UNIVERSITY OF PLYMOUTH

Cyber Threats & Adversarial Behaviours

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Centre for Security, Communications and Network Research

Module Overview

- Module Team:
  - Dr Hai-Van Dang (Module Leader – Cyber security)
  - Dr Lingfen Sun (Network)

- Communication:
  - Contact hours: during lectures
  - Surgery hours: TBC on DLE
  - Microsoft Teams, email – for individual queries – 2 working days

Module Overview

- Assessment
  - 30% - Set Exercise – Research-based task
  - 70% - Report – Case Study Report
- Sessions
  - Lecture – live and recorded, uploaded on DLE within 2 days
  - Mentimeter, DLE used during lectures
  - Practical – SMB101 (physical or VPN)
- Lecture slides: on DLE. The update version will be uploaded within 2 days after class

Module Overview

- Activities in class:
  - Individual
  - Group
- DLE overview
- Q&A: menti

Cyber Threats & Adversarial Behaviours - Your checklist

LO1: Can you name the motivations, attack vectors, threat consequences of the cyber threats? [1]

LO2: Can you research the trend of the cyber vulnerabilities? [6]

LO3: Can you know your rights by GDPR? [5]

LO4: Can you recognize the category of cyber crimes? [2]

LO5: Can you see how cyber kill chain is being used? [3,4]

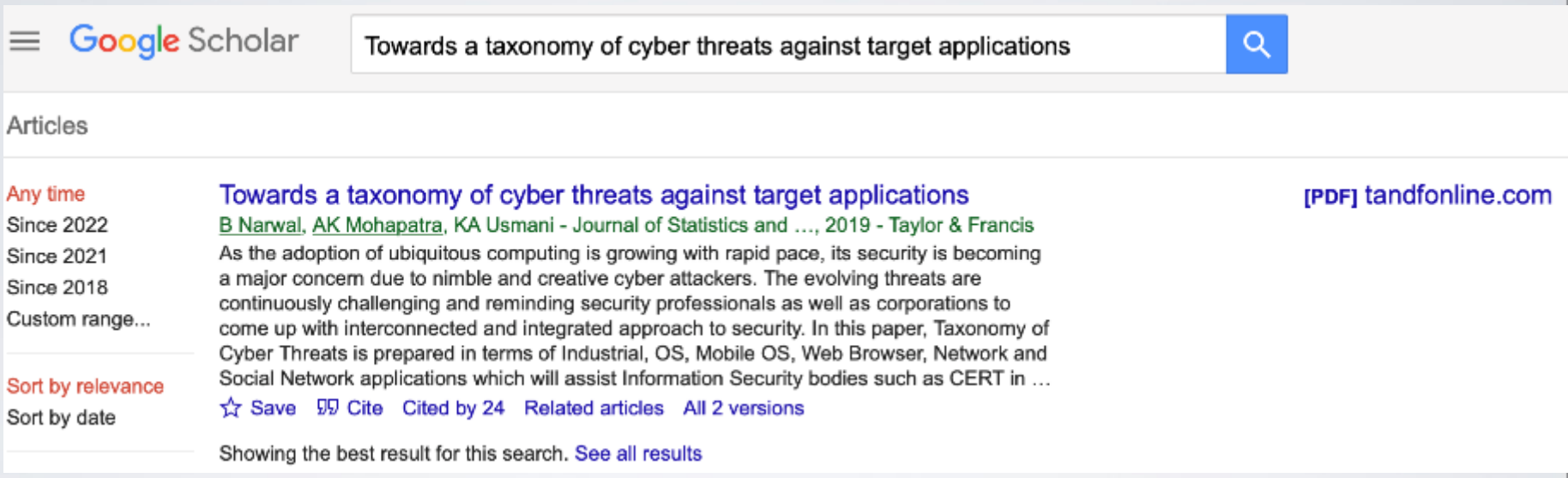
LO6: Can you recognize the different types of malware? [1

Further reading

1. Narwal, Bhawna, Amar Kumar Mohapatra, and Kaleem Ahmed Usmani. "Towards a taxonomy of cyber threats against target applications." Journal of Statistics and Management Systems 22.2 (2019): 301-325.
2. McGuire, Mike, and Samantha Dowling. "Cyber crime: A review of the evidence." *Summary of key findings and implications. Home Office Research report* 75 (2013).
3. Hutchins, Eric M., Michael J. Cloppert, and Rohan M. Amin. "Intelligence-driven computer network defense informed by analysis of adversary campaigns and intrusion kill chains." *Leading Issues in Information Warfare & Security Research* 1.1 (2011): 80.
4. Martin, Lockheed. "Seven Ways to Apply the Cyber Kill Chain with a Threat Intelligence Platform. Lockheed Martin Corporation (2015)." (2019).
5. https://ec.europa.eu/commission/presscorner/detail/en/MEMO_18_387
6. Cyber security breach surveys (DLE)

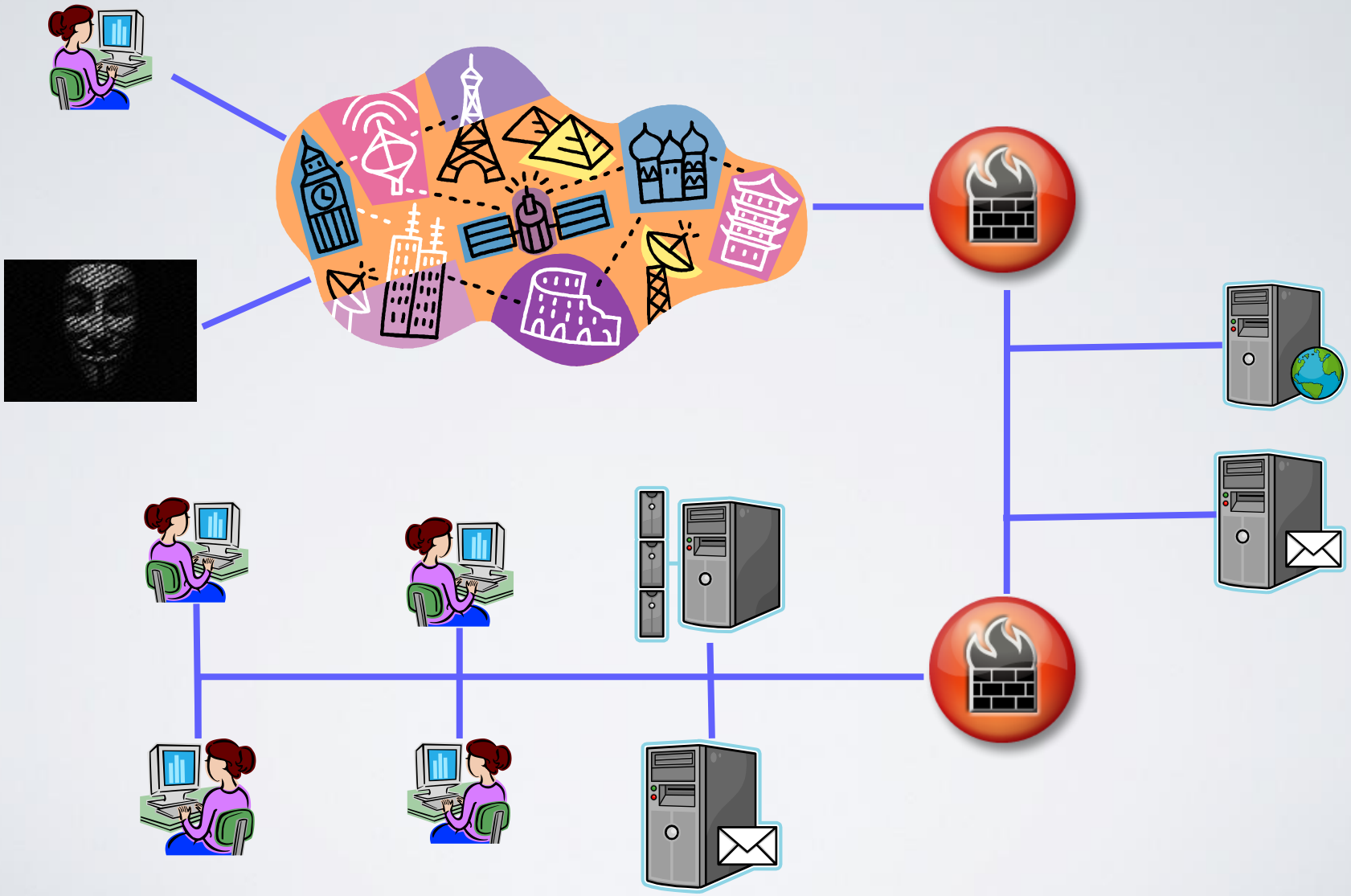
How to find the further reading material

