via tracking applications installed on mobile devices. Several states across the United States, and nations around the world, developed smartphone applications that enable improved **contact tracing** based on the physical locations individuals visit in real time. Specifically, these applications allow users to be tracked to determine their exposure to anyone who may have been infected and help reduce the transmission of the virus overall (Starks, 2020).

The speed with which these applications were produced meant that they were also not fully vetted for security flaws, some of which could be extremely serious (see **Box 17.3** for an example). For instance, the national contact tracing application for Qatar contained a vulnerability that would have allowed hackers to obtain the national identification number and health status of users (Starks, 2020). The state of North Dakota also implemented an application which was sharing users' location data to the digital marketing company Foursquare without their knowledge (Jumbo Privacy, 2020). Though the risks presented by such apps may be reduced over time with improvements to data protection and privacy plans, the potential for data to be leaked should be concerning to all.

Even more concerning is the fact that many IoT devices like televisions, web cameras, and appliances do not have much by way of security features to protect

### Box 17.3 The Difficulties of Using Contact Tracing Apps

#### Fearing Coronavirus, a Michigan College Is Tracking Its Students with a Flawed App

<https://techcrunch.com/2020/08/19/coronavirus-albion-security-flaws-app/>



Worse, the app had at least two security vulnerabilities only discovered after the app was rolled out. One of the vulnerabilities allowed access to the app's back-end servers. The other allowed us to infer a student's COVID-19 test results.

This article explores the security risks evident in an application that Albion University in Michigan required students to use in the fall 2020 semester. Though the use of contact tracing is intended to improve the health and safety of all, the security and privacy threats outlined in the article must also be balanced so as to ensure user information is not compromised.

them from compromise, or to notify the user of an attack. This is particularly concerning when considering the increased push by automotive manufacturers to produce Internet-connected and autonomous or self-driving vehicles (Dimitsikopoulos, 2011; Lu et al., 2014). These devices, often referred to as **CAVs (Connected and Autonomous Vehicles)**, utilize the existing infrastructure of modern car manufacturing but are enhanced by computer controls, electronics, wireless technologies, and integrated infotainment systems that connect to mobile devices (Gerla et al., 2014). As a result, there are now some vehicles that can be self-driving based on real-time information sharing and connectivity to various devices, vehicles, road markers, GPS, and other parts of the transportation infrastructure (Gerla et al., 2014).

**For more information on vehicle attacks, go online to:** <https://upstream.auto/research/automotive-cybersecurity/>



The emergence of CAVs and the applications and systems that support them are all potential targets for hackers and car thieves generally (Greenberg, 2015,

### Box 17.4 An Example of a Serious, but Controlled, Vehicle Hack



#### Hackers Remotely Kill a Jeep on the Highway – with Me in It

<https://www.wired.com/2015/07/hackers-remotely-kill-jeep-highway/>

Their code is an automaker's nightmare: software that lets hackers send commands through the Jeep's entertainment system to its dashboard functions, steering, brakes, and transmission, all from a laptop that may be across the country.

This article explains a vehicle hack identified by cybersecurity researchers, and its application in a real-world setting. The writer was driving the vehicle when the researchers remotely hacked the vehicle, and he describes in great detail how disorienting the experience was. This article provides an excellent overview of how vehicle hacks operate in practice.

2016; 2017). To date, there have been a small number of security incidents directly targeting the Internet-enabled components of CAVs mostly under highly controlled circumstances by researchers (see **Box 17.4** for detail). At the same time, the potential for serious harm cannot be ignored, as motor vehicle accidents can be fatal to drivers, passengers, and pedestrians. For instance, a woman crossing an intersection on a bike was killed when she was hit by a self-driving vehicle. The car was under testing by the ride-share company Uber, and contained a safety-driver, who was streaming a television show at the time of the collision (Cellan-Jones, 2020). Though such an incident appears to be an example of human error, it highlights that smart vehicle technology is not failsafe and can cause grave harm to the public (Cellan-Jones, 2020). Thus, we should give careful consideration to the impact that our rather immediate adoption of technologies can have on our lives before we take the equipment out of the box.

## Social Movements, Technology, and Social Change

While technology will no doubt force subtle shifts in patterns of human behavior, it will also be at the forefront of rapid social changes in political and government structures. The Internet and computer-mediated communications (CMCs)

provide individuals with an outlet to express dissent with policies and practices of their own government or those of foreign nations (see Chapters 10 and 11; DiMaggio et al., 2001; Van Laer, 2010). These technologies also allow nation-states' most vulnerable and critical systems to be attacked with greater secrecy and fewer resources than might otherwise be required offline (Brodscky & Radvanovsky, 2010). Now that attack techniques like NotPetya and Stuxnet have made cyberattacks against critical infrastructure a reality rather than a theoretical potential, we can expect this to become increasingly problematic.

At the same time, the proliferation of the Internet may play a vital role in transforming the nature of violent extremist activity in the real world. Since the Internet and social media have revolutionized access to extremist groups and messaging, it is possible for individuals to be exposed to radical messaging from anywhere at virtually any time. Acceptance of an ideology may no longer be dependent on intense or proximal real world social relationships, but rather on the extent to which messaging connects with the individual. Some may refer to this process as “**self-radicalization**,” in that the individual comes to accept a radical ideology on the basis of exposure to extremist content online without the need for actual physical social engagements with those in the movement. Even if a person makes tangential ties on the basis of interactions via social media, email, or a forum, this sort of contact constitutes a social interaction within the context of a larger extremist or terrorist subculture.

The problem of self-radicalization can be observed around the world through acts of violence performed across the political spectrum, such as the mass shooting performed by Omar Mateen who killed 49 people and wounded 53 others at the Pulse nightclub in Florida in June 12, 2016 (Wilber, 2016). Mateen had no immediate prior affiliation with any known terrorist group and appeared to have radicalized largely through online videos uploaded by radical groups, including beheadings of various people (Goldman, 2016; Wilber, 2016).

In 2019, Brenton Tarrant killed 50 people and injured 47 in Christchurch, New Zealand. This attack targeted worshipers at two mosques and evidence from Tarrant’s online manifestos suggests he did this as revenge against Muslims for acts of jihadi violence (BBC, 2020b). In fact, he livestreamed the shooting on Facebook as a means to promote his beliefs, recruit others to engage in violence, and spread fear in the population. Substantial evidence suggests he was highly active online and posted frequently in far right websites and forums, though it is not clear if he radicalized in part from offline associations with radical groups (BBC, 2020b). Regardless, his online activities and lack of prior

violent behaviors highlight the potential role the Internet played in shaping this act of violence.

These incidents are all reflective of ideologies and hate group activities that existed prior to the Internet. In the last few years, there have been a number of acts of violence that have occurred stemming from ideological movements that have grown purely online. As an example, a subculture referred to as the **involuntary celibate, or incels**, has developed in online forums and websites (O’Malley et al., 2020). The participants espouse a belief that they are unable to have sexual relationships because of the perceived unfair social structures that enable women to keep men from having sex. Individuals often become involved in this subculture as a result of feelings of inadequacy or difficulty connecting with others and seek out online communities where they can discuss their frustrations with dating (Tolentino, 2018; Van Valkenburgh, 2018).

The more time individuals spend with others increase their exposure to highly negative and misogynistic views of women that encourage violence against women over their control over sex as a resource (O’Malley et al., 2020; Tolentino, 2018). There have been a small number of acts of violence performed by members of the incel subculture, particularly Elliot Rodger who killed seven people in Santa Barbara, California in 2018 (BBC, 2018). Rodger was heavily engaged in incel forums and wrote a detailed manifesto emphasizing the need for violence against both men and women who effectively kept him from being able to have sexual relationships (BBC, 2018).

Similarly, the rise of the online global conspiracy theory called **QAnon** has spurred violence over the last few years (Beckett, 2020). Adherents of this theory believe that the world is run by a cabal of devil-worshiping pedophiles who run both the Democratic party and various aspects of the media (Beckett, 2020). To maintain their power, they kidnap children, force them to engage in sex acts and then kill them. Former President Donald Trump was believed by QAnon to be working to root out these individuals during his presidency (Beckett, 2020). All of this information was shared through cryptic messages posted anonymously in an underground forum by a supposedly high-ranking government insider with “Q” security clearance.



**For more on the rise of QAnon, go online to:** <https://www.nbcnews.com/tech/tech-news/how-three-conspiracy-theorists-took-q-sparked-qanon-n900531>

## Box 17.5 Understanding QAnon-Related Violence

### QAnon: A Timeline of Violence Linked to the Conspiracy Theory

<https://www.theguardian.com/us-news/2020/oct/15/qanon-violence-crimes-timeline>



“QAnon has not brought a single child abuser closer to justice,” View said. “But QAnon has radicalized people into committing crimes and taking dangerous or violent actions that put children at risk.”

This article provides an excellent overview of the range of real-world harm stemming from belief in the QAnon conspiracy, including multiple kidnappings and threats against politicians in the United States and Canada. The fact that these events have all occurred since 2018 also highlights why the FBI describes adherents to this conspiracy as a domestic terror threat in the United States.

Despite the relatively outrageous premise of this movement on face, many people across the world believe aspects of the theory. The acceptance of the theory led some to engage in extreme acts to bring justice for children, and the world as a whole (see **Box 17.5** for detail). For instance, on June 15, 2018, a man named Matthew Wright blocked a bridge near the Hoover Dam in Nevada (Ruelas, 2021). He was armed with multiple weapons and 900 rounds of ammunition and was driving a partially armored vehicle. The traffic jam caused by his blockade led police to the scene, and during this time, he demanded that then-President Trump begin to make the mass arrests promised by Q, stating “Uphold your oath. Please, Mr. President. We deserve the truth.” (Ruelas, 2021) After an hours-long standoff with police, he eventually moved off the bridge. He peacefully surrendered and was sentenced in January 2021 to serve over seven years in prison for charges related to terrorism and unlawful flight (Ruelas, 2021).

Despite the election of Joe Biden as president in 2020, QAnon still holds sway for some in the public. In fact, members of the QAnon movement were involved in the riot and attempted insurrection in the United States Capitol complex in Washington, DC on January 6, 2021 (Rubin et al., 2021). Participants in that riot stormed Congress and attempted to stop the counting of

electoral votes that would certify Biden as president. The very real violence of that day, and its intersection with QAnon (Rubin et al., 2021), highlights the need for future study to understand the behavioral, psychological, and social factors that may spur self-radicalization to online beliefs systems. Such research is essential, so that we may better understand how terror and extremism will evolve as a result of technology.

## Need for New Cyber Criminological Theories?

The various chapters of this book also illustrated the various ways in which technology has influenced the commission of many forms of crime. In most instances, “newer” forms of crime were not born from technology. Instead, criminals were able to use the Internet and various devices to commit traditional forms of crime and deviance in more effective and efficient ways. Thus, the notion that cybercrime can be viewed as “old wine in a new bottle” (Grabosky, 2001; Wall, 1998; see [Chapter 13](#)) has strong merit. In fact, the current body of criminological research on cybercrime as discussed in [Chapter 13](#) demonstrates that traditional theories of offending apply well to cybercrimes that have substantively similar counterparts in the physical world, such as theft, harassment, bullying, and pornography. In addition, traditional criminological theories have also provided considerable insight to somewhat more technical cybercrimes, such as unauthorized access to computer systems.

For example, one of the strongest predictors of cybercrime offending is the same as that of traditional crime – associating with delinquent or criminal peers (Holt & Bossler, 2014). Having friends who engage in various forms of cybercrime increases the likelihood that the individual will engage in these same offenses as well. Also, definitions (e.g., values, norms, and statements) that support involvement in cybercrimes are also associated with an individual’s willingness to engage in cybercrime, as is their acceptance of techniques of neutralization that justify offending behavior. In the social control literature, low self-control has been repeatedly found to be a significant predictor of almost all types of crime, including various forms of cybercrime (Holt & Bossler, 2014).

Given the support that these theories have in the larger literature, one of the most critical steps researchers can take to move the discipline forward is to elaborate on these existing theories. For instance, though it is clear that deviant peer relationships directly increase the risk of cybercrime offending, few have identified whether virtual peer networks or those in the real world have a greater impact on activity (Higgins, 2005; Holt et al., 2010; Miller & Morris, 2016). It

may be that having friends in the real world who engage in cybercrime is more pertinent to the introduction of these activities. For example, Miller and Morris (2016) found that traditional peers had a larger impact on the commission of digital piracy than virtual peers within a college sample. A recent case study analysis performed by Leukfeldt and colleagues found that offline relationships were important in the formation of criminal networks to facilitate phishing and malware use (Leukfeldt et al., 2017). Those who had access to online social networks of cybercriminals via forums, however, were more likely to engage in technical offenses with greater ease and efficiency. Both of these studies point to the need for additional studies using data from unique sources to better understand the intersections of virtual and traditional offline relationships in order to disentangle the relationship between peers and cybercrime generally.

There is also a need for research considering how certain demographic factors affect the likelihood of engaging in or becoming a victim of cybercrime. In criminological research on real-world offenses, there is a significant relationship between living in poverty and the risk of offending and victimization (see Bradshaw et al., 2009; Bursik & Grasmick, 1993). While technology use has become more ubiquitous, even for those living in low-income communities, it is possible that the degree to which individuals use these devices on a daily basis may significantly affect the risk of cybercrime victimization. Individuals living in poverty generally may have little disposable income for Internet connectivity or online shopping and may be less inclined to own their own computer. Instead, they may use computers in local libraries or other publicly accessible locations, which may reduce their risk of malware infections or computer hacking (Smith, 2013). The same individual may be more likely to use a mobile phone in order to access social media and email, which may increase their risk of cyberbullying and harassment (Smith, 2013). Limited research has found a link between youth living in disorganized communities and their experience with both cyberbullying victimization (see Holt et al., 2014) and engagement in hacking behaviors generally (Holt et al., 2020; Udris, 2016). Thus, further study is needed to understand the potential association between neighborhood conditions and the risk of both cybercrime offending and victimization.

At the same time, this book has demonstrated that there is something unique about cybercrime offending that separates it from traditional crime. There are some instances of “new wine,” such as malware creation, that has little connection to either the physical world or the second part of the analogy – the new bottle. In this case, examining the uniqueness of cybercrime might allow us to better understand these phenomena as well as provide brand new insights on

traditional forms of crime as well. For instance, studies examining the prevalence of technically complex forms of cybercrime like malware creation are relatively rare among University student samples and generally find few behavioral correlates (e.g., Rogers et al., 2006; Skinner & Fream, 1997). More research is needed to identify not only the prevalence and activities of these technically sophisticated forms of malware writers and users but also what behavioral or attitudinal drives make these criminals distinct from other criminals and their acts that require less knowledge or skill on the part of the offender.

Considering that criminological theory development has slowed over the last few decades, discussions of new cyber-specific criminological theories might be the catalyst that rejuvenates this field. For instance, the discussion of digital drift (Goldsmith & Brewer, 2015) presented in [Chapter 13](#) demonstrates that there may be utility in revisiting older criminological frameworks that recognize the unique nature of criminality. Individuals need not view themselves as criminals or delinquents in order to engage in such activities online; opportunities to offend are omnipresent, and it is up to the person to avoid offending. Though this framework has potential value, no empirical research to-date has tested propositions of digital drift. Thus, more study is needed to understand its true capability. Taken as a whole, the future of cybercrime research is bright. The field will help elaborate complex associations that have been held in the traditional literature for decades while also providing new insights into the commission of crime – both traditional and cyber-related.

## **Shifting Enforcement Strategies in the Age of the Internet**

As noted throughout this text, law enforcement agencies across the world are engaged in the investigation of cybercrime. The capabilities of these agencies to investigate cybercrimes range greatly based on both the specific agency in question as well as the type of cybercrime being investigated. Governments have provided substantive resources to fund policing agencies to pursue child exploitation crimes and child sexual abuse materials as individual units and in connection with one another (see [Chapter 8](#)). Few mechanisms, however, exist to help connect the investigative capabilities of local, state, federal, and international agencies in their investigations of serious hacking incidents, malware use, and data theft (see [Chapter 2](#)).

In order to move beyond the limits posed by limited inter-agency cooperation, some degree of innovation is required in order for police agencies to

disrupt and deter some forms of cybercrime. One strategy that is currently being tested in Europe involves the use of prevention campaigns tailored to young hackers at the start of their offending careers (Pritchard, 2020). For instance, the Dutch National Police High Tech Crime Team, in conjunction with prosecutors, the Ministry of Justice, as well as private industry implemented a program called **Hack\_Right** in 2017. The focus is on transitioning youth who demonstrate criminal hacking propensities, particularly involvement in DDoS, phishing, and criminal hacks, to use their skills for cybersecurity and ethical hacking behaviors (Pritchard, 2020).

A small number of youth have gone through the program, which is tailored to each person and focuses on helping them to understand the harm their activities may cause (Pritchard, 2020). The program also connects individuals to industry, so that they can identify the much broader range of legitimate applications for hacking techniques to better society and improve the state of security. Should such programs prove successful over time, they may provide an excellent direction for the future to deter some forms of serious cybercrime over the long term (see also Holt & Bossler, 2014).

The rise of encrypted applications and services, noted throughout this work, also present challenges for law enforcement. Offenders utilize services like Tor to conceal their location and engage in a host of offenses, from drug sales to child sexual exploitation offenses. Over the last five years, **encrypted chat applications** for use on mobile devices have also become a tool to conceal one's text-based communications with others. There are a range of these applications, including Signal, Telegram, and Viber, which encrypt the contents of a message, so that only the recipient and sender can read the message, and it cannot be accessed while in transit or when stored. The use of encrypted chat apps presents a substantial risk to police agencies and prosecutors, as an inability to access the content of messages may make it difficult to prove an individual's involvement in a criminal act (see **Box 17.6** for an example).

A number of techniques have been applied by police agencies across the world to help defeat these forms of encryption, with some being more successful than others. For instance, the FBI in the United States previously used so-called **network investigative techniques (NIT)** to compromise the browsers of individuals who visited various Dark Web sites in order to determine their real identity and location via IP address information (Farivar, 2017). Though the use of NIT enabled the arrest of hundreds of offenders, particularly those engaged in child sexual exploitation crimes, several of those accused questioned the legality of

## Box 17.6 The Risks Encrypted Apps Pose to the Criminal Justice System

### Why Full Evidence of the Plot to Kidnap Michigan Gov. Whitmer May Never Be Known



<https://www.usatoday.com/story/news/nation/2020/10/19/encrypted-apps-threema-wire-whitmer-kidnap-plot/3710295001/>

“Another term for this type of code is ‘warrant-proof’ encryption,” Nanz said. This means the company providing the messaging service can’t turn over the communication records even when it is ordered by the court.

This article explains the ways that encrypted text apps were used by members of a plot to kidnap the state of Michigan’s governor, Gretchen Whitmer, in 2020. The group’s planning and communications were primarily through two encrypted applications, some of which could not be obtained through warrants due to the company locations and the nature of the messages themselves. In fact, the messages entered by prosecutors as evidence for the case were provided by a confidential informant who had access to their content. The article also explains in some detail how such applications differ from traditional messaging clients and what risks they present for future investigations and criminal prosecutions.

these techniques in court (see [Box 17.7](#) for detail). One individual, Jay Michaud, challenged the government’s case against him on the basis that his personal information was acquired illegally (Farivar, 2017). Michaud claimed that the NIT employed was actually a form of malicious software that may not have been legal for the FBI to use. The District Judge hearing the case ordered the government to hand over the details of the NIT, so that attorneys could understand how their clients’ information was obtained, and to what extent the tool may have acquired other data. The government felt they were unable to disclose the details of the NIT which are currently classified. As a result, they dropped all charges against Michaud in favor of retaining the possibility of prosecution at a time when the disclosure of the NIT will not affect their ability to use the technique (Farivar, 2017).

A small number of law enforcement actions have been taken against encrypted application service providers, though it is unclear how police were

## Box 17.7 The Challenge of Law Enforcement Efforts to Hack Tor

### A Dark Web Tycoon Pleads Guilty. But How Was He Caught?

<https://www.technologyreview.com/2020/02/08/349016/a-dark-web-tycoon-pleads-guilty-but-how-was-he-caught/>



“The overarching question is when are criminal defendants entitled to information about how law enforcement located them?” asks Mark Rumold, a staff attorney at the Electronic Frontier Foundation, an organization that promotes online civil liberties.

This article considers the prosecution of Eric Marques, who ran a service called Freedom Hosting, which provided website hosting services for myriad illegal operations on the dark web, including several child sexual exploitation material distribution sites. Marques was eventually arrested in Ireland after his location was determined through an unclear application of hacking techniques by the FBI. The author calls to question whether his arrest is technically legal, or may have violated his rights, and how future investigations may need to be structured to avoid further risks.

able to break their protections. For instance, on March 9, 2021, multiple European law enforcement agencies, including Europol, announced they had cracked a Canadian-based secured communications service called **Sky ECC** (Bracken, 2021). The company sells all manner of mobile devices with specialized encryption software installed that allows users to communicate with one another inside of an essentially closed, secured network. Sky ECC is estimated to have 170,000 users globally, though a substantial number reside in Europe (Bracken, 2021).

It is unclear how Sky ECC’s encryption protocols were defeated, but police in Belgium and the Netherlands made arrests as part of an investigation into the illicit use of these services for various crimes (Bracken, 2021). Days later, on March 12, 2021, the company CEO and a former product distributor were indicted by the US Department of Justice on charges associated with the Racketeer Influenced and Corrupt Organizations (RICO) Act (Goodwin, 2021). The charges were based on the company’s involvement in supporting the sale of narcotics through the use of their secured application services. Should such

coordinated efforts generate successful prosecutions, they may provide a novel framework to defeat the use of encryption among criminals in the future.



**For more on how the police monitored millions of encrypted messages, go online to: <https://www.vice.com/en/article/3aza95/how-police-took-over-encrohat-hacked>**

### Considering the Future of Forensics

The globalization of technology has vastly changed the field of digital forensics. Traditional computer forensics focused only on dead-box forensics involving cases of inappropriate use policies or unauthorized computer access. Today, almost every criminal investigation will involve at least one form of digital evidence (DE) due to the increased use of technology in our daily lives; in addition, criminal cases are likely to involve more than one form of DE (mobile phone, internet browsing history; see [Chapter 14](#) for discussion). Approximately 51 percent of the world's population (4 billion) was using the Internet by the end of 2019 (International Telecommunication Union [ITU], 2020), which is up from 41 percent in 2015. In addition, there is still a disparity in that Internet penetration rates are only at 44 percent for developing countries compared to 87 percent for the developed countries (ITU, 2020). However, the number of individuals using the internet increases when we only consider youths (i.e., 15–24 years old) to 98 percent for developed countries and 66 percent for developing countries. Finally, the ITU (2020) report indicates that for the first time in history mobile-cellular subscriptions declined from 2019 to 2020, possibly as a result of the COVID-19 pandemic and resulting issues with socioeconomic status.

This continued increase in technology globalization guarantees that the criminal justice system (e.g., law enforcement, attorneys, and judges) will need to become more familiar with the basic, if not more advanced, forms of digital forensic investigation. In addition, the digital forensics investigator will need to sort through a variety of digital devices (e.g., IoT) as well as filter out irrelevant digital information from massive volumes of data (e.g., 18 TB hard drive). As a result, this will likely force changes in the ability of criminal justice personnel to become more adept at recognizing technological devices and their role in offending. In addition, this understanding of basic DE collection will have to take place at crime scenes themselves to ensure a successful prosecution (see [Chapter 15](#) for discussion).

The expansion of technology also has implications for the forensic sciences generally. For example, The National Research Council (NRC, 2009) issued a report on the status of forensic science in the United States that recognized the field of digital and multimedia analysis as a new subfield within the larger discipline of forensic science (NRC, 2009, pp. 178–185). Although the NRC acknowledged that the digital forensics discipline “has undergone a rapid maturation process” (2009, p. 181), the report noted that several challenges still remain if digital forensics is to be a rigorous, forensic science discipline: (1) lack of an agreed-upon certification program or list of qualifications for digital forensic examiners; (2) clarifying whether the examination of DE is an investigative or a forensic activity, and (3) wide variability in, and a degree of uncertainty about, the education, experience, and training of digital forensics professionals (p. 181). To that end, there are currently a number of professional certifications available, both vendor neutral (e.g., GIAC Certified Forensic Analyst) and vendor specific (i.e., tool specific, such as EnCase® Forensic Training Series; Ryan & Ryan, 2014). Unfortunately, there is no standardized list of certifications or qualifications required in the digital forensics discipline in order to be considered a digital forensics professional or expert.

From this report, it is important to recognize some progress has been made in the field of digital forensics. Researchers are working toward the development of a unifying professional code of ethics in digital forensics (Losavio et al., 2016). By developing a professional code of ethics in digital forensics, researchers and practitioners hope to move the field of digital forensics to a unified profession (Seigfried-Spellar et al., 2017). Also in response to the NRC report, the Department of Justice and the National Institute of Standards and Technology (NIST) established the National Commission on Forensic Science (NIST, 2013) to strengthen and enhance the forensic sciences. Under the Forensic Science Standards Board, the National Commission on Forensic Science administered the Organization of Scientific Area Committees (OSAC), which includes the field of digital forensics. The OSAC DE subcommittee is specifically made up of DE, facial identification, speaker recognition, and video/imaging technology and analysis. The OSAC-DE specifically focuses on the development of “the standards and guidelines related to information of probative value that is stored or transmitted in binary form” (NIST, 2014).