- Google scholar



- University library: http://primo.plymouth.ac.uk
- Google

Cyber Security & Networks



Session Content

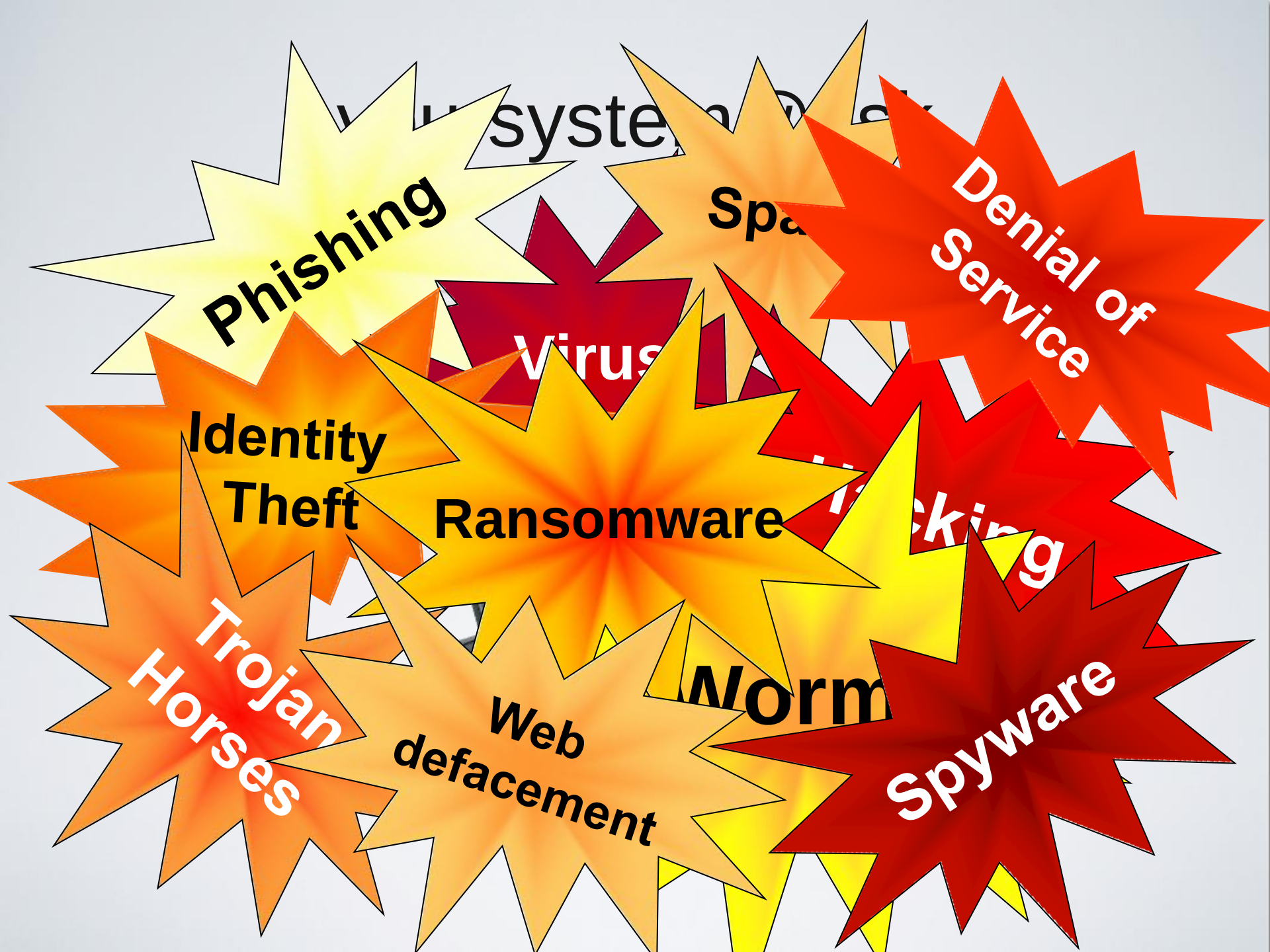
Introduction

Scale and Scope

Hackers

Malware

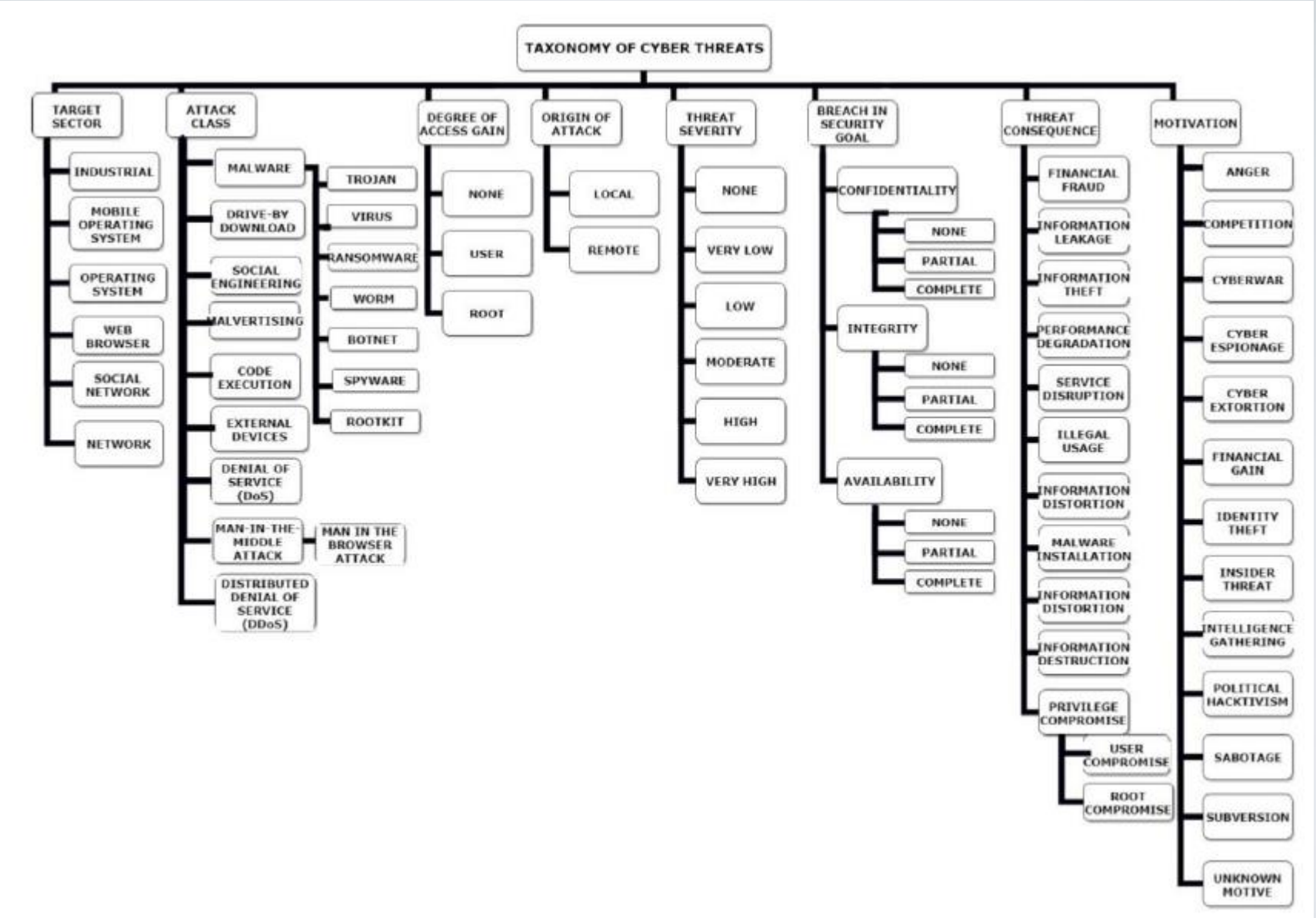
Conclusions


Phishing
Denial of Service
Identity Theft
Ransomware
Trojan Horses
Web defacement
Spyware

Activities

Group: Introduce name to each other. Share the work: one as facilitator to ask and collect the answers, the others contribute (No worries if you do not know the answers).

1. What can be motivation of the cyber attacks?
2. What can be threat consequences of the cyber attacks?
3. What can be the attack targets?



Source of image: [1]

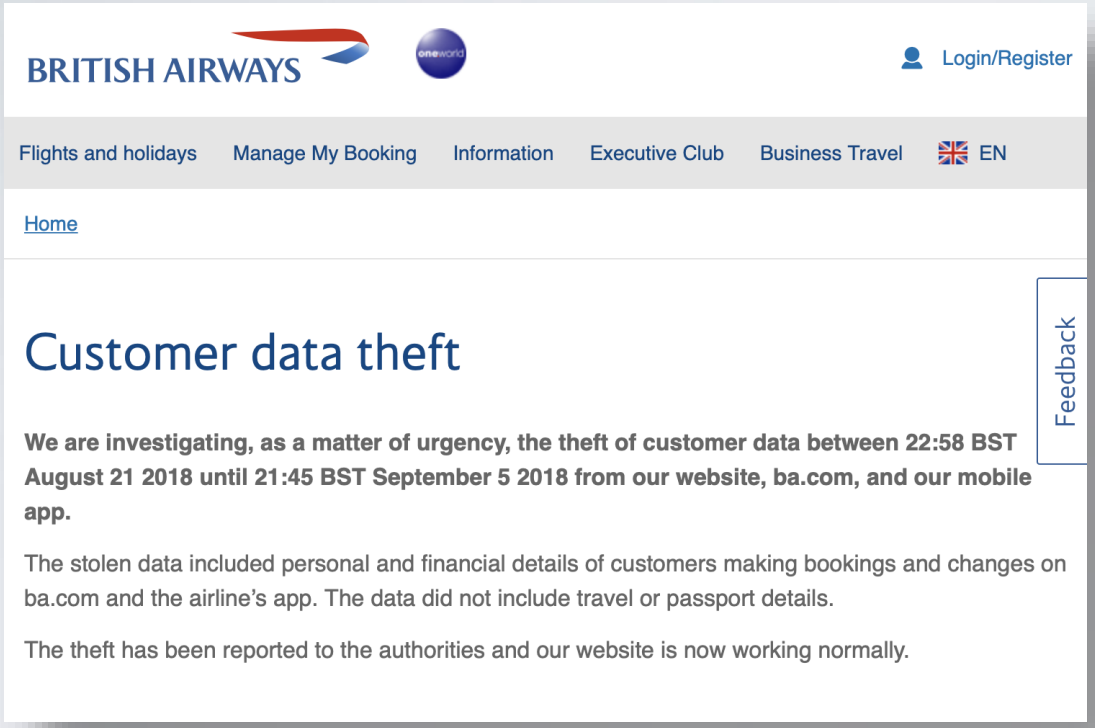
Example: Zeus

Group

- Facilitator: share the work (Example: one finds answers for a,b,c, the other does d,e,f) and collect the answes.
- Read https://en.wikipedia.org/wiki/Zeus_(malware) and identify the following information
  a. Type of malware
  b. Targeted system
  c. Attack vector (attack class, i.e. a path or means of an attack)
  d. Origin of attack (local or remote?)
  e. Threat consequences
  f. Motivation

Example Headlines

British Airways Hack



- BA experienced a "sophisticated, malicious criminal attack" on its website and app between 21 August and 5 September 2018
  - malicious code injection to the company's systems to achieve online card skimming
- Breach affected ~380,000 transactions, intercepting:
  - name, email address, credit card information (credit card number, expiration date and CVV/CVC)

https://www.britishairways.com/en-gb/information/incident/data-theft/latest-information
(not accessible in Jan 2022)
Other source: https://www.bbc.co.uk/news/business-48905907, https://www.bbc.co.uk/news/technology-45446529, last accessed Jan 2022

BA meets GDPR

- GDPR (General Data Protection Regulation) penalties can be up to 4% of annual global revenue
  - BA's total revenue for 2017 was £12.23bn, so a potential maximum fine of £489m
  - ICO (Information Commissioner's Office) fined BA £20 million (Oct 20)

www.gov.uk/data-protection/make-a-complaint

Data protection

Contents

Make a complaint

If you think your data has been misused or that the organisation holding it has not kept it secure, you should contact them and tell them.

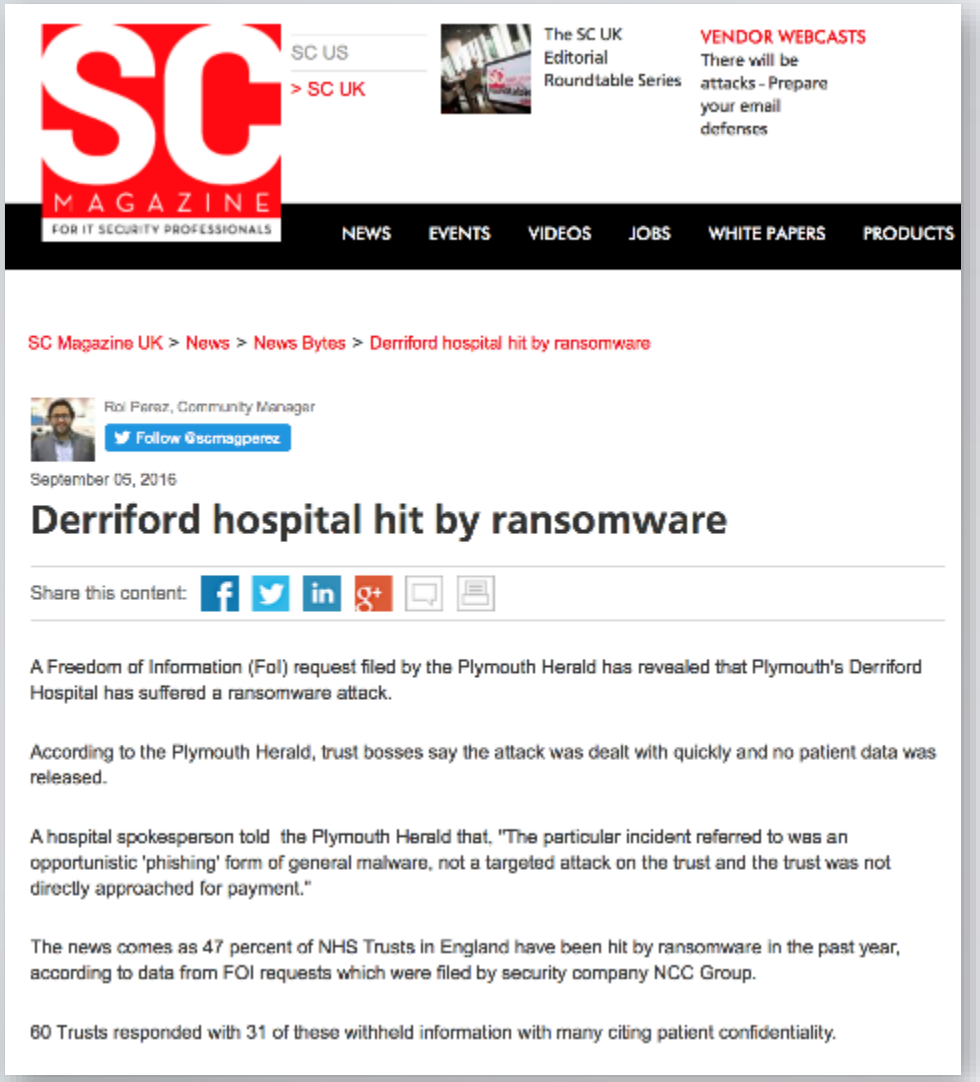
If you're unhappy with their response or if you need any advice you should contact the Information Commissioner's Office (ICO).

Your rights under GDPR

- menti

Image source: https://www.serveit.com/gdpr-for-developers-data-subject-rights/

Closer to home . . .



SC MAGAZINE
FOR IT SECURITY PROFESSIONALS

SC US
> SC UK

The SC UK Editorial Roundtable Series

VENDOR WEBCASTS
There will be attacks - Prepare your email defenses

NEWS EVENTS VIDEOS JOBS WHITE PAPERS PRODUCTS

SC Magazine UK > News > News Bytes > Derriford hospital hit by ransomware

Roi Perez, Community Manager
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September 05, 2016

Derriford hospital hit by ransomware

Share this content:

A Freedom of Information (FoI) request filed by the Plymouth Herald has revealed that Plymouth's Derriford Hospital has suffered a ransomware attack.