**For more information on the OSAC-DE, go online to: <https://www.nist.gov/osac/digital-evidence-subcommittee>**



Overall, the future of digital forensics relies on the discipline's ability to conquer each of the concerns highlighted by the NRC. The discipline needs to establish a standard of accreditation for digital forensic laboratories as well as a standard for training and continued education for digital forensic examiners. In addition, the digital forensics community needs to create a standardized protocol for the process of conducting a digital forensics investigation that focuses on the forensic scientific method (Casey, 2011). By following a scientific method, the examiner is less likely to overlook potential DE or report erroneous findings. According to Casey (2011), a protocol that focuses on the scientific method will encourage digital forensics examiners to follow procedures that are "generally accepted, reliable, and repeatable" as well as more likely to lead to "logical, well-documented conclusions of high integrity" (p. 224).

## The Challenge to Policy-Makers Globally

The trends identified in this chapter all demonstrate that technological innovations create myriad opportunities for crime and deviance. One of the most common ways that policy-makers, particularly in government and private industry, discuss how we may combat these problems is through the cultivation of better cybersecurity principles that can be employed by the common person every day. Every time an individual uses their antivirus software or carefully reviews an email message before responding, they are taking basic steps to secure their computer or device from compromise. As digital natives age, their use of and appreciation for technology may provide them with an even greater degree of computer security awareness than that of the digital immigrants of older generations. This may create a slight improvement in the general security posture of society as a whole.

Any benefits gained from improvements in security awareness, however, may be diminished by vulnerabilities and flaws in the computer systems and servers managed by ISPs and industry. As noted in [Chapter 11](#), when a new vulnerability in a product is identified and weaponized by hackers, it directly threatens the security of all computer users through no fault of their own. The problem is exacerbated when nation-states simply hoard previously unidentified vulnerabilities on the basis that they may be later used to compromise targets. Such actions put the whole world at risk, especially if it is a common product or one that is present in common critical infrastructure systems.

Thus, there is a need to consider what best practices can be developed for vulnerability identification and disclosure in order to minimize the potential for

collateral damage to the public. This is particularly true for vulnerabilities that may exist in trusted programs, as with the SolarWinds hack explained above. Many nations would likely be unwilling to find common ground on vulnerability disclosures that could be used for offensive cyberattacks due to the perceived advantages they provide.

Until nations can agree on a strategy, it is likely that private companies will have to engage in proactive policing efforts to help minimize the risk of harm to their clients. For instance, Google operates a security team called **Project Zero** that actively seeks out and publicly discloses zero-day vulnerabilities when discovered (Page, 2021). The team largely operates to improve the state of cybersecurity and block malicious hackers from affecting vulnerable targets. In 2021, the Team disclosed that they also actively analyzed what was revealed to be a Western nation-state sponsored hacker team that engaged in two separate attack campaigns throughout 2020 (Page, 2021). The actors utilized more than 11 separate zero-day vulnerabilities and exploits, which Project Zero identified and publicly reported, enabling security patches to be produced that closed those potential avenues for attack (Page, 2021). It is likely that such activities may continue in the future until a more common set of protocols can be established across nations.

There is also a need to improve the state of legislation so as to be both broad and flexible enough to be applied to a range of technological misuse while at the same time having substantive legal sanctions to deter individual offenders. Such a task is extremely difficult as there is no way to know how a new device or application will be adopted by offenders for nefarious purposes. For example, FOSTA and SESTA have impacted the volume of Internet-enabled prostitution and human trafficking occurring, though there is emergent evidence to suggest that arrests for both prostitution and sex trafficking in offline spaces have increased since the laws were enacted (see [Chapter 7](#)).

**For more on the impact of FOSTA-SESTA, go online to:** <https://whyy.org/segments/fosta-sesta-was-supposed-to-thwart-sex-trafficking-instead-its-sparked-a-movement/>



At the same time, legislative overreach can have negative outcomes as well. This is exemplified in the on-going legal challenges to the FBI's strategies to investigate Tor as outlined above. The use of exploitative malware by

law enforcement to capture data that could be used against any citizen may be excessive and violate individual rights to privacy. Thus, legislators and law enforcement agencies alike must walk a fine line when developing new methods to prosecute or pursue cybercriminals.

At a global level, there is also a need for improved international mechanisms to help combat serious financial and hacking-related cybercrimes. As noted in [Chapter 8](#), there are a number of working groups that exist to coordinate transnational responses to child exploitation crimes. There are few similar entities to pursue hacking and fraud-related crimes, making it difficult to effectively sanction and deter offenders. In fact, the lack of resources may account for the continuing number of mass data breaches that also foster the global market for stolen data (Peretti, 2009).

One strategy could be to better effect controls over the range of cryptocurrencies that now exist, most notably Bitcoin. The growth of cryptocurrencies over the last ten years has been instrumental in transforming the ways in which cybercriminals engage in financial transactions (Matthews, 2021). Some nations have taken steps to regulate their use, with EU member states placing some degree of control over their use, exchange process, and rate of taxation. Others have considered their use illegal, such as India, while others have heavily restricted its use (Partz, 2020). Others, including the United States, have taken minimal efforts to identify the regulatory boundaries that should influence its use as a form of currency relative to that of traditional currencies (Matthews, 2021). Though the lack of standards makes it difficult to engage in consistent enforcement, there is also an opportunity to find ways to promote financial regulations and working groups similar to what is observed with wire transfers and criminal investigations. Such a development could be invaluable to affect certain forms of cybercrime, particularly illicit market operations.

## Summary

Computers and the Internet have radically changed how we communicate, engage in business, and interact with the larger world in a very short amount of time. The benefits of these technologies are substantial, though they also create a range of threats to personal safety and national security. As a result, we have to continuously identify these threats and the ways that technologies are being abused by offenders to facilitate criminal behaviors. Only then can we improve our understanding of the influence of technology on the nature of crime and deviance in the 21st century and better protect ourselves.

## Key Terms

Connected and Autonomous Vehicles (CAVs)  
Contact tracing  
Encrypted chat applications  
Hack\_Right  
Internet of Things (IoT)  
Involuntary Celibate (Incel)  
Network investigative technique (NIT)  
Project Zero  
QAnon  
Self-radicalization  
Sky ECC  
SolarWinds  
Trusted platforms

## Discussion Questions

1. Can you think of any distinct technologies (whether hardware or software) that you use that could be exploited by hackers? In what way could they be harmed? What information could be gathered from their compromise?
2. How could innovations like unmanned aerial vehicles (UAVs) or drones be used by cybercriminals to effectively collect information or offend? How could law enforcement agencies around the world use these devices to disrupt cybercriminals generally?
3. Based on everything you read throughout this book, what do you think the future of cybercrime offending and offenders will look like?
4. What other solutions can you think of to better prepare law enforcement to investigate cybercrimes? How can we improve the overall response?

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# Glossary

.xxx domain	A web domain address that provides a voluntary option for individuals to host pornographic content online.
1 terabyte (1 TB)	One trillion bytes.
419 scams	Another term for advance fee email schemes. The name references the Nigerian legal statutes that are used to prosecute fraud.
Absence of a capable guardian	Variable in routine activity theory that references the lack of physical, personal, or social protection that can minimize harm to a target.
Access key	The password used by encryption programs that unlocks a file using the same algorithm that encrypted the information in order to decrypt it.
Abstract organization	One of the three characteristics of a nation-state that refers to the distinct and independent persona of a nation-state.
Accuracy	The integrity of the data.
Action Fraud	The UK national agency that handles complaints of Internet-based fraud and theft.
Active files	Existing files that are currently available on a hard drive, meaning they have not been deleted.

<i>Ad hoc</i> phase	A term used to describe the pre-forensics age of computer forensic technologies.
Adam Walsh Child Protection and Safety Act	US law that, among other protections, prohibited the defense from obtaining copies of child pornography evidence, in order to limit distribution of said illicit materials, so long as the defense has an ample opportunity to examine the evidence at a government facility.
Admissibility	The process of determining whether evidence will assist the fact finders (e.g., judge) through their decision-making process.
Advance fee email schemes	A scheme where a spam mail sender requests a small amount of money up front from the recipient in order to share a larger sum of money later.
Advanced Persistent Threat (APT)	A reference to a nation-state sponsored hacker/attacker group that utilizes multistep attack methods to gain access to high-value targets.
Affidavit	A written, or occasionally verbal, statement to which the law enforcement officer has sworn an oath to the magistrate that the information is true and factual.
Age Verification Services (AVS)	A web-based service that, upon entry into a website, verifies the age of an individual via either a valid credit card or a driver's license.
Al Qaeda in the Arabian Peninsula (AQAP)	A jihadi terrorist network operating out of Gulf states to cause ideological harm.
Allow States and Victims to Fight Online Sex Trafficking Act (FOSTA)	One of a pair of US laws passed in 2018 that make it illegal to knowingly facilitate, assist, or support sex trafficking in online environments.
Alternative Right, Alt-right	A term referencing extremist groups on the far right of the US political spectrum, inclusive of neo-Nazi, white nationalist, and other movements operating on- and offline.

Amendment	An addition or alteration to the US Constitution.
Andrew “weev” Auernheimer	A well-known hacker who radicalized while incarcerated for violations of the US Computer Fraud and Abuse Act who engages in hacks on behalf of extremist far-right beliefs and acts as technological support for various far-right websites.
Anonymous	A group that stemmed from the image board 4chan that engages in a number of hacks and attacks against targets around the world.
Anti-Malware Testing Standards Organization (AMTSO)	An organization that exists to provide a forum to improve the process of malware identification and product testing across the global security industry.
Anti-Phishing Working Group (APWG)	A not-for-profit global consortium of researchers, computer security professionals, financial industry members, and law enforcement designed to document the scope of phishing attacks and provide policy recommendations to government and industry groups worldwide.
App	A software application typically downloaded by the user that performs a certain function.
Apparent authority principle	US legal standard that states that if police obtain consent to search premises from someone who they reasonably believe shares a common authority over the premises then it does not violate Fourth Amendment rights even if the individual did not have the authority to give consent.
Appeal to higher loyalties	One of the five basic techniques Sykes and Matza developed that allows individuals to break from conformity, operating on the basis that an offense is for the greater good of the group.

Ardit Ferizi	A hacker born in Kosovo who was arrested and extradited to the United States for engaging in a data breach to gain sensitive information on behalf of ISIS. Currently serving time in US federal prison for violations of the Computer Fraud and Abuse Act.
Argot	Special language utilized by subcultures to refer to individuals in and out of the group and demonstrate connection to the subculture.
Arrest warrant	A signed document by a judge or magistrate authorizing law enforcement to take the person into custody.
Attribution	The identification and linking of a hacking incident or some other offense to an individual or group.
Australian Federation Against Copyright Theft (AFACT)	A nongovernmental federation that targets pirates in Australia and Oceania generally.
Authentic	A true and unaltered copy of the original data source.
Authenticity	The ability to prove that the evidence is genuine in a court of law.
Back Orifice 2000 (BO2K)	A piece of malware written by members of Cult of the Dead Cow which infected Microsoft BackOffice server programs.
Berne Convention for the Protection of Literary and Artistic Works	A legal framework created in 1986 to provide a common framework for intellectual property rights.
Best evidence rule	See <i>original writing rule</i> .
Bestiality	Experiencing sexual arousal from sex with animals.
Better Online Ticket Sales (BOTS) Act	US legislation designed to minimize the use of automated software to purchase tickets to sporting events and other activities for the purposes of resale to the general public.
Beyond a reasonable doubt	Term used to refer to the standard of proof needed in US criminal courts to show that a person on trial committed a crime.

BigDoggie	A website that enables individuals to access and post reviews of escort services.
Bill C-13	Proposed legislation that would make it a crime to share an intimate image without the consent of the subject of the image, punishable by up to five years in prison.
Bill of Rights	The first ten amendments of the US Constitution.
Bitcoin	A relatively anonymous form of electronic currency used by a range of actors to pay for goods.
Bit Torrent	Specialized software used to engage in distributed file sharing over the Internet, which has become particularly popular among those engaging in digital piracy.
Black-hat hacker	Uses techniques and vulnerabilities in order to gain access to information or harm systems.
Blended threat	Any form of malware that combines aspects of viruses, worms, and trojan horses together in a single tool.
Blind	Term used to refer to the idea that an independent forensic examiner should be completely unaware of the conclusions reached by the initial examiner.
Blockchain	A digital ledger used to maintain records associated with various activities, particularly cryptocurrencies, through the use of cryptography to prove something occurred on a specific date and time.
Boogaloo Bois	A far-right antigovernment extremist group operating within the United States with an interest in inciting a second Civil War.
Boogaloo Movement	The broad association of far-right extremist actors and groups interested in sparking a second Civil War in the United States.

Boot sector	A region of any sort of storage media or the hard disk of a computer that can hold code and be loaded into the computer's memory by its firmware.
Boot sector virus	A form of malware that operates by attempting to install code into the boot sector of either a form of storage media like a flash drive or the hard disk of the targeted computer.
Botnet	A form of malware that combines aspects of trojan horse programs and viruses and allows an infected computer to receive commands and be controlled by another user through Internet Relay Chat channels or the web via HTTP protocols.
Bridges	A hardware write blocker.
Bulletin board system (BBS)	A form of asynchronous computer-mediated communication used heavily during the 1980s.
Bureau of Customs and Border Patrol (CBP)	The US federal agency responsible for policing and managing the borders of the country and the movement of products in and out of the nation.
Business Email Compromise (BEC)	A form of email-based fraud where the actor misrepresents themselves as a trusted party in order to obtain a massive sum of money through a one-time transfer of funds.
Cam whores	Performers who engage in text-based conversations with individuals viewing them on streaming-video feeds and take requests for specific behaviors or sexual acts.
Cambridge Analytica	A UK-based political consulting company that was involved in a data acquisition and misuse scandal involving Facebook and various political operatives in the United Kingdom and United States.

Canadian Anti-Fraud Centre (CAFC)	A joint effort between the RCMP, Ontario Provincial Police, and the Competition Bureau that collects reports on various forms of fraud that take place online and offline.
Canadian National Child Exploitation Coordination Center (NCECC)	The Canadian agency that serves as a focal point of contact for online exploitation cases that cross jurisdictional boundaries within Canada or internationally.
Capture the Flag	Competitions where hackers compete against each other individually or in teams to hack one another, while at the same time defending their resources from others.
Carding	When an individual sells personally identifiable information acquired in some fashion via markets operating online, most often involving the use and abuse of credit and debit card details.
Carding markets	Markets that enable individuals to efficiently engage in credit card fraud and identity theft with minimal effort and limited technical knowledge or skill.
Carnegie Mellon Report	A report published by a student at Carnegie Mellon University which suggested that over 80 percent of images on the Internet involved sexually explicit content. The findings were subsequently debunked.
Carrier	The transport medium for digital information.
Catfishing	The creation and development of relationships through social media predicated on false information.
Celerity	Swiftness, in the context of deterrence theory.
Centre for the Protection of National Infrastructure (CPNI)	The Center designed to protect UK critical infrastructure owners from emerging threats and coordinate responses in the event of a physical or cyber-based compromise.

Certainty	Refers to how likely it is that an individual will be caught and punished for an offense within deterrence theory.
Chain of custody	The chronological documentation of evidence as it is processed during an investigation.
Chaos Communication Congress (CCC)	One of the oldest and largest computer hacking and security conferences held in Europe.
Child Exploitation and Online Protection (CEOP) Command	The FBI-operated agency that takes reports of exploitation, abuse, and missing youth and will directly investigate threats and coordinate responses, depending on the scope of harm across multiple areas.
Child Exploitation Task Forces (CETF)	This FBI-operated task force provides a reactive and proactive response to online sexual exploitation cases and sex tourism practices.
Child love	A term used by pedophiles to describe their sexual attraction to youth.
Child pornography	The real or simulated depiction of sexual or sexualized physical abuse of children under 16 years of age, or who appear to be less than 16, that would offend a reasonable adult.
Child Pornography Protection Act of 1996	This US Act extended existing laws regarding child pornography by establishing a new definition for this term, amending the criminal code under Title 18 to define child porn as “any visual depiction, including any photograph, film, video, picture, or computer or computer-generated image or picture of sexually explicit conduct.”
Child Protections Operations (CPO) Teams	The Australian Federal Police team that investigates and coordinates the response to child exploitation cases both domestically and internationally.
Child sexual abuse imagery (CSAI)	A phrase used to describe photos involving the real or virtual sexual abuse of children.

Child sexual abuse material (CSAM)	A phrase used to describe digital or physical media involving the real or virtual sexual abuse of children.
Child sexual exploitation material (CSEM)	A phrase used to describe digital or physical media featuring the real or virtual sexual abuse of children.
Child Victim Identification Program (CVIP)	A US FBI-led program that examines images of child pornography in order to determine the identity and location of child victims.
Cipher	A mathematical formula (algorithm) that uses a set of rules for transforming a message.
Ciphertext	An illegible message.
Civil offense	A noncriminal offense, usually a dispute between private parties.
Closed market	Illicit markets that occur behind closed doors or in controlled environments that are generally hidden from the public and require some degree of knowledge in order to gain access.
Closed-source software	Software where the source code is not made available to the general public; only the object code, which restricts the ability of users to modify and share the software due to copyright infringement, is publicly shared.
Cloud storage	A virtual warehouse where people can store data on a network.
Cluster	Two or more consecutive sectors on a hard drive.
Code-Red Worm	A form of malware activated online on July 13, 2001 that infected any web server using Microsoft's IIS web server software.
Collection/acquisition phase	Phase of the digital evidence collection process concerned with the retrieval and preservation of digital evidence.

Collision	When hashing a hard drive does not result in a unique digital fingerprint for an item, but instead the same hash value is produced.
Commodity	The way that the clients of sex workers describe prostitutes in online forums.
Communications and Multimedia Act 1998	Malaysian act that allows law enforcement to conduct a search to compel a suspect to provide all encryption keys or passwords in order to search computerized data.
Communications Security Establishment (CSE)	The Canadian military entity engaged in proactive network attack and defense.
Compelled	Being forced to give information in the context of a police investigation or criminal court proceeding.
Computer-mediated communication (CMC)	Communications technologies that utilize the Internet to connect individuals, such as email, Instant Messaging Systems, and Facebook.
Computer as a target	When the computer or network is the aim of the attack.
Computer as a tool	When the computer itself is used as an instrument to commit a crime.
Computer as incidental	When the computer is either involved in the commission of a crime but has a smaller role, or the computer is being used merely as a storage device.
Computer contaminants	A term for a virus or malware designed to damage, destroy, or transmit information within a system without the permission of the owner.
Computer crime	Crime in which the perpetrator uses special knowledge about computer technology to commit the offense.
Computer Crime and Intellectual Property Section (CCIPS)	The sub-section of the US Department of Justice that prosecutes computer hacking cases at the federal level.

Computer Emergency Response Team (CERT)	An agency that serves as a coordinating point for responses to major network emergencies.
Computer Forensic Tool Testing project (CFTT)	Provides unbiased, open, and objective means for manufacturers, law enforcement, and the legal community to assess the validity of tools used in computer forensics.
Computer forensics	The investigation and analysis of media originating from digital sources in an effort to uncover evidence to present in a court of law.
Computer Fraud and Abuse Act (CFAA)	The first US federal law which made it illegal to engage in various forms of computer hacking and fraud.
Computer Network Attack (CNA)	The offensive use of hacking techniques to affect a target in the context of cyberwarfare.
Computer Network Defense (CND)	The use of proactive defense techniques to secure a target in the context of cyberwarfare.
Computer Network Exploitation (CNE)	The offensive use of hacking techniques and data collection methods to assess and affect a target in the context of cyberwarfare.
Computer Security Incident Response Teams (CSIRT) Con	A different name for Computer Emergency Response Team. A computer hacking or computer security conference.
Concept virus	A form of malware that demonstrated the potential use of macro programming languages as a method of compromise.
Conclusion	An overall summary of the findings derived from the examination.
Condemnation of the condemners	One of the five basic techniques Sykes and Matza developed that allows individuals to break from conformity, operating on the basis that those who would condemn their actions are hypocritical and doing so out of personal spite.

Confirmation bias	The tendency to accept information that confirms our beliefs while rejecting information that contradicts them.
Connected and Autonomous Vehicles (CAV)	Cars, trucks, and other vehicles that can be connected to the Internet in some fashion and may or may not be capable of self-driving or other routinized activities via software and hardware.
Contact tracing	Establishing a chain of connections between human actors in order to establish who may have been in proximity to an infected or contagious person so that they may be notified of their risk and tested to determine potential illnesses.
Copyright	A legal form of protection for intellectual property that provides exclusive use of an idea or design to a specific person or company, the right to control how it may be used, and legal entitlement to payment for its use for a limited period of time.
Copyright Act of 1976	The US federal law that removed the power to prosecute copyright infringement cases from state courts in 1976.
Copyright laws	Laws designed to protect the creators of intellectual property.
Corpus delicti	Refers to the principle that a crime must be proven to have been committed.
Counter-Proliferation Investigations (CPI) Unit	A unit within the US Immigration and Customs Enforcement (ICE) Homeland Security Investigations (HSI) agency focused on preventing and investigating any efforts by criminal and terrorist networks to obtain export controlled technology and military equipment.
Crack	A term that emerged within the hacker subculture to recognize and separate malicious hacks from those supported by the hacker ethic.

Cracker	A negative term referring to those who engage in deviant or criminal applications of hacking.
Criminal Justice and Administration Act 2008	This UK law criminalized the possession of extreme pornography.
Criminal offense	The violation of a law in which a crime is committed against the state, society as a whole, or a member of society.
Critical Infrastructure Center	A US Department of Homeland Security-based organization designed to coordinate the protection of various forms of critical infrastructure.
CryptoLocker	A form of malware that spreads via attachments in emails or as downloadable malware online that encrypts data on any hard drives attached to the infected system using a very strong encryption protocol and holds the user's system hostage until payment is received.
Cryptomarket	An illicit market operation on the so-called Dark Web that can take various forms.
Cult of the Dead Cow (cDc)	A well-known hacker group in the 1990s that developed the BO2K malware.
Cyber Civil Rights Initiative (CCRI)	A nonprofit organization operating to assist victims of cybercrimes both in the United States and internationally.
Cyber Security Agency (CSA)	A Singapore-based government agency proactively engaged in the attack and defense of government agencies online.
Cyber trespass	The act of crossing boundaries of ownership in online environments.
Cybercrime	Crime in which the perpetrator uses special knowledge of cyberspace.
Cybercrime Act 2001	Inserted a new section into the Crimes Act 1914 giving law enforcement the ability to compel a person to provide all encryption keys or passwords when investigating a computer-related crime.

## Glossary

Cyber-deception and theft	All the ways that individuals may illegally acquire information or resources online.
Cyberdeviance	Any activity facilitated by technology that may not be illegal but is not socially accepted by the majority of groups in a local area.
Cyber Fraud Task Forces (CFTFs)	A public private partnership operated by the US Secret Service as a means to detect, investigate and prevent cybercrime.
Cyber-porn	The range of sexually expressive content online.
Cybersecurity and Infrastructure Security Agency	An agency within the US Department of Homeland Security (DHS) agency focused on managing and securing both cyber and physical critical infrastructure.
Cybersmile	A charitable organization, founded in 2010, to educate the public on the harm caused by cyberbullying through service programs in schools and neighborhoods.
Cyberstalking	Online communication that may lead a victim to feel fear for their personal safety and/or experience emotional distress.
Cyberterror	The premeditated, methodological, and ideologically motivated dissemination of information, facilitation of communication, or attack against physical targets, digital information, computer systems, and/or computer programs which is intended to cause social, financial, physical, or psychological harm to noncombatant targets and audiences for the purpose of affecting ideological, political, or social change; or any utilization of digital communication or information which facilitates such actions directly or indirectly.

Cyberterrorism	The use of digital technology or computer-mediated communications to cause harm and force social change based on ideological or political beliefs.
CyberTipline	An electronic resource operated by the US National Center for Missing and Exploited Children that provides a way for individuals to report suspected incidents of child abuse, child pornography, and sexual exploitation online.
Cyber-violence	The ability to send or access injurious, hurtful, or dangerous materials online.
Cyberwar	Term used to describe the use of cyberattacks in support of conflict between nation-states.
Darkode	A high-profile hacker site engaged in the development and sale of various pieces of malware and stolen data files.
Dark Web	Websites and online content hosted on encrypted networks that can only be accessed through the use of specialized software clients and tools, such as TOR or Freenet.
Data breaches	The illegal acquisition of mass quantities of information through hacking techniques.
Data recovery	Process of salvaging digital information.
<i>Daubert</i> hearing	A hearing in US courts to determine whether a piece of scientific evidence, a theory, or study is reliable and therefore admissible in court.
<i>Daubert</i> standard	The four criteria for determining whether the relevant scientific evidence, theory, or study is reliable, and therefore admissible in US courts, based on testing, publication, error rates, and acceptance of the theory or technique.
<i>Daubert</i> trilogy	The three cases that helped to establish the current interpretation of the <i>Daubert</i> standard. These cases are <i>Daubert v. Merrell Dow Pharmaceuticals</i> (1993), <i>General Electric Co. v. Joiner</i> (1997), and <i>Kumho Tire Co. v. Carmichael</i> (1999).