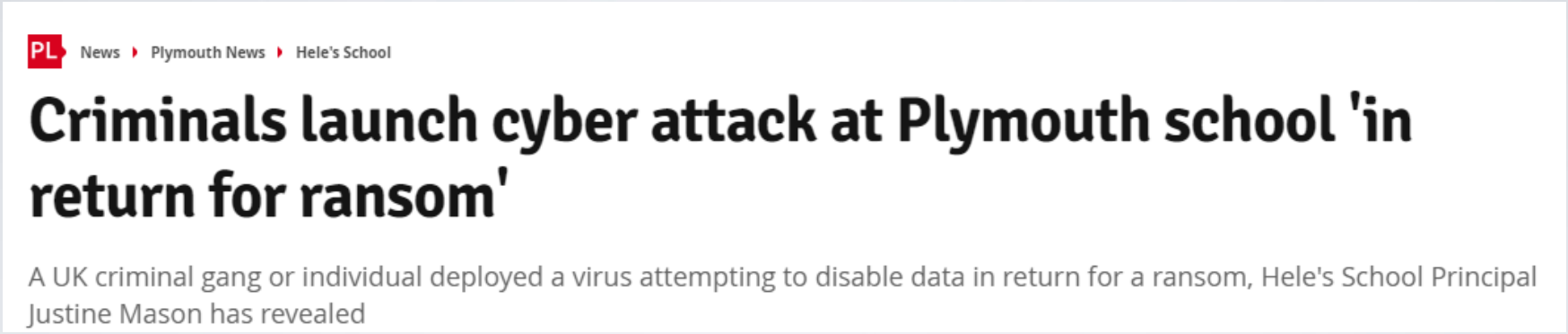
According to the Plymouth Herald, trust bosses say the attack was dealt with quickly and no patient data was released.

A hospital spokesperson told the Plymouth Herald that, "The particular incident referred to was an opportunistic 'phishing' form of general malware, not a targeted attack on the trust and the trust was not directly approached for payment."

The news comes as 47 percent of NHS Trusts in England have been hit by ransomware in the past year, according to data from FOI requests which were filed by security company NCC Group.

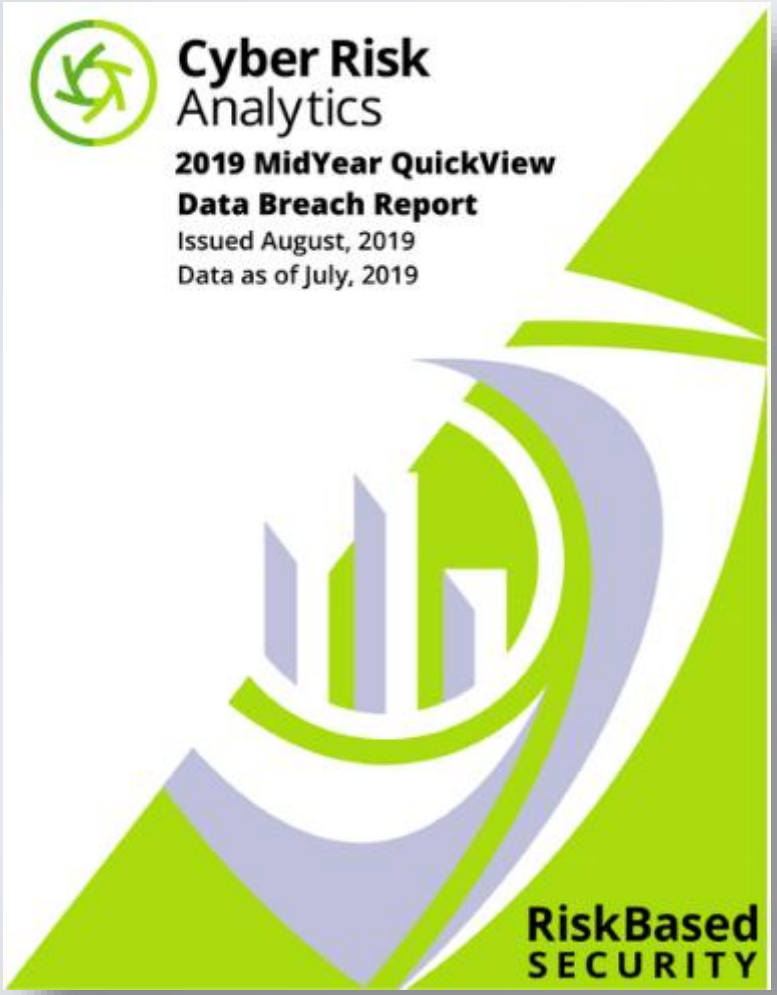
60 Trusts responded with 31 of these withheld information with many citing patient confidentiality.

- 60 NHS Trusts in England responded to a freedom of information (FoI) request
  - 28 admitted being hit by ransomware
  - 31 did not confirm or deny



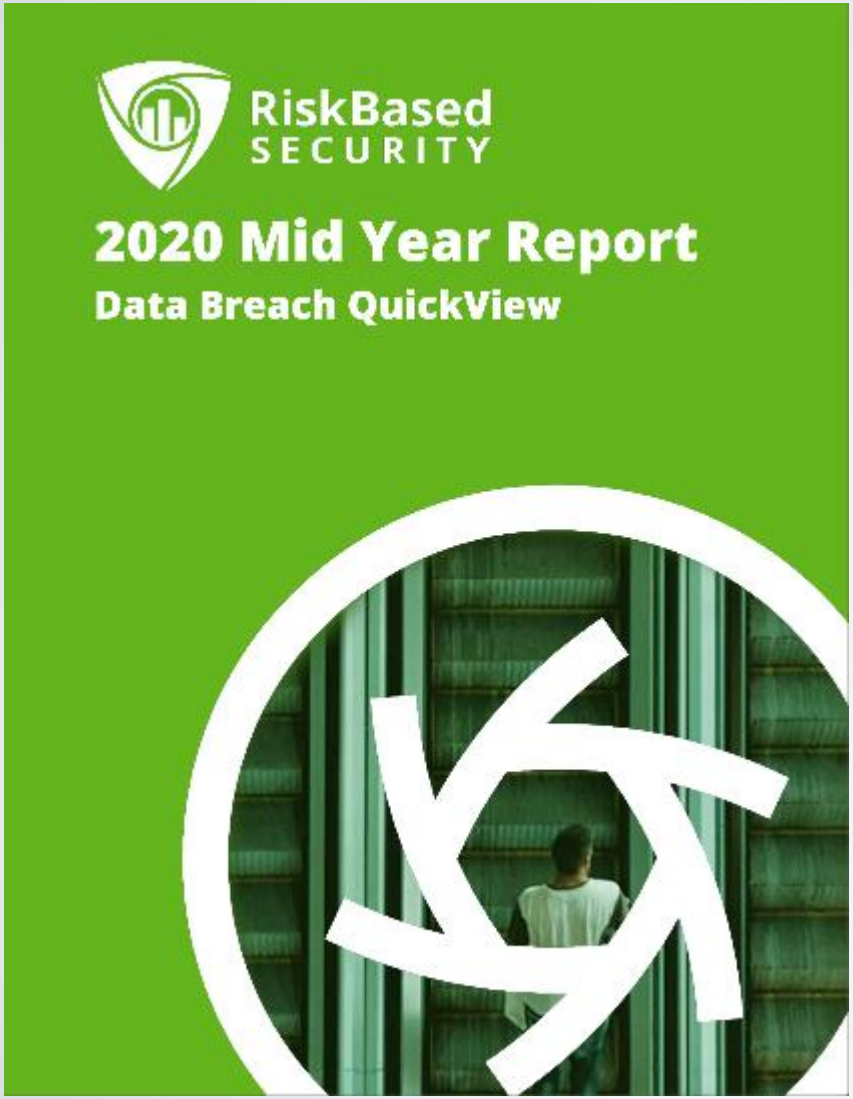
Source: https://www.plymouthherald.co.uk/news/plymouth-news/criminals-launch-cyber-attack-plymouth-3282812

And for 2019 …



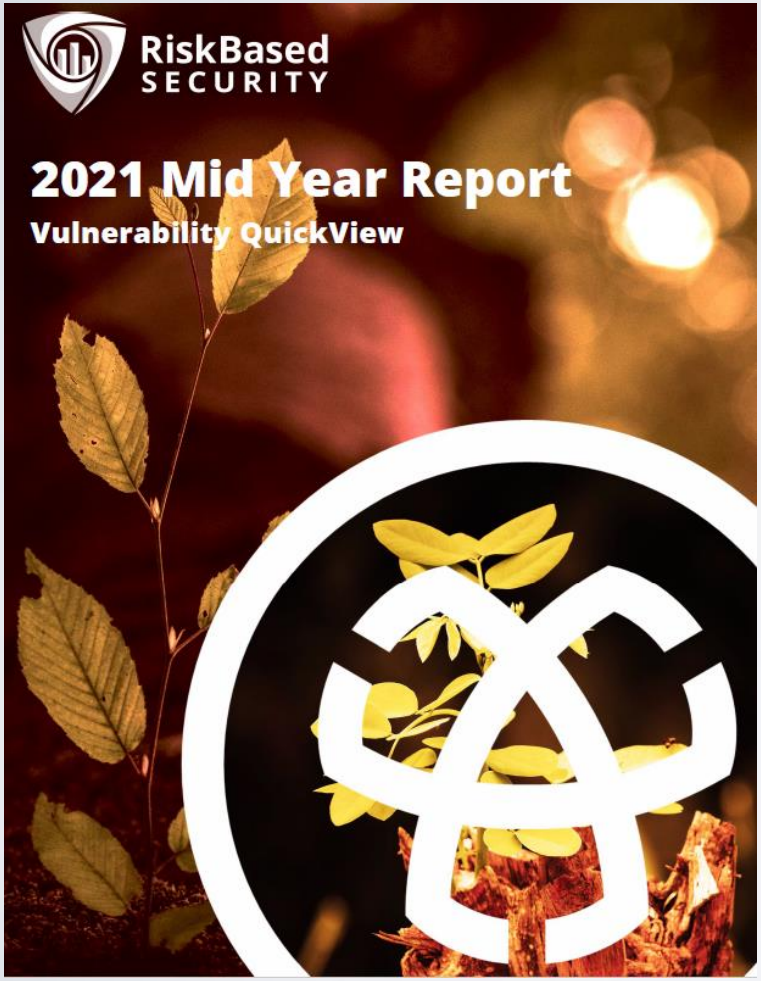
- 3,813 breaches were reported by the end of June, exposing over 4.1 billion records
  - An increase of 54% in reported breaches and 52% in exposed records compared to mid-2018
  - Three breaches are within the top 10 largest breaches of all time
- Breach insights:
  - Web was the top breach type for *number of records exposed*, accounting for 79% of compromised records
  - Hacking was the top breach type for *number of incidents*, accounting for 82% of reported breaches
  - ~70% of breaches exposed email addresses and ~65% exposed passwords

And for 2020 …



- 2,037 publicly reported breaches by the end of June, exposing over 27 billion records
  - A decrease of 52% in reported breaches compared to a 54% increase in exposed records compared to mid-2019
  - 27 billion in 6 months is more that the total of 2019 by more than 12 billion
  - Two of the largest breaches ever reported
- Breach insights:
  - Payment card details exposed surpassed 90 million records
  - Healthcare sector nearly matched the information sector – accounting for 14.3% of the reported breaches