<i>Daubert v. Merrell Dow Pharmaceuticals</i> (1993)	US court case which held that any scientific expert testimony presented in federal court must undergo a reliability test.
Dead-box forensics	The examination of powered-down computer components.
DefCon	An annual computer security and hacking conference held each year in Las Vegas, Nevada.
Defend Trade Secrets Act (DTSA)	A US law enacted in 2016 to allow those who own trade secrets to sue any party in federal court when that secret has been misappropriated.
Definitions	One of the four principal components of Akers's social learning theory, suggesting that the way an individual views a behavior will affect their willingness to engage in that activity.
Deleted files	A file whose entry has been removed from the computer's file system so that this space is now marked as usable again.
Denial of a victim	One of the five basic techniques Sykes and Matza developed that allows individuals to break from conformity, operating on the basis that there is no discernible victim (e.g., large corporation) or the "victim" deserved it.
Denial of an injury	One of the five basic techniques Sykes and Matza developed that allows individuals to break from conformity, operating on the basis that no one or thing will get hurt or damaged.
Denial of responsibility	One of the five basic techniques Sykes and Matza developed that allows individuals to break from conformity, operating on the basis that some other person, event, or situation will be directly responsible for the offense and should be blamed.

Denial of service	A form of cyberattack where a service or resource supported by the Internet is overloaded with requests, keeping legitimate users from access.
Denigration	A form of cyberbullying involving making comments about individuals' characters or behaviors that are designed to harm their reputation, friendships, or social positions.
De-NISTing	The process of filtering the dataset and removing non-user-created files.
Department of Defense Cyber Crime Center	A specialized agency run by the Air Force to perform forensic analyses and training for attacks against DoD computers and defense contractors.
Department of Homeland Security	The US federal department that houses multiple law enforcement entities and coordinates responses to cyberthreats and attacks.
DHS Cybersecurity and Infrastructure Security Agency (CISA)	The US Department of Homeland Security-specific agency tasked with a whole of government approach to cybersecurity and infrastructure protection.
Deterrence theory	This perspective argues that humans will be deterred from choosing to commit crime if they believe that punishments will be certain, swift, and proportionately severe.
Deviance	A behavior that may not be illegal, though it is outside of the formal and informal norms or beliefs of the prevailing culture.
Differential association	One of the four principal components of Akers's social learning theory, arguing that who we associate with influences our willingness to engage in crime and our exposure to definitions supporting offending.
Differential reinforcement	One of the four principal components of Akers's social learning theory, arguing that the punishments or positive reinforcement we receive after engaging in crime will influence our willingness to perform that act again.

## Glossary

Digital age	The era of digital technologies.
Digital evidence	Information that is either transferred or stored in a binary form.
Digital forensics	The analysis of digital evidence, which includes network, computer, mobile device, and malware forensics.
Digital immigrant	Those born before the creation of the Internet and digital technologies.
Digital Millennium Copyright Act (DMCA)	US law designed to directly affect media piracy online through further revisions to the Copyright Act by extending protection to various music and performances that have been recorded in some fashion.
Digital native	Youths who were brought into a world that was already digital, spend large amounts of time in digital environments, and utilize technological resources in their day-to-day lives.
Digital piracy	A form of cybercrime encompassing the illegal copying of digital media such as computer software, digital sound recordings, and digital video recordings without the explicit permission of the copyright holder.
Disinformation	The creation and spread of false information, particularly in online environments, to affect the social, political, or economic functions of a nation.
Distributed denial of service (DDoS) attack	When individuals send multiple requests to servers that house online content to the point where these servers become overloaded and are unable to be used by others.
Distributor	An individual who actively shares CSAM/CSEM online.
Double jeopardy clause	US legal clause that states that an individual is protected from being prosecuted or punished twice for the same crime.

Dread Pirate Roberts	The handle for Ross William Ulbricht. Ulbricht was the site administrator for the Silk Road.
Drift	Term used by David Matza to refer to the transition between criminality and conformity without accepting a deviant or criminal identity.
Drive slack	When the operating system does not overwrite old information that was once available on the storage device between the start of the next sector and the end of the cluster.
Due process clause	US legal clause that states that the government cannot deprive someone of “life, liberty, or property” without due process, meaning the government must follow rules and procedures for conducting legal procedures to limit arbitrary decisions.
e-jihad	Term used to describe the use of the Internet as a venue for indoctrination and cyberattack by Islamic extremist groups.
Electronic Communications Privacy Act (ECPA)	The US law that enabled law enforcement to obtain the name and address of ISP subscribers, along with personal details and sensitive data.
Electronic Pearl Harbor	Term used to refer to an unexpected and catastrophic cyberattack against the United States.
Elk Cloner	An early form of malware, designed to infect Apple II computers via a floppy disk that did not cause any actual harm but was difficult to remove.
EnCase®	A forensics tool created by Guidance Software in 1997. This automated tool can image a drive, without altering its contents, and then verify that the image is an exact copy of the original drive.

Encrypted chat applications	A type of text-based messaging application for use on mobile devices that are encrypted so as to conceal the communications from others.
Encrypted email	A form of email that utilizes end-to-end encryption to conceal the contents from others.
Encryption	The process of transforming text, such as an email, through the use of mathematical algorithms so that it is no longer legible to others.
Endangered Child Alert Program (ECAP)	A US FBI-led program that seeks to identify the adults featured in some child exploitation content so they may be brought to justice.
Enterprise Phase	The period of digital forensic technologies in the early 2000s marked by familiarity with digital evidence handling and the creation of tools specifically designed for digital forensic analysis.
Escort	A type of sex worker who operates behind closed doors and typically makes appointments with clients rather than soliciting publicly.
European Union Directive 2001/29/EC	Also known as the Copyright Directive, this European Union statute establishes guidelines concerning the adequate legal protection of copyrighted materials through technological means.
European Union Directive 91/250/EEC/2009/24/EC	A European Union statute that provides legal protection for computer programs and harmonized copyright protection across the EU.
Evidence integrity	The reliability and truthfulness of the evidence.
Examination/analysis stage	The stage of digital forensic investigation involving data recovery/extraction and analysis of digital data.

Exit scam	A scheme whereby cryptomarket operators amass a large amount of money from customers that is being held in escrow to complete transactions and then take all those funds and close the market without warning. This leaves all participants with no way of gaining back their funds.
Exclusion	A form of cyberbullying involving intentionally keeping others from joining an online group, such as a network on Facebook or some other site online.
Exigent circumstance	Refers to emergency situations that allow law enforcement officers to conduct a warrantless search when they believe people are in danger or potential evidence will be destroyed.
Export Enforcement Coordination Center (E2C2)	A US-based operational enforcement agency that is housed within ICE as a means to regulate the flow of goods and investigate criminal activities.
Exploit	A program that can take advantage of vulnerabilities to give the attacker deeper access to a system or network.
Exploit packs	A form of malware that can infect web browsers and thereby enable remote takeovers of computer systems.
External Attackers	Individuals who do not have legitimate or legal access to a network who attempt to gain access through the use of various hacking techniques.
External hard drives	Portable storage devices located outside of the computer and are usually connected via a USB port.
Extraction	See <i>data recovery</i> .
Extreme pornography	UK-centric definition for materials produced for the purpose of sexual arousal which depicts acts that “threaten a person’s life; acts which result in or are likely to result in serious injury to a person’s anus, breasts or genitals; bestiality; or necrophilia.”

Fair and Accurate Credit Transactions Act of 2003	The US law that provides multiple protections to help reduce the risk of identity theft and assist victims in repairing their credit in the event of identity theft.
Federal Bureau of Investigation (FBI)	A prominent US federal law enforcement agency that can be involved in the investigation of most forms of cybercrime, particularly hacking, financial crimes, and cyberterrorism.
Federal Bureau of Investigation's Violent Crimes Against Children (VCAC)	This US-based law enforcement agency investigates a range of sexual offenses and criminal activities that affect youth, ranging from child pornography to sex trafficking to kidnapping.
Federal Rules of Evidence (FRE)	Governs the admissibility of evidence in federal court proceedings in the United States.
Federal Trade Commission (FTC)	An independent watchdog agency within the US federal government responsible for consumer protection and monitoring the business community.
Federation Against Copyright Theft (FACT)	The primary trade organization in the United Kingdom dedicated to the protection and management of intellectual property, notably that of film and television producers.
Fifth Amendment	The Fifth Amendment to the US Constitution that protects an individual from self-incrimination, double jeopardy, and deprivation of liberty without due process.
File	A piece of computer-based data.
File Allocation Table (FAT)	The type of file system used in older versions of the Windows operating systems.
File carving	The process of searching for a certain file signature in a hard drive and attempting to extract the associated data without regard for the file system.
File extension	The part of the file's name that tells the operating system what program to use to open it.

File sharing	The process of electronically exchanging intellectual property over the Internet without the permission of the original copyright holder.
File signature	An identifying value for the content of a computer file.
File slack	The leftover space between the end of the file and the end of the last storage unit for that file.
File system	The way in which data is organized and retrieved on a computer hard drive.
Financial Coalition Against Child Pornography (FCACP)	A coalition that comprises 39 financial institutions and Internet service providers who are jointly operating to take complaints of child pornography and disrupt the businesses that are engaged in the sale of or profit generation from this content.
<i>Fisher v. United States</i> (1976)	US court case which demonstrated that statements given voluntarily to police and criminal justice system actors are not protected by the Fifth Amendment.
Five Eyes	A colloquial term used to reference the working relationships between the Australia, Canada, New Zealand, the UK, and US governments, particularly as relates to intelligence collection and analysis.
Flaming	A form of cyberbullying involving engaging in online fighting where users directly target one another with angry or irritated messages, often featuring vulgar language.
FloodNet	The DDoS tool that was developed by the Electronic Disturbance Theater. The program could be downloaded directly from their website to be utilized by individuals who shared their perspectives on the use of the Internet as a space for social activism.

Florida Computer Crimes Act of 1978	The US state law that was the first codified state statute regarding computer crime, involving offenses against intellectual property, offenses against computer equipment or supplies, and offenses against computer users.
Food and Drug Administration (FDA) Office of Criminal Investigations (OCI) Footer	The criminal investigation arm of the US-based Food and Drug Administration to combat a range of offenses.
Forensic confirmation bias	The last few bytes that mark the end of a file.
Forensic science	Term referencing the class of effects through which an individual's preexisting beliefs, expectations, motives, and situational context influence the collection, perception, and interpretation of evidence during the course of a criminal case.
Forensic soundness	The application of science to the law, meaning the scientific process of gathering and examining information to be used by the criminal justice system.
Forensic Toolkit® (FTK)	The validity of the method for collecting and preserving evidence.
Forum for Incident Response and Security Teams (FIRST)	Commercial software commonly used in digital forensic investigations that was created by AccessData. It is capable of imaging a hard drive, scanning slack space, and identifying steganography; however, it is also capable of cracking passwords and decrypting files.
Fourth Amendment	A global organization that serves to coordinate information sharing and connections between all teams worldwide.
Fragmented	Limits the US government's ability to search and seize evidence without a warrant.
	A file that is stored in nonconsecutive sectors on a computer hard drive.

Fraud	Wrongful or criminal deception intended to result in financial or personal gain.
FRE Rule 401	Defines relevance as the tendency to make the fact being presented in a case more or less probable. It also defines authenticity as the ability to prove that the evidence is genuine.
FRE Rule 702	States that if scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education may testify thereto in the form of an opinion or otherwise.
FRE Rule 801	States that hearsay is considered second-hand evidence, meaning it is testimony not based on first-hand or personal knowledge.
FRE Rule 901	States “the proponent must produce evidence sufficient to support a finding that the item is what the proponent claims it is.”
Free space	The portion of the hard drive that has yet to be assigned to a partition.
French postcards	Images of nudes printed on postcard stock and sent through the mail to others.
<i>Frye</i> standard	States that scientific evidence is only admissible if it is generally accepted as reliable by the scientific community.
<i>Frye v. United States</i> (1923)	US court case that led to the development of the <i>Frye</i> standard for the presentation of scientific evidence.
Fusion Center	A joint operational policing resource found in the United States, often at the state level, that acts as a coordination point for criminal and terrorism-related threats.
Gatekeeper	A term used to refer to a judge in the context of assessing both the relevance and reliability of scientific evidence.