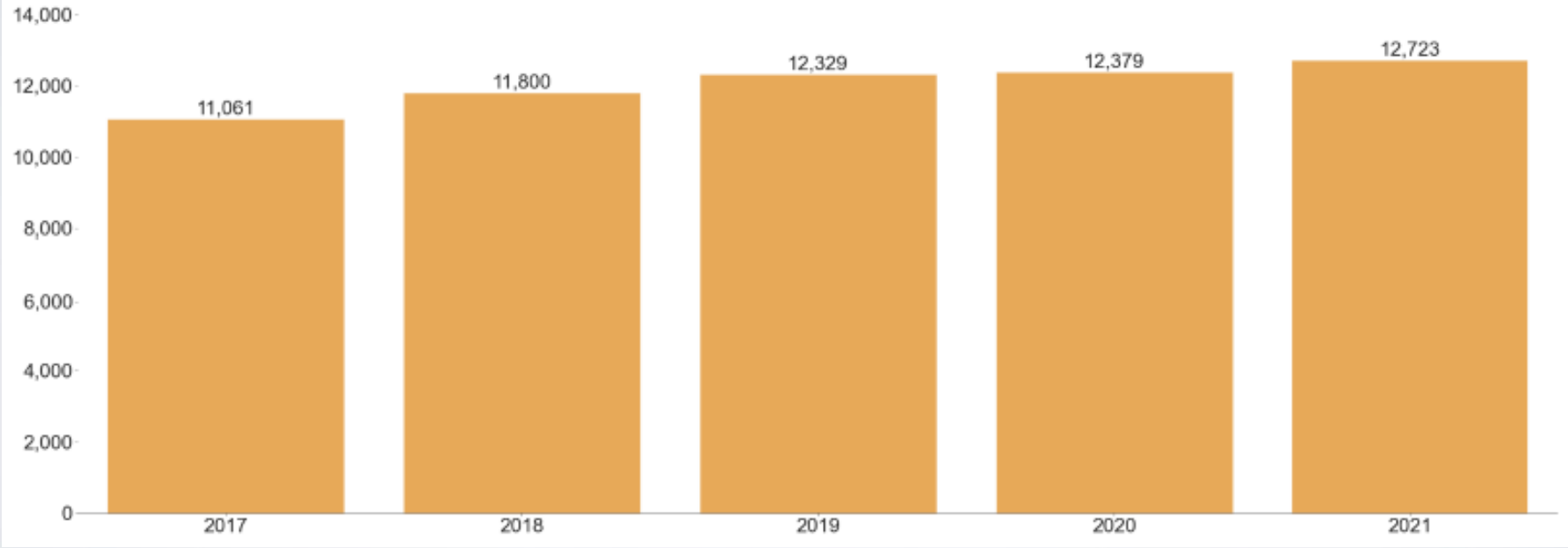
And for 2021 …



- 12,723 vulnerabilities that were disclosed during the first half of 2021.
  - 2.8%, compared to the same period in 2020, despite ongoing business disruptions.
  - an average of 80 new vulnerabilities per day
  - 849 vulnerabilities that are remotely exploitable but do not have a mitigating solution.
- Insights: see the next slides

Vulnerabilities increase

Figure 1: Number of vulnerabilities disclosed by Q2, in the last five years



Top ten products by vulnerabilities disclosures in Q2 2021

Table 1: Top ten products by vulnerability disclosures in Q2 2021, as compared to 2020.

Name	Rank 2021	Rank 2020	Count 2021	Count 2020
Debian Linux	1 ↑	2	628	609
Fedora	2	N/A	584	N/A
openSUSE Leap	3 ↓	1	526	692
Ubuntu	4	4	443	521
Windows 10	5	5	274	478
SuSE Linux Enterprise Server (SLES)	6 ↑	10	260	394
Windows Server (Semi-Annual Channel)	7 ↑	8	259	427
Windows Server 2019	8 ↓	7	248	436
Google Pixel / Nexus Devices	9	9	242	414
SuSE Linux Enterprise Server for SAP	10 ↑	15	233	360

Top ten vendors by vulnerabilities disclosure in Q2 2021

Table 2: Top ten vendors by vulnerability disclosures in Q2 2021, as compared to 2020

Name	Rank 2021	Rank 2020	Count 2021	Count 2020
Software in the Public Interest, Inc.	1 ↑	8	628	610
Microsoft Corporation	2 ↑	3	627	789
SUSE	3 ↑	4	590	782
Fedora Project	4	N/A	584	N/A
IBM Corporation	5 ↑	6	547	708
Oracle Corporation	6 ↓	1	521	915
Google	7 ↓	5	503	753
Cisco Systems	8 ↑	10	463	384
Canonical Ltd.	9	9	444	522
Red Hat	10 ↓	2	439	843

Scope and Scale

Name a few cyber crimes

- Menti

Categories of Computer Crime and Abuse

Audit Inspectorate (1981)

- Fraud

- Theft

- Survey repeated every 3-4 years
- Last one was 2004/5

Categories of Computer Crime and Abuse

Audit Commission (2005)

- Fraud
- Hacking
- Invasion of Privacy
- Sabotage

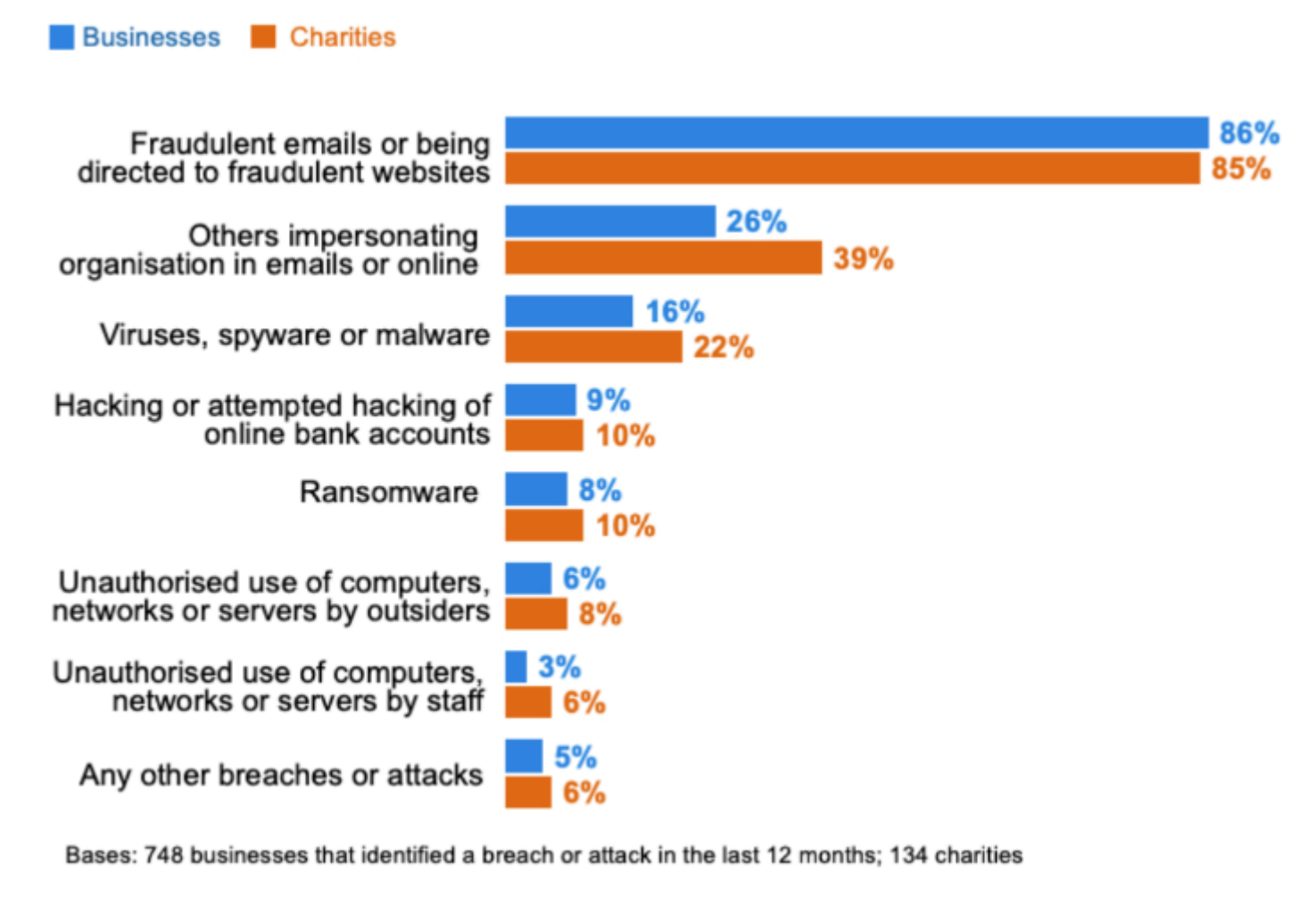
- Theft
- Use of unlicensed software
- Private work
- Virus / Denial of Service
- Accessing pornographic / inappropriate material

And since 2005…?

DLE quiz – cybercrime – 8 mins

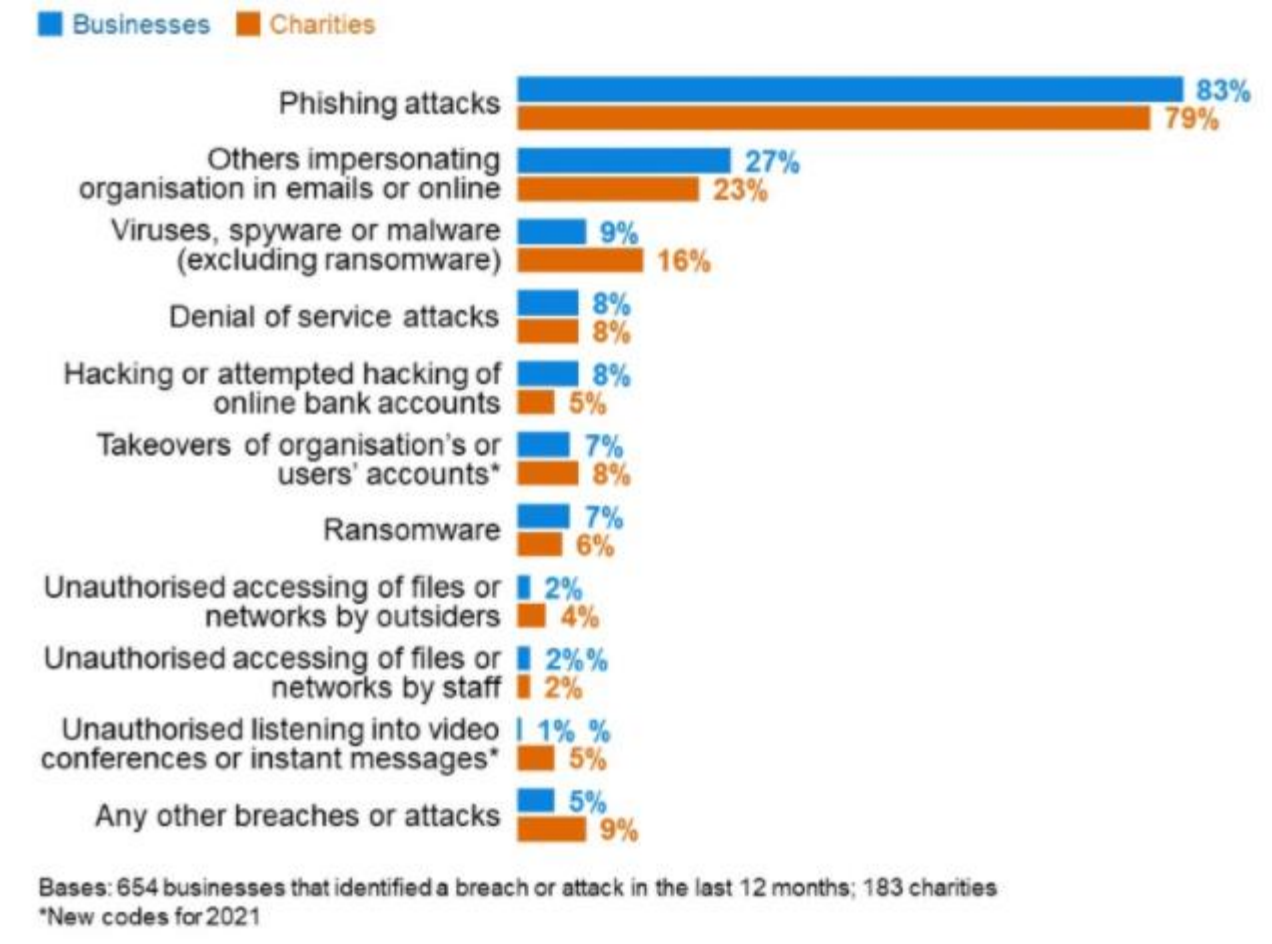
- Mobile device malware
- Cryptojacking
- Ransomware
- Advanced Persistent Threats
- Mass exposures / data leaks
- Social network misuse
- IoT threats
- Spear phishing
- Business Email Compromise

Current status



(Cyber Security Breaches Survey 2020)

Current status



(Cyber Security Breaches Survey 2021)

Increasing cyber threats

"… I think that the fact I am here is also the bad news, because it indicates the level of cyber threats, it just proves that now we're living in a different world … These threats they don't stay the same level, there is evolution … Now we're living in the era of cyber wars, cyber weapons, cyber sabotage …"

Eugene Kaspersky

Plymouth University Graduation Speech

September 2012

Categorising Cybercrime

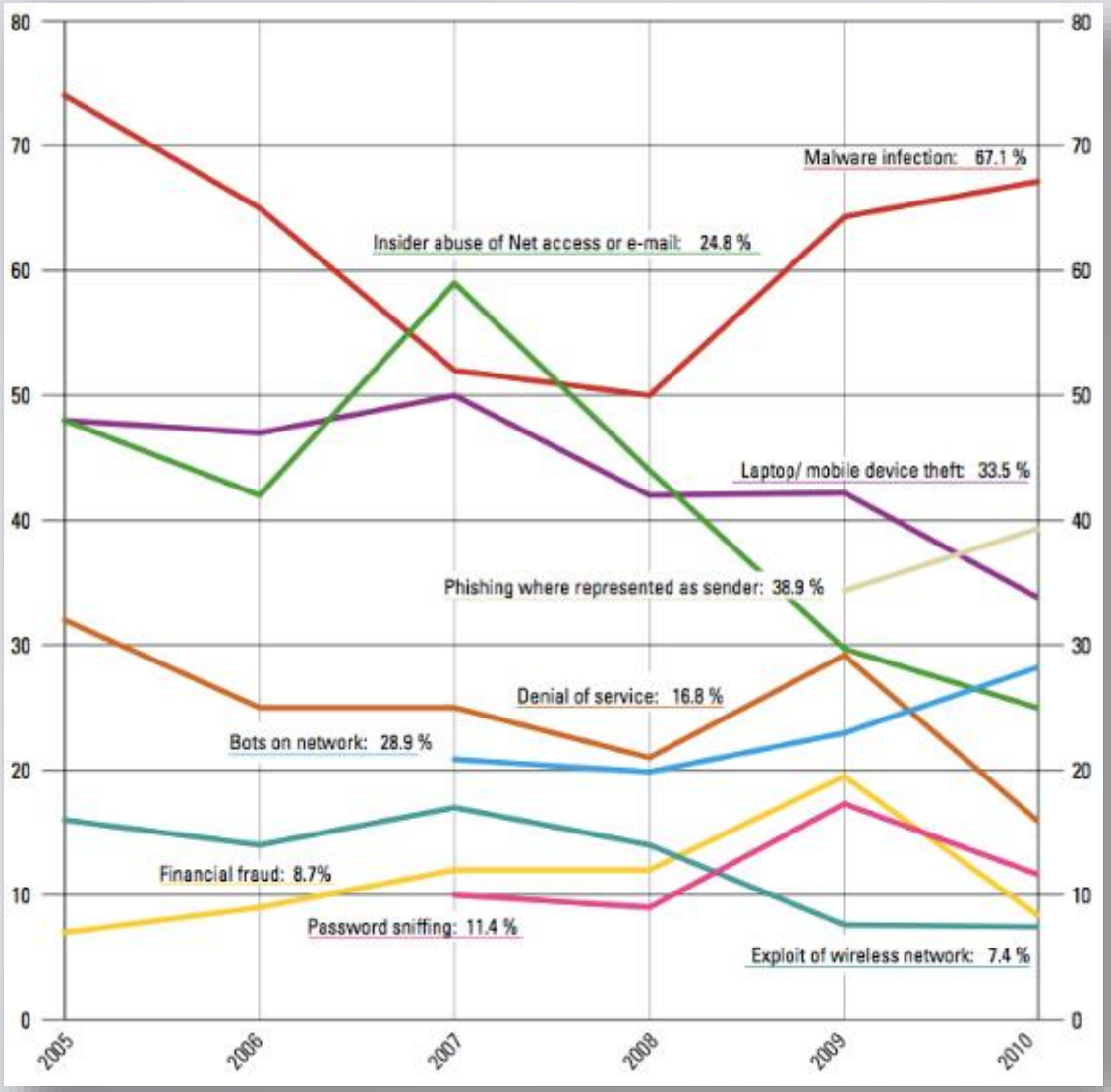
- **Cyber-dependent crimes**
  - offences that can only be committed by using a computer, computer networks, or other form of ICT (Information and Communication Technology)
  - include the spread of viruses and other malicious software, hacking, and DDoS attacks,
  - primarily acts directed against computers or network resources, but there may be secondary outcomes (e.g. fraud)
- **Cyber-enabled crimes**
  - traditional crimes that are increased in scale or reach by use of computers, networks or other ICT
    - **fraud** (including mass-marketing frauds, 'phishing' e-mails and other scams; online banking and e-commerce frauds);
    - **theft** (including theft of personal information and identification-related data); and
    - **sexual offending against children** (e.g. grooming, possession/creation/distribution of sexual imagery)

Lack of standardisation

Cyber-dependent Crime Categories

Information Security Breaches Survey 2014	CSI 2010/11 Computer Crime and Security Survey	Ernst & Young Global Information Security Survey 2014
• Actual penetration into the organisation's network • Denial of Service attack • Attack on Internet or telecommunications traffic	• Malware infection • Bots / zombies within the organization • Password sniffing • Denial of Service • Web site defacement • Other exploit of public-facing Web site • Exploit of wireless network • Exploit of DNS server • Exploit of client Web browser • Exploit of user's social network profile • Instant messaging abuse • Insider abuse of Internet access or e-mail (i.e. pornography, pirated software, etc.) • Unauthorized access or privilege escalation by insider • System penetration by outsider	• Cyber attacks to disrupt or deface the organization • Cyber attacks to steal financial information (credit card numbers, bank information, etc.) • Cyber attacks to steal intellectual property or data • Internal attacks (e.g., by disgruntled employees) • Malware (e.g., viruses, worms and Trojan horses) • Zero-day attacks

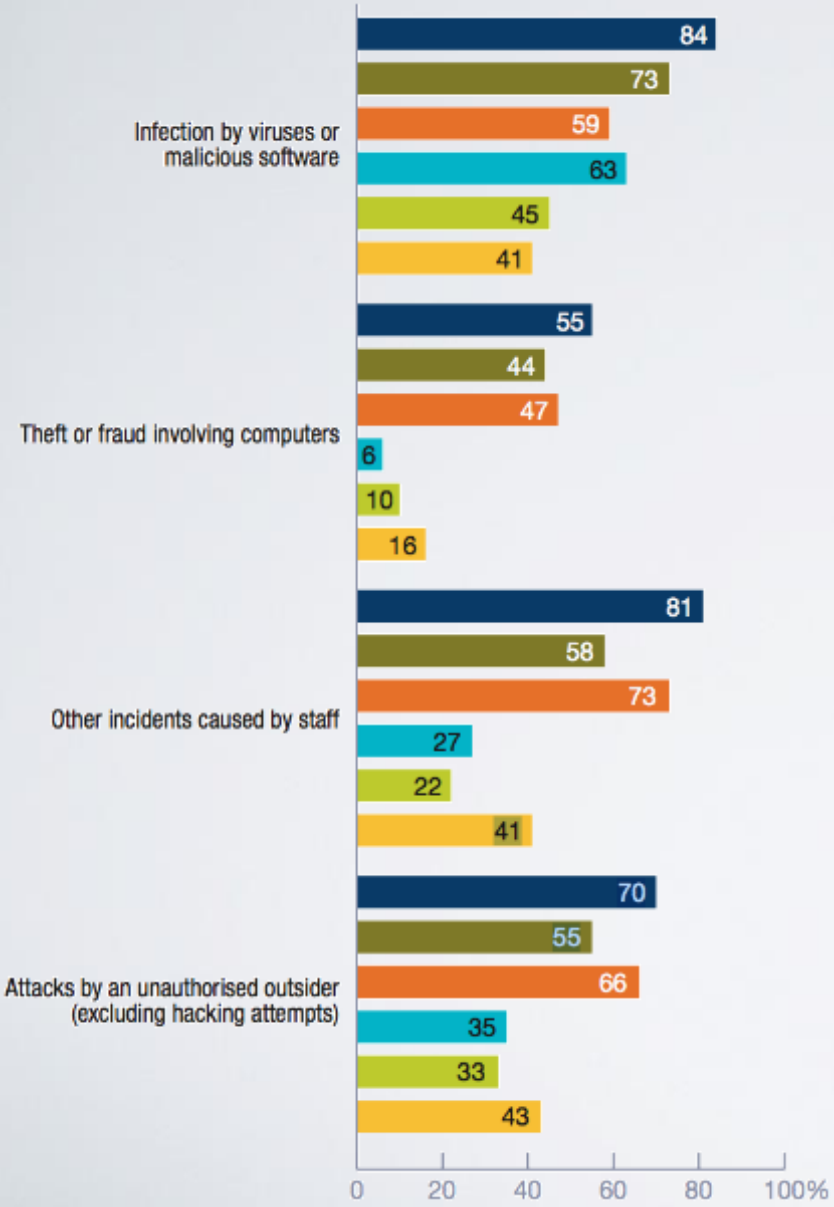
Trends for key incident types



- Reponses of 148 US corporations, government agencies, financial, educational and medical institutions

(CSI Survey, 2010)

Causes and perpetrators of incidents



ISBS 2015 - large organisations
ISBS 2015 - small businesses
ISBS 2014 - large organisations
ISBS 2014 - small businesses
ISBS 2013 - large organisations
ISBS 2013 - small businesses

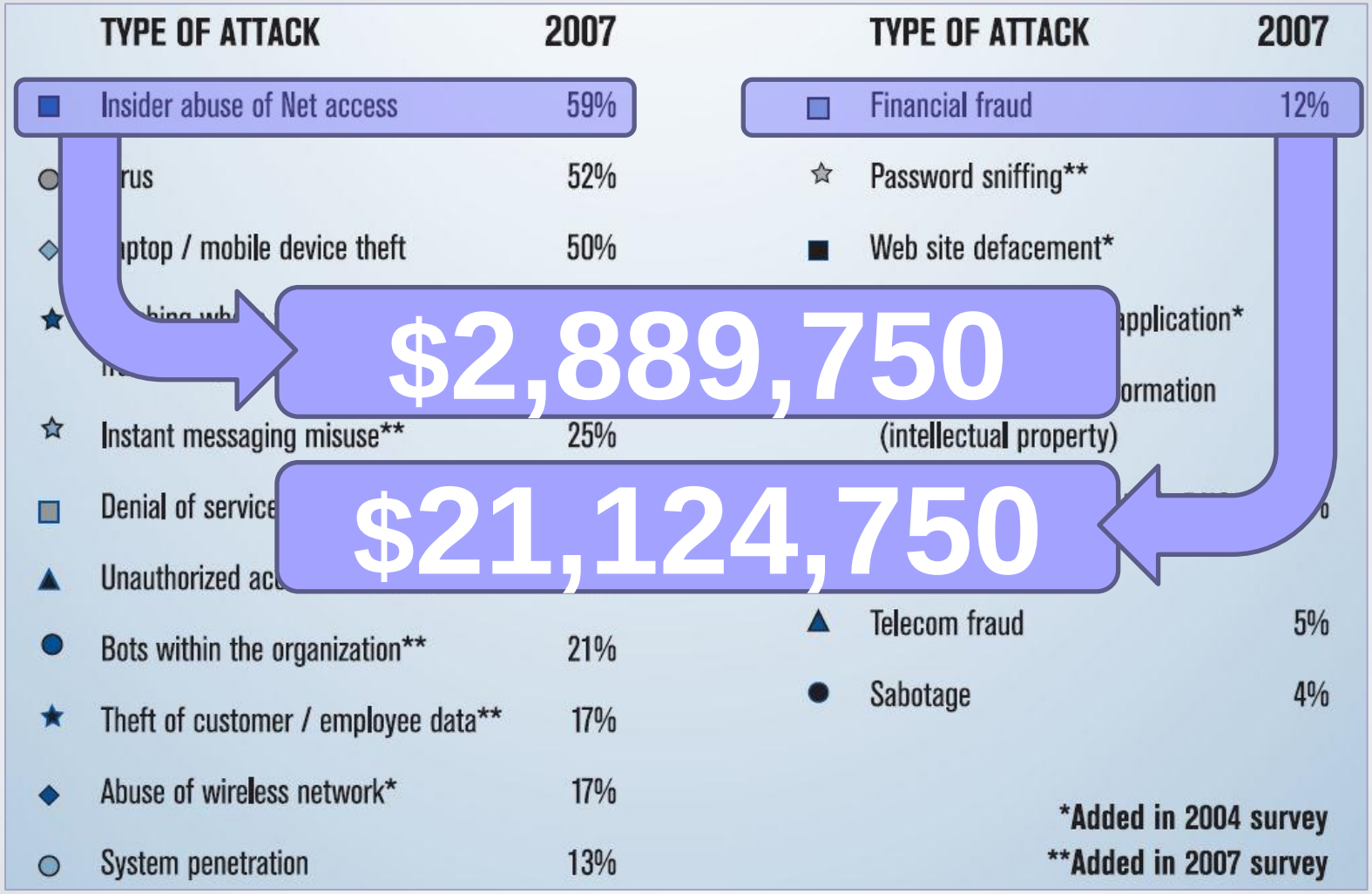
	Large organisations	Small businesses
Infection by viruses or other malicious software	3 (5)	2 (3)
Theft or fraud involving computers	2 (3)	2 (1)
Other incidents caused by staff	6 (6)	2 (3)
Attacks by an unauthorised outsider (excluding hacking attempts)	6 (11)	3 (5)
Any security incidents	14 (16)	4 (6)

Median number of breaches
(2014 figures in brackets)

(BIS ISBS, 2015)

Incidence versus Cost

CSI Computer Crime Survey (2007)



Points to note

- Figures only relate to *reported* incidents
  - It is often conjectured that the true level of computer crime remains much higher than reported
  - organisations do not wish to risk undesirable consequences such as bad publicity, legal liability, or loss of custom
- Financial loss is just one impact that may result from cybercrime
  - other impacts may be disruption to services, loss of data or damage to reputation etc
  - more difficult to quantify and may actually be more significant in many contexts

Hackers

Hackers

- Common use refers to individuals attempting and/or gaining unauthorised access to IT systems
- Distinction sometimes drawn between Hackers (explorers) and Crackers (malicious)
- Explorers or intruders?
  - “We’re not doing any harm”

Example – The Morris Worm

- Robert Tappan Morris, a 23-year-old doctoral student from Cornell
- November 1988
- no dangerous payload
- tried and convicted of violating the 1986 Computer Fraudand Abuse Act

Source : **Computer security basics,** Rick. Lehtinen

Defining Hackers

Common Dictionary Definitions

“Someone who hacks into other people’s computer systems”

Cambridge British English Dictionary, 2013

“a person who secretly gets access to a computer system in order to get information, cause damage, etc. : a person who hacks into a computer system”

Merriam-Webster Online Dictionary, 2013

“Computer Slang:

a. a computer enthusiast.

b. a microcomputer user who attempts to gain unauthorized access to proprietary computer systems.”