<i>General Electric Co. v. Joiner</i> (1997)	A US court case that demonstrated that not only was scientific evidence under review but so was the methodology and reliability of an expert's reasoning process.
General strain theory	An individual-level theory developed by Robert Agnew that discusses the role of frustrations leading to negative emotions which, if not addressed appropriately, can lead individuals to engage in crime as a response.
General theory of crime	Gottfredson and Hirshi's theory that argues that crime stems from low self-control and opportunities to offend.
Geneva Convention	A series of treaties and protocols that establish legal standards for conduct in warfare.
Girlfriend experience (GFE)	A term used by the customers of prostitutes to refer to a sexual experience meant to feel like a consensual relationship with no money involved.
Golden Age	See <i>Enterprise phase</i> .
Google Glass	A form of wearable technology created by the company Google. These thin glasses come with a wearable computer featuring a heads-up display that is voice activated and controlled. Users can do a variety of things while wearing Glass, including taking photos and videos, searching the Internet, checking email, and several other activities that are evolving through the creation of new applications.
Grand jury	A group of people who determine whether or not there is enough evidence to formally charge the individual with a crime.
Gray-hat hacker	A group of hackers that falls between black- and white-hat hackers who have shifting or changing ethics depending on the specific situation.
Grooming	The misuse of the Internet by using it to engage in inappropriate communication with children.

Hack	The modification or alteration of computer hardware or software to enable technology to be used in a new way, whether for legitimate or illegitimate purposes.
Hack_Right	A strategy of minimizing involvement in criminal hacking among juveniles by detecting their behaviors early and diverting them toward white-hat activities, first implemented in the United Kingdom and the Netherlands.
Hacker	An individual who modifies or alters computer hardware or software to enable technology to be used in a new way.
Hacker space	A physical location where individuals can converge to discuss technology and learn from one another.
Hacktivism	Using hacking techniques to promote an activist agenda or express their opinion.
Handheld devices	A source of potential electronic information that includes mobile phones, digital multimedia devices (e.g., iPod), digital cameras, and global positioning systems (GPS).
Handle	The nicknames used by individuals in on and offline environments.
Hands-on contact offenders	Individuals who have engaged in physical contact sexual offenses.
Harassment	The repeated distribution of cruel or mean messages to a person in order to embarrass or annoy them.
Hard drives	Data storage devices used for storing and retrieving data.
Hardware	The tangible or physical parts of a computer system.
Hash	A fixed value (output) – see also <i>hashing</i> .
Hash algorithm	A set of calculations that takes an arbitrary amount of data (input) and creates a fixed value (output) that acts as a unique reference number for the original data.

Hashing	The process of creating a hash value from a variable amount of data.
Header	The first few bytes that mark the beginning of a file.
Hearsay	Term used to refer to second-hand evidence, or information obtained on a first-hand or personal knowledge basis.
Hidden files	Files that have been manipulated in such a way that the contents of the original file are concealed.
Hitman	An individual who engages in acts of violence on a fee-for-service basis.
Hypothesis	A reasonable explanation as to what might have occurred or why.
I/O error	Input/output errors that are often the result of a bad sector on a hard drive.
Identification document	A document made or issued by or under the authority of a government with information concerning a particular individual intended to serve as a form of identification.
Identity fraud	Within the United Kingdom, this term refers to the illegal misuse of a document made or issued by or under the authority of the government.
Identity theft	Within the United States, this term refers to the unlawful use or possession of a means of identification of another person with the intent to commit, aid, or abet illegal activity.
Identity Theft and Assumption Deterrence Act of 1998	This US law made it a federal crime to possess, transfer, or use a means of identification of another person without authorization with the intent to commit or aid in the commission of illegal activity at the local, state, or federal level.
Identity Theft Enforcement and Restitution Act of 2008	This US federal act allows offenders to be ordered to pay restitution as a penalty to victims of identity theft and enhanced existing laws regarding cybercrime.

Identity Theft Penalty Enhancement Act of 2003	This US act added two years to any prison sentence for individuals convicted of a felony who knowingly possessed, used, or transferred identity documents of another person.
Imaging	The process of making an exact copy (bit by bit) of the original drive onto a new digital storage device.
Imitation	One of the four principal components of Akers' social learning theory, suggesting that an individual's first act of deviance or criminality is an attempt to model the behavior of their peers and intimate others.
Immigration and Customs Enforcement (ICE)	The US federal agency that manages the processing and prosecution of illegal immigrants and the movement of materials through the borders of the nation.
Impersonation	A form of cyberbullying involving falsely posting as other people to harm their reputation or social status by logging into their existing accounts to post messages or by creating fake accounts to masquerade as that person.
<i>In re Boucher</i> (2007)	US court case which led to Fifth Amendment challenges to encryption protocols.
Incidental	When the computer is either involved in the commission of a crime in a smaller accompanying role or is being used merely as a storage device.
Incriminating	Information that implicates an individual in a criminal incident or wrongdoing.
Indian Music Industry (IMI)	A trust representing the recording industry distributors of the country of India, similar to the RIAA in the US.
Information Age	Period of time marked by the increased production, transmission, consumption of, and reliance on information.

InfraGard	A nonprofit public-private partnership designed to facilitate information sharing between academics, industry, and law enforcement.
Inspire	An jihadist-oriented online publication released by the terrorist organization AQAP to influence the behavior of individuals across the globe.
Integrated National Security Enforcement Teams (INSET)	Canadian counter-terrorism security forces housed under Public Safety Canada.
Intellectual property	Any work or artistic endeavor created by an individual which has been fixed in some form, such as being written down.
Internal Attackers	Individuals with legitimate access to a network or computer resources, often as employees, who attempt to gain access to resources they cannot use through the use of various hacking methods.
Internal hard drives	Hard drives that are installed inside a computer or device.
International Center for Missing and Exploited Children (ICMEC)	A nonprofit agency with a similar mission to the NCMEC, though it is focused on building partnerships in a global context to better investigate child exploitation cases and build the legal capacity of nations so that there is consistency in laws to prosecute these offenses.
International Criminal Tribunal	The formation of a truly international court that could represent the victim nations and offenders could be a valuable tool to pursue cases where multiple nations were affected by a group of actors.
Internet Crime Complaint Center (IC3)	A collaborative effort of the National White Collar Crime Center (NW3C) and the FBI operating for crime victims, consumers, and researchers to understand the scope of various forms of online fraud. Victims can contact the agency through an online reporting mechanism that accepts complaints for a range of offenses.

Internet Crimes Against Children (ICAC)	US-based local task forces that provide a mechanism for coordination between local, state, and federal law enforcement, as well as prosecutors, to combat child sex offenses.
Internet Relay Chat (IRC)	A protocol created in 1988 that allows for real-time text messaging, mostly for group discussions in chat rooms, between internet-connected computers.
Internet of Things	All non-computing devices connected together via the Internet, including thermostats, refrigerators, and other appliances.
Involuntarily Celibate (Incel)	An individual who does not have sexual or emotional relationships with others, though not by their choice. These individuals communicate in online forums and are increasingly willing to engage in violence against the opposite sex out of anger or frustration.
Irhabi007	The screen name of Younes Tsouli, a UK-based hacker who engaged in a series of hacks in support of jihadist ideologies online and offline.
Islamic State of Iraq and Syria (ISIS)	A terrorist organization formed in the wake of the war in Iraq, which has engaged in serious acts of mass-violence around the world.
Johns	A term used to refer to the customers of prostitutes.
Joint Terrorism Task Force (JTTF)	US-based multiagency partnerships between local, state, and federal agencies to investigate and respond to terrorist threats and terror-related crimes.
Jus ad bellum	A set of guidelines that help to determine the permissibility, or just nature of a decision to engage in war.
Jus in bello	A set of guidelines for the conduct of participants in an armed conflict.
Just compensation clause	States that any property taken by the government must be for public use and the owner must be fully reimbursed its market value.

<i>Katz v. United States</i> (1967)	Key US court case that defined an individual's right to privacy in public spaces.
Key disclosure law	Legislation that mandates a person to provide encryption keys or passwords to law enforcement for digital forensic investigations.
Keyword search	The process of using a word or series of words to conduct a search in the entire physical drive of a computer regardless of the file systems.
<i>Kumho Tire Co. v. Carmichael</i> (1999)	US court case that helped inform the <i>Daubert</i> standard of evidence.
Lamer	A term used by hackers to refer to individuals with limited capacity and/or skills.
Latent	Another term for hidden.
Law Reform Commission	Irish body of law that helped inform standards of evidence.
Legacy systems	Outdated computer systems, devices, or software.
Liable	Civil and criminal responsibility for a behavior or specific activity.
Liberty Reserve	An electronic payment processor that is being prosecuted in the United States for its role in money laundering for various forms of crime.
Logical extraction	The process of identifying and recovering data based on the file systems present on the computer hard drive.
Lori Drew	A woman alleged to have created a fictitious MySpace profile in order to harass a 13-year-old girl named Megan Meier, who eventually committed suicide as a result of contact with Drew's profile.
Low Orbit Ion Cannon (LOIC)	The DDoS tool that is used by the group Anonymous to support attacks against personal, industrial, and government targets around the world.
Macro virus	A popular way to infect systems by using a common weakness in a variety of popular programs like Excel, Word, and PDFs.

Macro programming language	A programming language common to Microsoft Office products that was used by virus writers to compromise user systems.
Magic numbers	See <i>file signatures</i> .
Malicious Communications Act 1998	Enables individuals to be prosecuted for sending messages to another person for the purpose of causing fear or anxiety. Revised in 2001 to include electronic communications of any kind that convey a threat, indecent or offensive content, or information that is false.
Massage parlor	A business that operates as a supposedly legitimate massage clinic but actually provides sexual services to clients.
Master file table (MFT)	Contains information about all of the files, folders, and directories on a drive.
Megan Meier	A young woman who committed suicide after receiving bullying messages from a fake MySpace profile, alleged to have been created by Lori Drew, the mother of one of Megan's friends.
Megan Meier Cyberbullying Prevention Act	Proposed US federal legislation would have made it illegal for anyone to use CMC "to coerce, intimidate, harass or cause substantial emotional distress to a person," or use electronic resources to "support severe, repeated, and hostile behavior." This resolution was not successfully passed into law.
Melissa virus	A well-known virus that spread throughout the globe in the 1990s.
Message Digest Version 5 (MD5)	A type of hashing algorithm that takes a large amount of data of arbitrary length (input) and calculates a unique "fingerprint" of this data expressed as a unique combination of hexadecimal digits of a specified length (output).
Metropolitan Police Central e-crime Unit (PCeU)	The London, England police agency that responds to serious forms of cybercrime affecting citizens.

Microsoft Digital Crimes Unit	A working group created by the Microsoft Corporation to combat cybercrime in conjunction with law enforcement.
Mileage	Term used by the customers of prostitutes in web forums to refer to the appearance of sex workers and their deterioration in appearance over time in the sex trade.
<i>Miller v. California</i>	US court case that established the definition of obscene content that is still in use today.
Morris worm	The first worm created by Robert Morris that caused substantial harm to the Internet in the 1980s.
Motion Picture Association of America (MPAA)	The US association that operates to protect the intellectual property of their artists and creative producers.
Motivated offender	Variable within routine activity theory that constitutes any individual or group who has both the inclination and ability to commit crime.
MP3 format	A software standard designed to compress audio files.
MuTation Engine (MtE)	A polymorphic generator that not only encrypts a virus but randomizes the routine used so that it varies with each replication.
Napster	A popular file sharing program developed in 1999 that allowed a larger population of Internet users to engage in piracy.
Nation-state actor	Hackers who engage in attacks at the behest of or in cooperation with a government or military entity.
National Centre for Cyberstalking Research	A UK-based research center designed to address the problem of cyberstalking.
National Center for Missing and Exploited Children (NCMEC)	One of the key nonprofit organizations in the United States that deals with missing children and child exploitation. It performs multiple roles to facilitate the investigation of crimes against children.