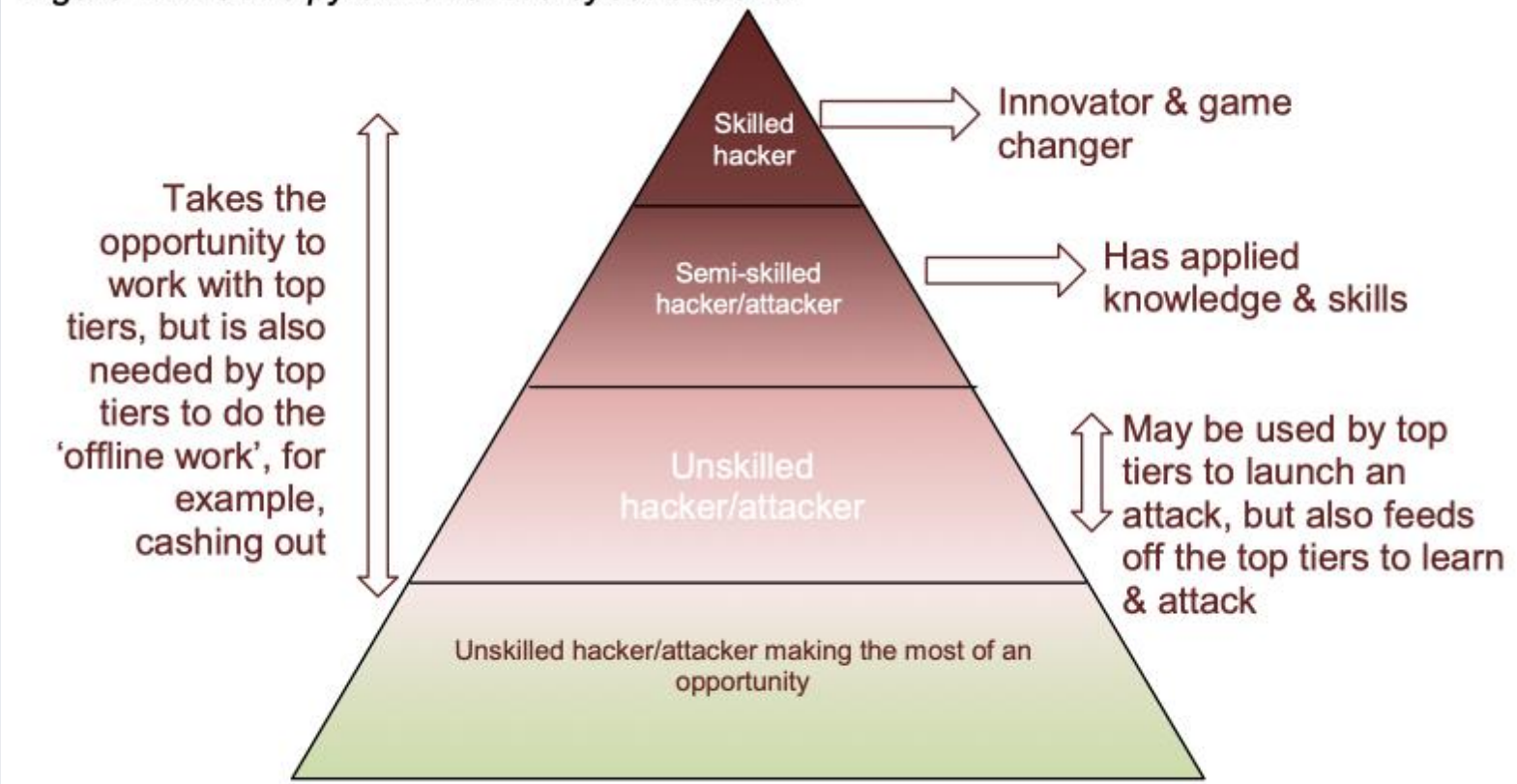
Dictionary.com, 2013

Classifying Hackers

- Calling someone a ‘hacker’ is like calling someone who breaks the law a ‘criminal’
  - It provides a top-level label, but gives you no idea of what they have actually done
- Classifying hackers is easier said than done:
  - Some say it is simply Hacker vs Cracker
  - Others use the names Black Hat, White Hat and Grey Hat
- Many other sub-groups can be identified
  - Hacktivists, Script Kiddies, Warez D00dz etc.
  - BUT there is no definitive overall list

Categories by skill levels

Figure 1.7: Skills pyramid for the cyber attacker



Source: Holt (2013)

Why do people hack?

- Egotism
- Espionage
- Ideology
- Intellectual challenge
- Mischief / Fun
- Money
- Revenge

Classify the attackers

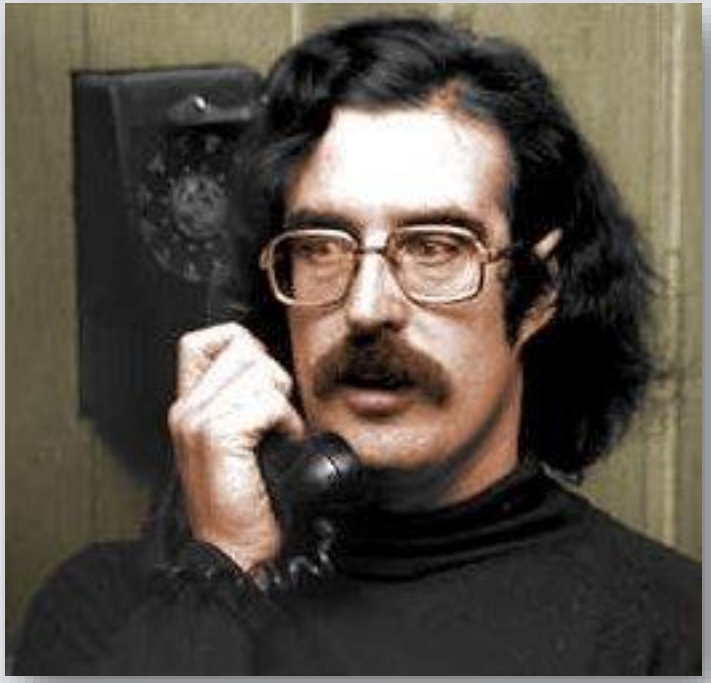
Group

Identify the following information about John Draper, Kevin Poulsen, Kevin Mitnick, Gary McKinnon

- Skill level (according to the pyramid)
- Motivation
- Type of hacker
- What did they do?
- What were they charged?

Notable Hackers

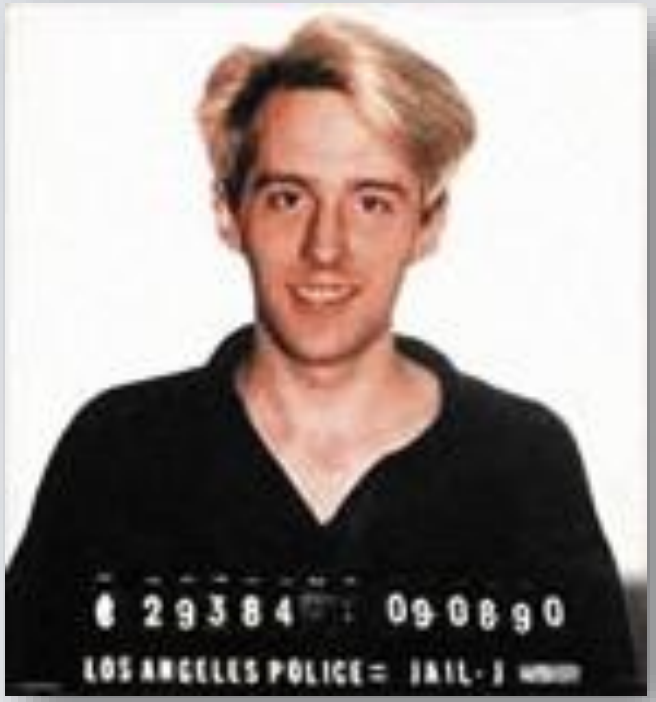
John Draper



- Better known as Cap'n Crunch aka John Draper
- Early 1970s phone phreaker
  - Blue Boxes, toy whistles, an Esquire article and prison!
- Later wrote EasyWriter wordprocessor for the Apple II and later the IBM PC

Notable Hackers

Kevin Poulsen



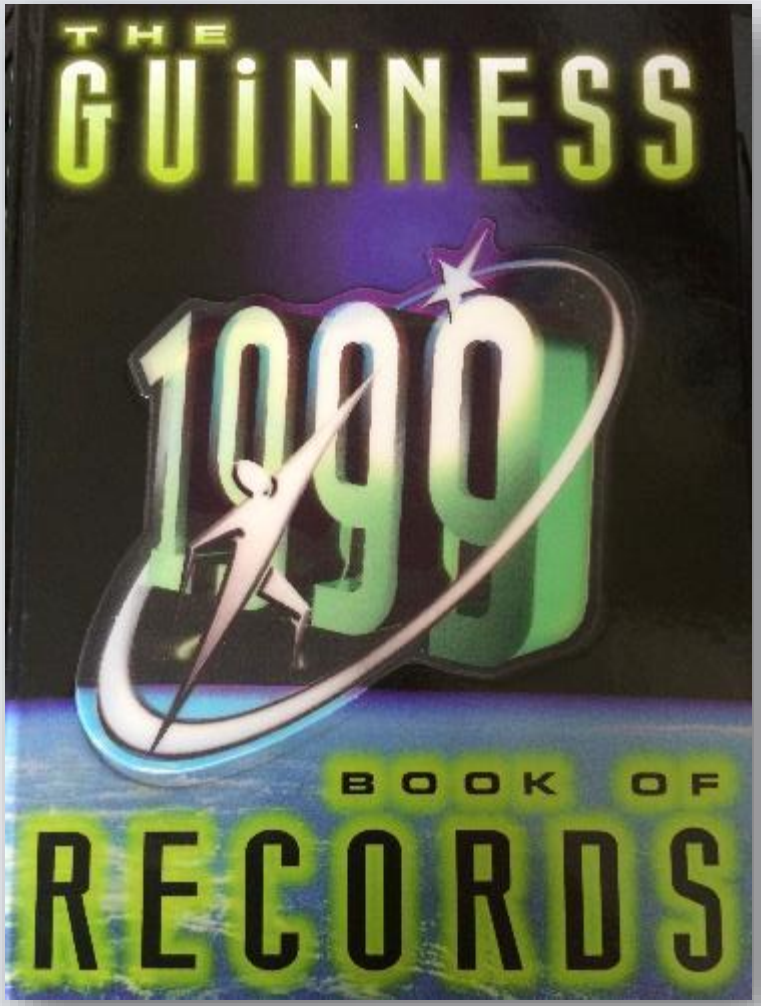
- Active in the 1980s/early 90s under the handle of ‘Dark Dante’
  - Hacked into radio shows to win prizes (e.g. a Hawaiian holiday and a $50,000 Porsche!)
- Suspected of espionage (charges dropped)
- Jailed for 51 months and fined $56,000
- Subsequently a senior editor at Wired.com

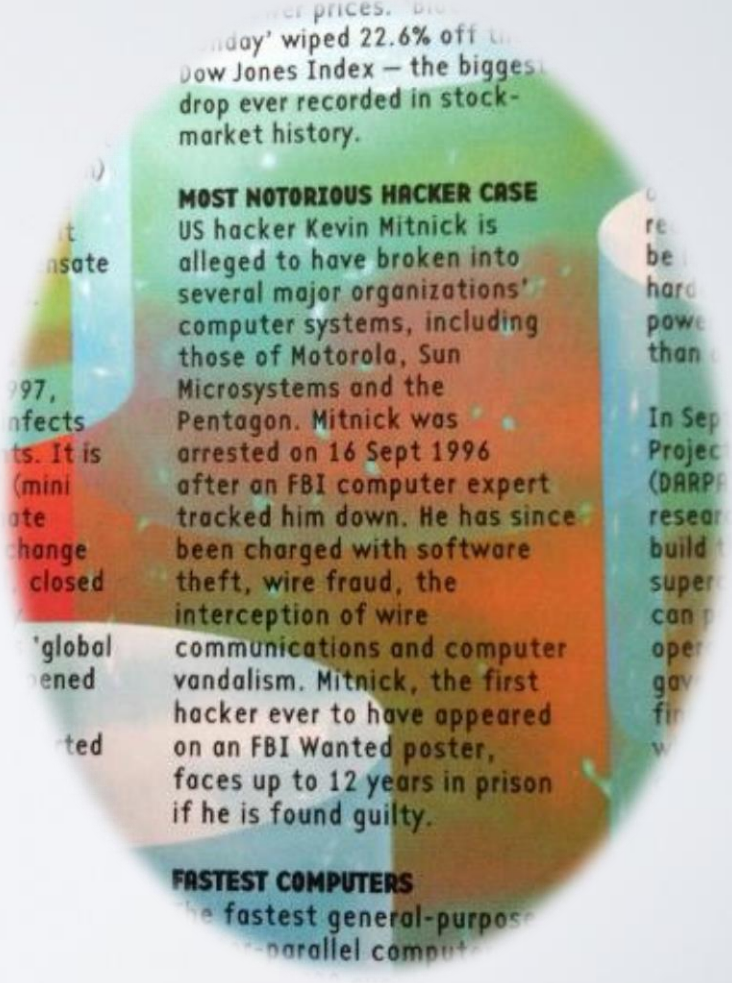
Notable Hackers

Kevin Mitnick

- Probably the best known example
- “America's Most Wanted Computer Outlaw”
- The subject of 4 books and one Hollywood film
- Entry in *1999 Guinness Book of World Records* : ‘Most Notorious Hacker Case’

Mitnick the ‘Record Breaker’ …



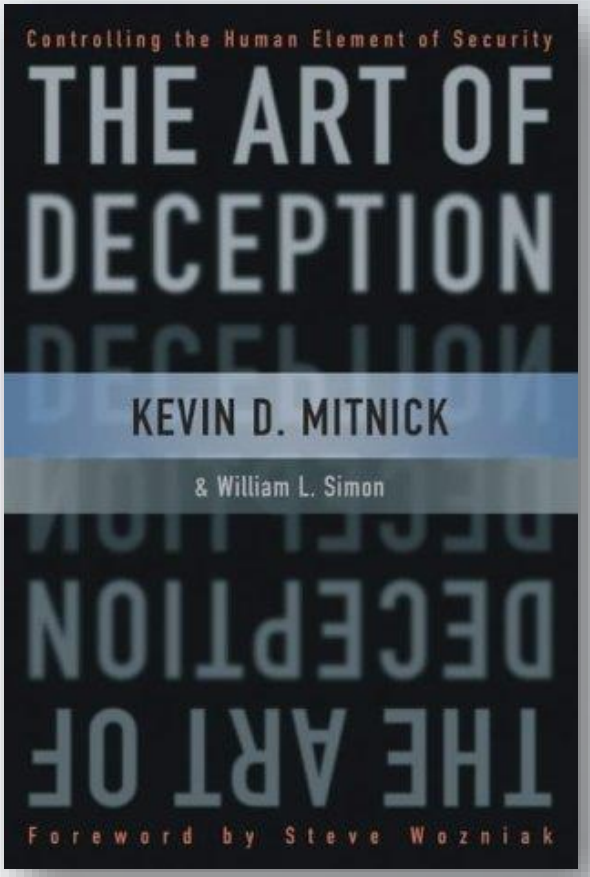


The Mitnick Timeline

- **1981** –Physical break-in at Pacific Bell's COSMOS phone centre.
- **1983** – Use of computer at University of Southern California to gain illegal access to the ARPANET.
- **1984** – Arrest warrant issued for running unauthorised TRW credit reference checks.
- **1987** – Convicted of stealing software from Santa Cruz Operation.
- **1989** – Repeated unauthorised entries into systems at DEC's Palo Alto research lab in 1987/88. Sentenced to one year in prison

The Mitnick Timeline

- **1992** - Violated probation and went underground. Accused of stealing software from Motorola, Nokia and Sun, among others.
- **1994** –Stole software, email and other files from a system belonging to Tsutomu Shimomura.
- **1995** – Arrested in North Carolina, after over 2 years on the run.
- Left prison in **January 2000** and published ‘The Art of Deception’ in **October 2002**.

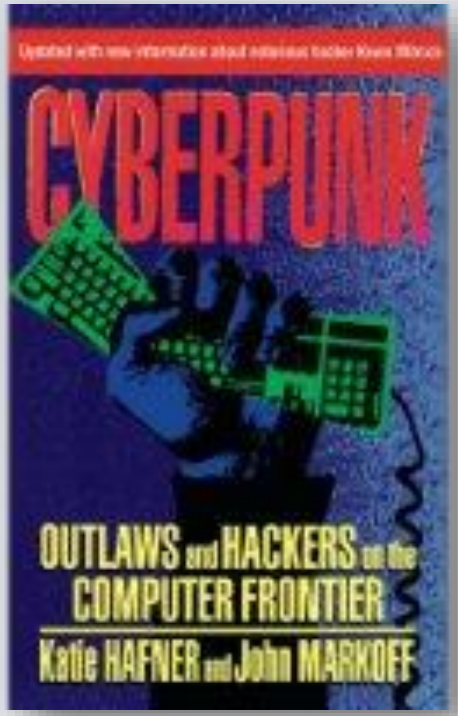


Kevin Mitnick

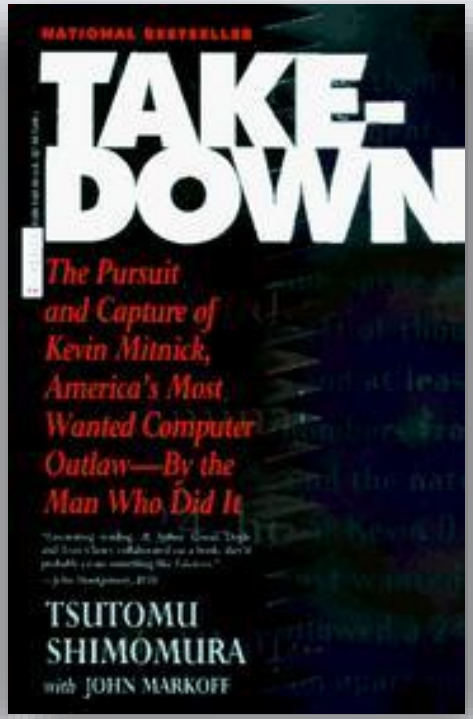
Pre- and post-prison quotes

- "*I saw myself as an electronic joy rider . . . I was like James Bond behind the computer. I was just having a blast . . . I was an accomplished trespasser. I don't consider myself a thief*".
- *"I do want to make a public apology . . . My past actions have invaded their privacy by getting into machines and getting into their code, and I do regret doing that stuff because it's wrong to do".*

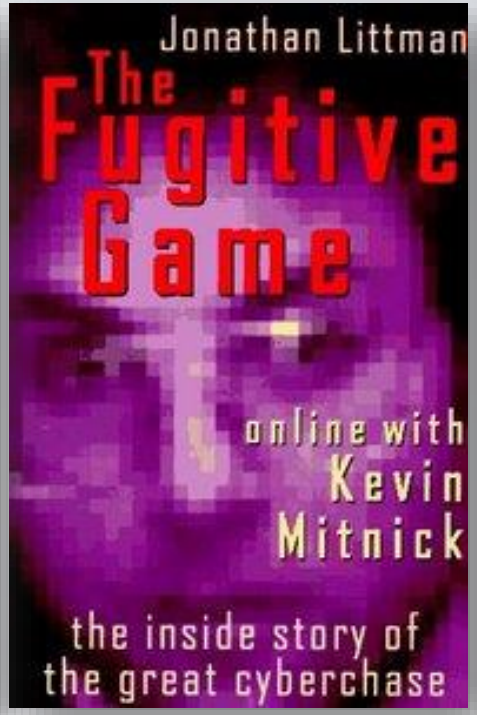
The Mitnick Story



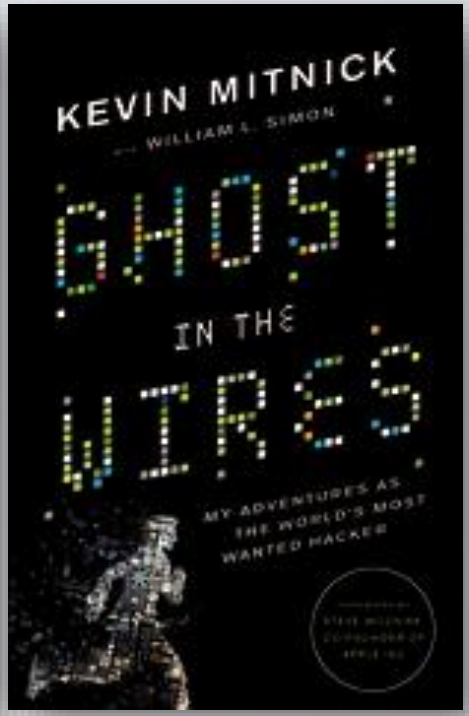
1991



1995



1996



2011

Notable Hackers

Gary McKinnon

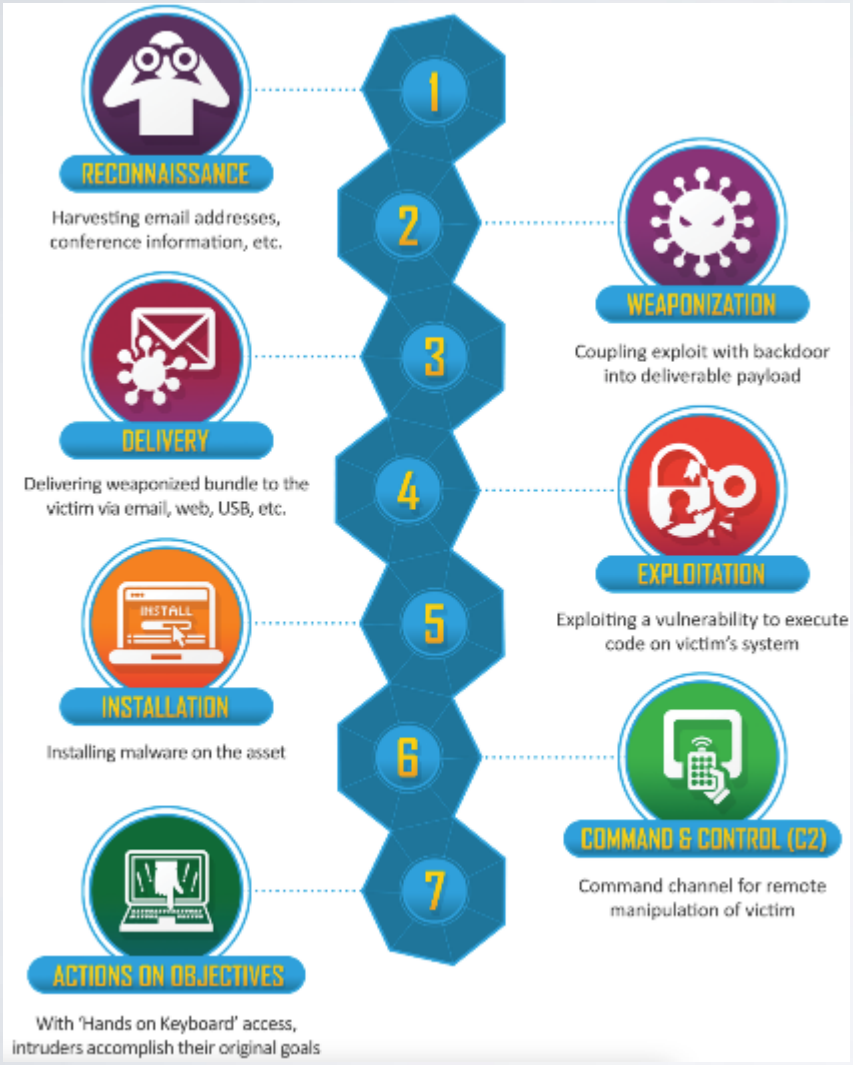
- Unemployed UK sysadmin
- Indicted by US grand jury in 2002, for hacking into over 90 systems between Feb 2001 and March 2002:
  - US Army, US Air Force, US Navy, Department of Defense, and NASA
  - Estimated damage in the region of $900,000
- Used automated vulnerability scanning to identify unpatched Windows NT flaws