National Counter Terrorism Policing Network (NCTPN)	The UK-based collaborative network designed to link police forces involved in the prevention, deterrence, and investigation of terrorism.
National Crime Agency (NCA)	UK national criminal justice agency that has both national and international reach and works in partnership with law enforcement organizations to particularly focus on serious and organized crime.
National Crime Victimization Survey-Supplemental Survey (NCVS-SS)	A US-based survey with a nationally representative sample of respondents that demonstrates the prevalence and incidence of cyberstalking.
National Domestic Extremism and Disorder Intelligence Unit	The UK-based national police unit tasked with investigating and combatting homegrown acts of terror and extremism within England and Wales.
National Fraud Authority (NFA)	UK agency was formed in 2008 in order to increase cooperation between the public and private sectors to investigate fraud.
National Fraud Intelligence Bureau (NFIB)	The NFIB collects information on various forms of fraud and aggregates this data along with reports from business and industry sources into a large database called the NFIB Know Fraud system. It is operated by the City of London police.
National Incident-Based Reporting System (NIBRS)	The US-based incident reporting system used by law enforcement agencies to collect and report data on crime.
National Intellectual Property Rights Coordination Center (NIPRCC)	The US-based center housed within the Department of Homeland Security that is responsible for enforcing intellectual property laws.
National Police Forces	Law enforcement agencies that respond to and investigate incidents that cut across state or other internal territorial boundaries.
National Policy Institute (NPI)	A US-based white supremacist think tank and lobbying group focused on alt-right and other extremist group interests.

National Security Agency (NSA)	The US agency which supports offensive and defensive operations in support of US military and civilian networks.
National Security Investigations Division	A unit within the US Immigration and Customs Enforcement (ICE) Homeland Security Investigations (HSI) agency focused on the investigation of criminal enterprises, organizations, and foreign intelligence actors within the US.
National Software Reference Library (NSRL)	The US NIST-supported reference library that maintains details on various software programs.
Nation-state	A nation-state is any sovereign nation with a defined territory and a governmental organizational structure.
Necrophilia	Experiencing sexual arousal from sex with the dead.
Neighborhood Children's Internet Protection Act (NCIPA)	This US law requires Internet filtering technology in public libraries to block young people from accessing harmful content, including pornographic and obscene materials.
Nested search	A search within a search.
Network Investigative Technique (NIT)	The use of hacking and/or malicious software by law enforcement agencies, particularly the FBI in the United States, which may or may not be legal.
Network Forensics	The use of digital forensic capture and analysis methods against a live network of computer systems.
New Technology File System (NTFS)	The current file system for Windows NT operating systems.
No Electronic Theft (NET) Act of 1997	A US federal law designed to increase the penalties for the duplication of copyrighted materials.
Non-nation-state-sponsored actor	An individual who acts without any sort of state or military backing.
Noob/Newbie	An individual new to hacking and with minimal knowledge of technology.

North Atlantic Treaty Organization (NATO)	An intergovernmental military alliance linking European and North American nations to secure their interests and improve the state of collective security across all groups.
NotPetya	A form of malicious software, thought to have been created by the Russian government, that appears to operate like ransomware but actually causes substantive harm to any infected computer system.
Object code	Code that restricts the ability of users to modify and share the software due to copyright infringement.
Obscene Publications Act (OPA) 1959	Law applicable in England and Wales that indicates any article may be obscene if its effect on the audience member who reads, views, or hears it is to “deprave and corrupt.”
Obscene Publications Act 1857	This UK act made it illegal to sell, possess, or publish obscene material, which was not clearly defined in the law.
Obscenity	Term used to refer to content that may be indecent, lewd, or vulgar, which varies based on the legal standards of a given nation.
Observation One Ummah	The first stage of the scientific method. An international nonprofit charity to provide assistance to individuals in need.
Online harassment	The repeated distribution of cruel or mean online messages to a person in order to embarrass or annoy them.
Open-field searches	A form of legal search that can be conducted by law enforcement without a warrant in any open field or large area that cannot be considered persons, houses, papers, or effects.
Open Markets	A type of illicit market with no barriers to entry for any participant, whether as buyer or seller.

## Glossary

Open-source software	Software programs that can be freely used, modified, and shared with anyone.
Operation Aurora	The name given to a series of cyberattacks against various major corporations to steal sensitive intellectual property information, which appeared to originate in China.
Operation Olympic Games	The name of a classified US military operation to disrupt the Iranian nuclear program.
Operation Predator	This US ICE-led program is designed to facilitate the investigation of child exploitation in the United States and abroad.
Operation Rescue Me	This US FBI-led program has been in operation since 2008 to identify victims of child exploitation based on their appearance in images or video of child pornography.
Operation Spade	Name given to a multinational investigation of a child pornography ring operating out of multiple nations to produce content.
Operation: Bot Roast	An investigation conducted by the US FBI targeting botnet operators.
Original writing rule	States that the original evidence, rather than a duplicate, is generally required unless the duplicate can be authenticated and it can be proven that its contents are the same as the original.
Outing	A form of cyberbullying involving the posting of real personal information about individuals to embarrass them, such as sending images of them in states of undress, posting who they are attracted to, or information about homosexual preferences which may not be known to the general public.
Partition recovery	The process of evaluating the partition table and the unused space on the physical hard drive of a computer.

Partition table	Computer-based reference description for how the operating system has divided the hard drive into partitions.
Partitioning	The process of dividing up a computer hard drive into separate storage spaces.
Partitions	Separate storage spaces in a computer hard drive that determines how much space is allocated to each storage bin, or partition.
Password-protected files	Locked files that require a password to gain access.
Patent	See <i>Copyright</i> .
Payload	The changes that a piece of malware causes to a computer system upon activation.
Pedophile	An individual with a sexual attraction to individuals under the age of 18 years.
Peer-to-peer (P2P) file sharing protocols	Protocols that enable direct file sharing between two computer systems over the Internet.
People's Liberation Army of China (PLA)	The name of the Chinese military.
Peripheral device	Externally connected components that are not considered essential parts of a computer system, such as scanners, printers, and modems.
Personal Identification Number (PIN)	The four-digit number used as a password to secure access to bank accounts at ATMs.
Personally identifiable information (PII)	Information that is unique to an individual that can be used on its own or with other information to identify, locate, or contact a single individual.
Philippine Rules of Electronic Evidence (PREE)	This specifically outlines the admissibility rules for electronic evidence compared to the Philippine Rules of Evidence (PRE), which is a separate standard for non-electronic evidence.
Phishing	Using email messages to try to acquire bank account information or other valuable information from victims.

Phreaking	The act of using hacking techniques to exploit vulnerabilities within telephony.
Physical extraction	The process of salvaging digital information.
Pirate Bay	A well-known group that enables piracy.
Plain view doctrine	Allows law enforcement officers to conduct a search and seizure for evidence that may not be in the search warrant but is in plain view and its incriminating nature is immediately apparent.
Plaintext	A legible message or piece of content.
Police Agencies	An agency empowered by a state with the responsibility to enforce laws within a specific set of geographical boundaries, including the power to arrest individuals and use force when necessary to maintain order.
Police and Justice Act 2006	The UK law that enhanced sentences for computer hacking cases.
Police Intellectual Property Crime Unit (PIPCU)	A unit in the London Police that investigates and handles various forms of piracy.
Pornography	The representation of sexual situations and content for the purposes of sexual arousal and stimulation.
Prediction	A specific statement as to how you will determine if your hypothesis is true.
Pre-forensics	A term used to refer to the 1980s regarding digital forensic technologies, characterized by the lack of formal structure, protocols, training, and adequate tools.
Preponderance of evidence	Means it must be more likely than not that the accused in fact committed whatever acts they are accused of.
Preservation	Making a copy of the original data files for examination in a way that minimizes the possibility of any changes being made to the original data files.

PRISM program	An NSA-implemented program beginning in 2007 to collect email and other electronic communications data of all sorts, carried out through cooperative relationships with various technology companies, including Apple, Facebook, Google, Microsoft, and Skype.
Probable cause	Means there must be adequate reasons or justifications, rather than mere suspicion, to conduct a search.
Process models	Techniques and strategies designed to provide practical guidelines and procedures for conducting a digital forensic investigation.
Project Zero	A security threat hunting team searching for zero-day vulnerabilities, employed by Google.
Proprietary software	See <i>closed source</i> .
Prosecutorial Remedies and Other Tools to end the Exploitation of Children Today Act (or PROTECT Act) of 2003	This US law criminalized virtual child pornography and extended the legal definition to include “a digital image, computer image, or computer-generated image that is, or is indistinguishable from, that of a minor engaged in sexually explicit conduct.”
Prostitution	The practice of paying for sex, which may or may not be illegal depending on place.
Protection from Harassment Act 1997 (c40)	This UK law criminalized stalking and bullying in professional settings. Section 4 of the Act criminalizes the act of putting others in fear of violence, defined as any course of conduct that would cause “another to fear, on at least two occasions, that violence will be used against him,” where the offender “is guilty of an offence if he knows or ought to know that his course of conduct will cause the other so to fear on each of those occasions.”

Protection of Freedoms Act 2012	Revised the Protection from Harassment Act 1997 to include language specifically related to stalking and incorporate aspects of technology into law.
Proxy server	A server that can be used to hide a computer's location by acting as an intermediary between a computer and the servers and systems it connects to through the Internet.
Pump and dump messages	A form of spam-enabled fraud that attempts to manipulate the value of corporate stocks.
Punternet	A UK-based website designed for individuals to post reviews of escorts and sex workers.
QAnon	A global conspiracy theory centered on the belief that Democrats, celebrities, and others in positions of power are actually pedophiles who kill children in ritualistic methods.
RAM slack	When randomly selected data from RAM is stored in the file slack.
Radical Far Right	See <i>alt-right</i> .
Random access memory (RAM)	Type of computer-based memory that stores that part of the data that is currently being used by the computer.
Ransomware	Malware that demands the operator of the infected system pay in order to have their system's functionality restored.
Read-only	Term referencing the ability of a device to only view accessible data on a drive but not alter it in any way.
Reasonable expectation of privacy	The person must have exhibited an actual expectation of privacy, and the expectation must be one that society is prepared to recognize as reasonable.
Reasonableness clause	A search is constitutional if it does not violate a person's reasonable and legitimate expectation of privacy.

Recording Industry Association of America (RIAA)	A trade organization that supports the recording industry and those businesses that create, manufacture, or distribute legally sold and recorded music within the United States.
Redroom	A scam operating on the Dark Web where individuals claim to provide access to horrible acts of violence against others on a fee-for-service basis.
Regulation of Investigatory Powers (RIPA)	This law mandates key disclosure so long as law enforcement obtains signed authorization from a high-ranking official.
Relevant	When evidence can make the facts presented in a case more or less probable; evidence that does not tend to prove or disprove a presented fact in a case is deemed irrelevant, and therefore inadmissible.
Reliability	The accuracy of the evidence deemed relevant to a case.
Repeatability	Where independent test results are obtained with the same method, on identical test items, in the same laboratory, by the same operator, using the same equipment within short intervals of time.
Report/presentation stage	The final step in the process of digital forensic investigation where the findings that are determined relevant to the investigation are finalized in a report.
Reproducibility	Where test results are obtained with the same method on identical test items in different laboratories with different operators using different equipment.
Revenge porn	Websites explicitly for individuals to post sexual images and videos they received or acquired for others to see without the consent of the creator.
Right to privacy	See <i>Fourth Amendment</i> .

Ripper	A seller in carding markets who does not provide data after being paid, is slow to respond to customers, or sells bad data and does not offer to replace their products.
Romance Scam or Romance Fraud	A form of online fraud where the offender gains the emotional and romantic trust of their target, often through misrepresentation and manipulation, so as to obtain money from them over time.
Routine activity theory	Cohen and Felson (1979) argued that direct-contact predatory victimization occurs with the convergence in both space and time of three primary components: (1) a motivated offender; (2) a suitable target; and (3) the absence of a capable guardian.
Rule 34	Online meme that states that “if it exists, there is pornographic content of it.”
Scareware	See <i>Ransomware</i> .
Scientific evidence	Information derived from the scientific method that is relevant to the facts of a case.
Scientific method	A process that uses strict guidelines to ensure careful and systematic collection, organization, and analysis of information.
Script kiddie	A derogatory term meant to shame individuals by recognizing their use of premade scripts or tools, their lack of skill, and the concurrent harm that they may cause.
Search	The exploration or examination of an individual’s home, premises, or person to discover things or items that may be used by the government as evidence in a criminal proceeding.
Search and seizure	When law enforcement officers are identifying and collecting potential evidence to be used in the court of law.

Search incident to arrest	The process of searching a person who has been arrested for a crime.
Search warrant	A document signed by a judge or magistrate authorizing law enforcement to conduct a search.
Secret shopper schemes	A form of spam-enabled fraud where sellers pretend to operate legitimate businesses that are seeking employees who can cash checks and purchase goods with the proceeds.
Section 49 request	In the United Kingdom, a law enforcement mandate which requires encryption key disclosure so long as law enforcement obtains signed authorization from a high-ranking official using a specialized Section 49 form.
Sector	The smallest physical storage unit on a computer disk drive, which is almost always 512 bytes.
Secure hash algorithm (SHA)	A common hashing algorithm created by the US National Security Agency that creates a 160-bit value for an item using a unique combination of hexadecimal digits.
Seizure	The exercise of control by the government over a person or thing because of a violation of the law.
Self-control	The ability to constrain one's own behavior through internal regulation.
Self-incrimination	Giving a statement that might expose oneself to punishment for a crime.
Self-incrimination clause	In the United States, a Fifth Amendment rule that provides defendants with protection from self-incrimination.
Self-radicalization	The process of accepting a radical, extremist, or terrorist ideological belief system through self-directed engagement with written materials, videos, and content, often found online.

Severity	Involves the intensity of the punishment relative to the harm caused by the crime in the context of deterrence theory.
Sexting	The practice of sending photos or videos of individuals in provocative outfits or engaging in sexually suggestive activities through text messaging.
Sexual fetishes	The experience of sexual arousal or enhancement of a romantic encounter based on the integration of physical objects or certain situations.
Shoulder surfing	The act of stealing someone's passwords for email accounts or access to a system by looking over their shoulder and watching their keystrokes.
Silk Road	An online market developed to enable individuals to buy and sell narcotics through various mechanisms internationally. It garnered great attention from both researchers and the popular media due in part to the fact that transactions were paid using bitcoins.
Sky ECC	A subscription-based encrypted messaging application that was heavily used by criminal actors around the world to conceal their communications.
Slack space	See <i>file slack</i> .
Social engineering	The use of tactics that try to fool or convince people to provide information that can be used to access different resources.
Social learning theory	Criminological theory created by Akers which argues that the learning process of any behavior, including crime, includes four principal components: (1) differential association; (2) definitions; (3) differential reinforcement; and (4) imitation.
Software	Consists of programs that include instructions which tell computers what to do.

SolarWinds	A US-based software company that was implicated in one of the most serious hacks of the US government agencies to date.
Sovereignty	The authority of a state to control its territory and populace and defend itself with force as needed.
Space transition theory	This theory created by K. Jaishankar argues that people behave differently while online than they otherwise would in physical space.
Spam	Unsolicited emails sent to large groups.
Spamhaus	An international organization founded in 1998 to track the activities of email spammers and spam campaigns broadly.
Spear phishing	Well-crafted and targeted spam messages that target one person or a small group.
Special Interest Group for Vendors (SIG Vendors)	A subgroup of FIRST that links respondents with software, hardware, and security vendors in order to handle emergent threats and mitigation techniques.
Stalking	The use of repeated and intense harassing messages that involve threats or cause the recipient to feel fear for their personal safety.
Standard of proof	A continuum of probability used to assess suspicions of an individual's guilt based on the evidence presented.
Star Wars Kid	The name given to a video featuring a young boy flailing a stick around a room in a similar fashion to a lightsaber, which was released to the Internet by classmates without his permission and went on to become a key example of cyberbullying behavior.
Steganography	The practice of hiding information in such a way that others are not aware that a hidden message exists.
Steganography medium	The type of digital media containing a steganographic message, typically in video or picture files.

Stop Enabling Sex Traffickers Act (SESTA)	One of a pair of US laws passed in 2018 that make it illegal to knowingly facilitate, assist, or support sex trafficking in online environments.
Stop Online Piracy Act (SOPA)	This legislation was designed to expand the capabilities of law enforcement to combat both digital piracy and online counterfeiting and would have enabled courts to order that websites be blocked in the event that they hosted or were in some way involved with either piracy or counterfeiting activities.
Street prostitution	Prostitutes who solicit individuals on the street.
Streetwalker (SW)	A term used to reference a street-walking prostitute in online forums.
Structured phase	A term given for the mid 1980s to describe the state of digital forensic technology, characterized by the harmonization between computer forensic procedure/policy and computer crime legislation.
Stuxnet	A computer worm that was used in attacks against the Natanz uranium enrichment facility in Iran.
Subculture	Any group having differentiating values, norms, traditions, and rituals that set them apart from the dominant culture.
Subpoena	A court order requiring a person to appear before a grand jury or produce documents.
Suitable target	A variable in routine activity theory referring to a person or object that has traits making him/her attractive to the offender on a wide range of factors.
Supervisory Control and Acquisition System (SCADA)	Computer systems that support the processes within industrial systems such as nuclear power plants, hydroelectric dams, or sewage treatment plants.

Survey/identification stage	The initial step of a digital forensic investigation. During this stage, law enforcement personnel and digital forensic technicians survey the physical and digital crime scene to identify potential sources of digital evidence.
Tallinn Manual	An academic study referencing the ways in which international laws relevant to conflict applies to cyberwarfare broadly.
Technicways	Term referring to the ways that behavior patterns change in response to, or as a consequence of, technological innovations.
Techniques of neutralization	Theory created by Sykes and Matza that focuses on how beliefs affect the process of deciding to commit a delinquent or criminal act. This theory assumes that most people hold conforming beliefs, but may still engage in criminal behavior occasionally through the application of definitions that justify their actions.
Territoriality	The ownership and control of an area or physical space and the contents within it.
Terror	Planned acts of violence designed to promote fear or cause harm in a general population in support of a social agenda.
Testimonial	A statement made to law enforcement.
The Hacker Ethic	A series of values developed by hackers in the 1960s that espouse their beliefs about the use of technology.
The Hacker Manifesto	An article published in the magazine Phrack written by “The Mentor” that details his perceptions of hacking and rationalizing involvement in illegal hacks.
The Protection of Children Act 1978 (PCA)	The first UK legislation that made it illegal to obtain, make, distribute, or possess an indecent image of someone under the age of 18 years.

The Shadow Brokers	A hacker group responsible for the illegal acquisition and release of zero-day vulnerabilities and hacking tools thought to have been stockpiled by the US NSA.
ThinkUKnow	A UK-based program designed to educate children and adults about threats to youth safety.
Thumb drives	See <i>USB flash drives</i> .
Tor	An anonymous and encrypted network used by individuals to hide their physical location.
Torrent	A form of file sharing that enables easy and distributed access to various intellectual property and online content, commonly used to pirate materials.
Trademark	See <i>Copyright</i> .
Traders	The misuse of the Internet by individuals who traffic in child pornography.
Traffic stop	Occurs when the driver of the vehicle is stopped because there is suspicion that a traffic violation has occurred or a crime is being committed.
Trailer	See <i>Footer</i> .
Transparency	Term used to describe the reporting of forensic evidence analysis findings that are detailed in such a way as to leave no mystery in the digital forensics process.
Travelers	The misuse of the internet by individuals who attempt to find children to molest through computer-mediated communications.
Trawler	A software tool used to scrape, or collect, content from websites.
Tricking	A form of cyberbullying that involves convincing individuals to provide personal information about themselves in what they think is a personal conversation, which is then revealed to the general public.

Tricks	A term used by sex workers to describe their clients or customers.
Trojan	A form of malware that appears to be a downloadable file or attachment that people would be inclined to open, that when opened executes some portion of its code and delivers its payload on the system.
Truant	An individual who routinely skips school.
True threat	Term used in US law to identify statements where the speaker means to communicate a serious expression of intent to commit an act of violence against another person or group.
Trusted platform	A seemingly secured software environment that can be used to download and upload materials without fear of compromise.
Truth in Domain Names Act of 2003	A US law that makes it illegal for individuals to create domain names that are misleading or designed to directly expose individuals to pornographic content without their knowledge.
UK Computer Misuse Act	UK law developed in the 1990s that enabled the prosecution of computer hacking cases.
Unallocated space	Space on a hard drive to which data has not yet been written.
Unfair prejudice	A form of prejudice that could bias or confuse fact finders.
Uniform Crime Report (UCR)	The primary US reporting mechanism used by law enforcement agencies to collect and report data on crimes made known to the police.
Uniform Trade Secrets Act (UTSA)	A US act created in 1979 designed to standardize state laws related to the protection of trade secrets.
United States Constitution	Legal document in the United States that was adopted on September 17, 1787 that mandates all state judges to follow federal law in the event that conflicts arise between state and federal law.

United States Cyber Command, CYBERCOM	Created in 2009 by the Pentagon in order to manage the defense of US cyberspace and critical infrastructure against attacks.
United States Department of Justice (US DOJ)	The US federal department that has the responsibility to “enforce the law and defend the interests of the United States according to the law.”
United States Secret Service (USSS)	The US federal law enforcement agency that provides protection for the President and foreign dignitaries and investigates hacking and financial crime cases.
<i>United States v. Alkhabaz</i>	A major US federal court case that established the concept of true threats in the prosecution of stalking cases.
<i>United States v. Fricosu (2012)</i>	US court case that involved a woman’s right to protection from self-incrimination on the basis of encrypted data on a laptop.
<i>United States v. Smith (1998)</i>	US court case that ruled that the warrantless search of a cell phone seized incident to arrest violates the Fourth Amendment.
US Postal Inspection Service	The US federal agency that investigates child pornography and other crimes facilitated through the US mail.
USA PATRIOT Act	A US law, the Provide Appropriate Tools Required to Intercept and Obstruct Terrorism (PATRIOT) Act, was passed in 2001 to support law enforcement investigations of terrorism.
USB flash drives	The most common removable storage device for digital media that are small, lightweight, and can easily be transported and concealed.
Validity	Term used to describe whether forensic evidence was collected and preserved in a manner so that an accurate conclusion can be drawn.
Vault App	An application used to keep media and text messages private through password protection and other obfuscation techniques.

Vehicle System Forensics	The use of digital forensic capture and analysis methods against a car or other vehicle's computer and infotainment systems.
Verification	Establishes the integrity of the digital evidence by proving that the duplicate is authentic.
Video cassette	A form of media utilizing magnetic tape that could record and store visual and audio content.
Video cassette recorders (VCRs)	A form of technology that allows individuals to watch and record media using magnetic cassette tapes.
Violent Crimes Against Children International Task Force (VCACITF)	The largest global task force in the world that investigates child exploitation cases.
Virtual Global Taskforce (VGT)	Established in 2003, an alliance of agencies and private industry that work together in order to identify, investigate, and respond to incidents of child exploitation.
Virtual Private Networks (VPNs)	The practice of establishing an encrypted and protected network connection when using a public internet connection to disguise an individual's online identity and minimize tracking of their online identity.
Virus	One of the oldest forms of malware that cannot be activated or execute its payload without some user intervention, such as opening a file or clicking on an attachment.
Volatile	Term referring to the potential for data loss when a computer is powered off.
Vulnerability	Flaws in computer software, hardware, or people (in the case of social engineering or committing risky activities which open oneself to victimization).
Vulnerabilities Equity Process (VEP)	The process implemented within the US government to determine how to handle zero-day vulnerabilities and their use, particularly their disclosure to the public.

## Glossary

Wannabe	A reference to noobs or script kiddies, referencing their limited capacity and skills.
WannaCry	A form of ransomware that is thought to have originated from North Korea as a means to generate funds for the country.
Warez	Pirated software and intellectual property that was commonly used by hackers in the 1980s.
Warez doodz	Individuals who posted and shared programs.
Warrant	A signed document issued by a judge or magistrate that authorizes a specific course of action for law enforcement.
Warrants clause	The second clause of the Fourth Amendment indicating that a warrant or signed document issued by a judge or magistrate authorizes a specific course of action.
Wearable devices	Any sort of Internet-enabled device that can be worn by a person, such as a watch or pair of glasses.
Web defacement	An act of online vandalism wherein an individual replaces the existing HTML code for a web page with an image and message that they create.
Welcome to the Game	A video game where the player moves throughout a Dark Web environment in order to see redroom content.
White-hat hacker	A type of hacker with some skill who works to find errors in computer systems and programs to benefit general computer security.
White power	A term often associated with white supremacist groups like the Ku Klux Klan and other religious or ideologically based groups with an emphasis on the purity and separation of the white race.
Wiping	The process of cleaning a digital storage device to ensure that there are no remnants of data present.

Wire fraud	Fraud committed through the use of electronic communication.
Work-at-home schemes	A form of spam-enabled fraud where the seller promises recipients substantial earnings for just a few hours of work per day.
World Intellectual Property Organization (WIPO)	An international agency designed to support intellectual property rights.
Worms	A unique form of malware that can spread autonomously, though it does not necessarily have a payload.
Write	The process of altering or modifying data on a hard drive.
Write blocker	A device that allows read-only access to all accessible data on a drive, as well as prevents anything from being written to the original drive, which would alter or modify the original evidence.
Zeus Trojan	A form of malware that targets Microsoft Windows systems and is often sent through spam messages and phishing campaigns.
Zoombombing	The practice of joining a zoom session or other online conference call in order to cause harm by disrupting the proceedings, often as a means to troll the participants.



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