The McKinnon case

An example target

- Earle Naval Weapons Station
  - responsible for replenishing munitions supplies to the US Atlantic fleet
- Attacked three times between April and September 2001
- final attack (on 23/9/2001 … 2 weeks after 9/11)
  - shut down the entire network of 300 machines after deletion of key system files
  - system outage for a week, and unable to send/receive external email for a further 3 weeks
- October 2012 - Home Secretary blocks extradition

Cyber Kill Chain



- Developed to aid security professionals in identifying the steps adversaries will follow
- Based upon techniques/concepts of military kill chains

Source: https://www.lockheedmartin.com/en-us/capabilities/cyber/cyber-kill-chain.html

Apply cyber kill chain (1)

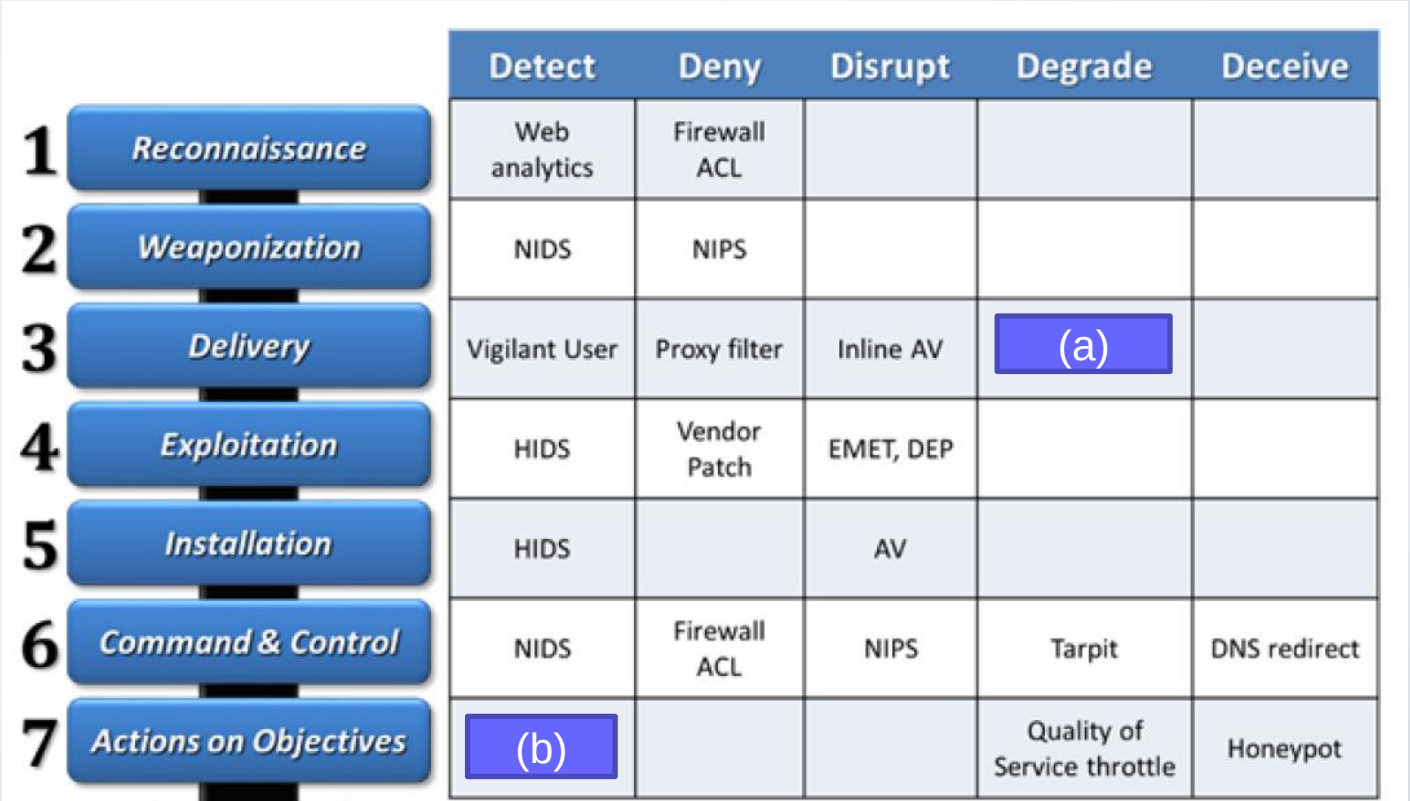
- Menti
- You are working in the security team in company A. Your team receives two alerts:
  a) an event produced from a Network Intrusion Detection System (NIDS)
  b) an event from a Host Intrusion Prevention System (HIPS)

  Which would you prioritize to deal first and why?

Apply cyber kill chain (2)

(Menti)The below graph showing each stage of the process on one axis and the countermeasure along the other can then identify the tool in place to perform the mitigation at that stage in the box where each intersects. An empty box indicates gaps where investments can be made to further enhance the organization's protections.

Which would you prioritize to invest and why?



	Detect	Deny	Disrupt	Degrade	Deceive
1 Reconnaissance	Web analytics	Firewall ACL			
2 Weaponization	NIDS	NIPS			
3 Delivery	Vigilant User	Proxy filter	Inline AV	(a)	
4 Exploitation	HIDS	Vendor Patch	EMET, DEP		
5 Installation	HIDS		AV		
6 Command & Control	NIDS	Firewall ACL	NIPS	Tarpit	DNS redirect
7 Actions on Objectives	(b)			Quality of Service throttle	Honeypot

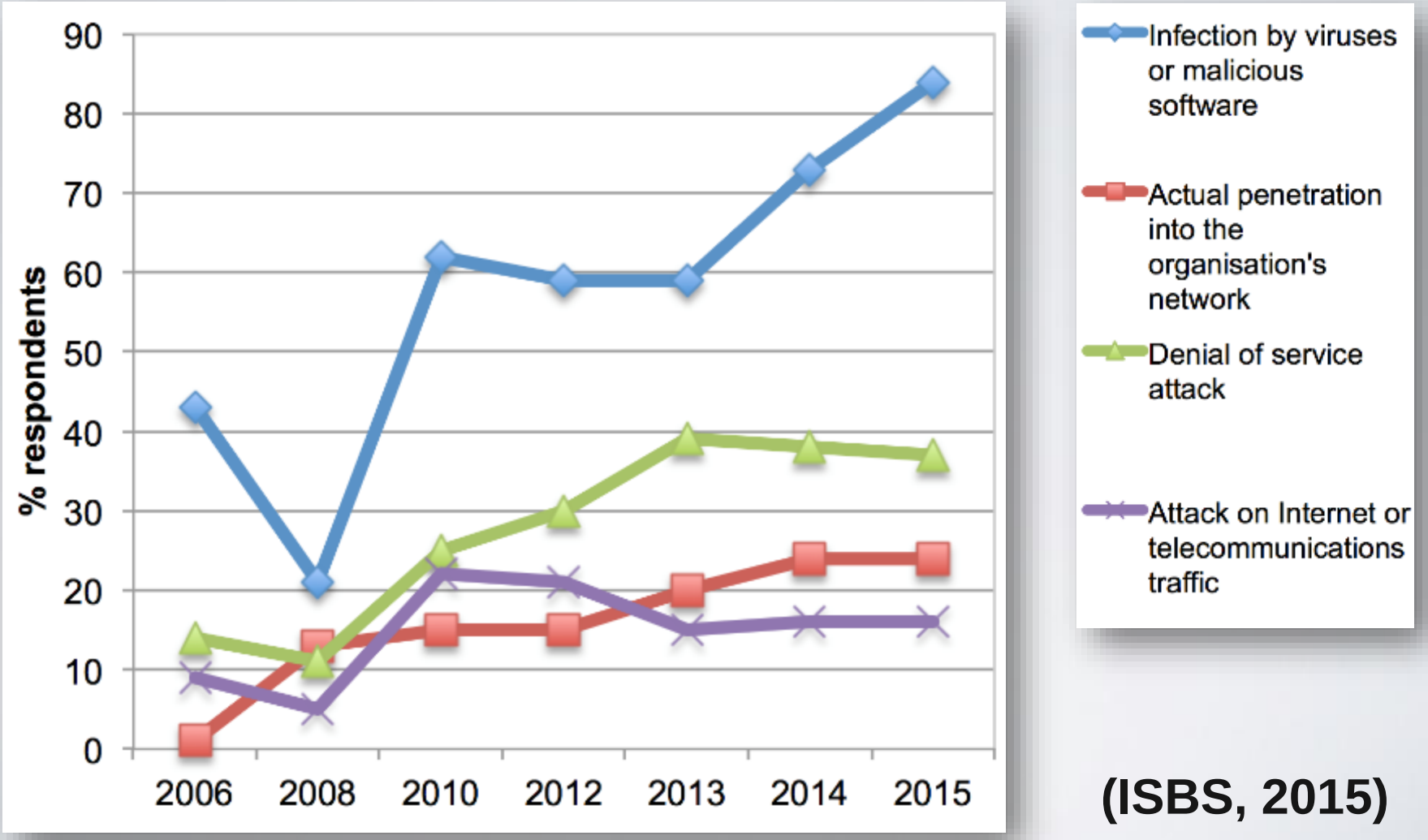
Malware

Malware

- A long-standing problem, growing in scale, sophistication and routes
- Kaspersky Lab reported identifying 360,000 new malicious files per day in 2020
  - an increase of 125,000 per day compared to 2012

    (Source: Kaspersky Lab, Dec 2014)
  - in 2008, we talked of 8,000 new strains per month
- Commonly reaches, and targets, end-users

Historically a top threat



(ISBS, 2015)

Types of Malware

- **Virus**

  A *non-autonomous* program that replicates and spreads itself by infecting systems, programs or files.

- **Worm**

  Code that is able to replicate and spread *autonomously* through systems and networks.

- **Trojan horse**

  A program containing unexpected hidden functionality, potentially operating alongside expected behaviour

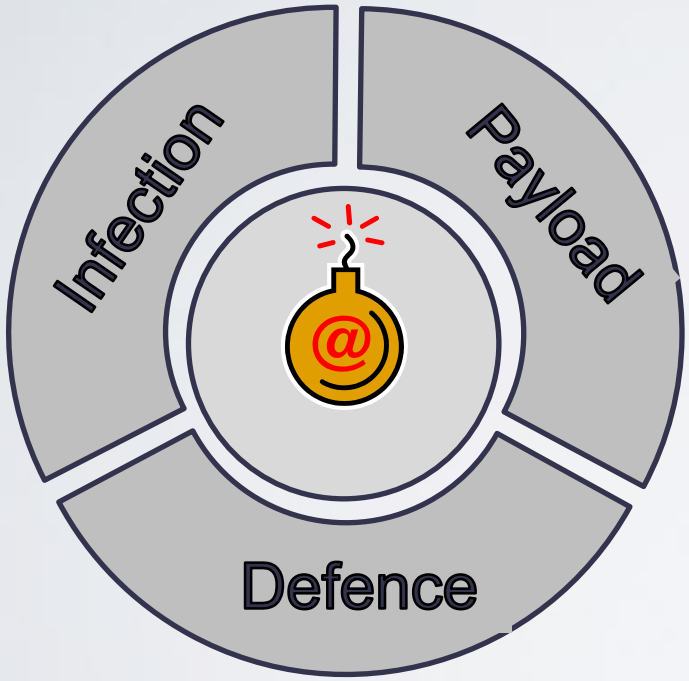
- **Spyware**

  Parasitic software that invades users' privacy by gathering information

Characteristics

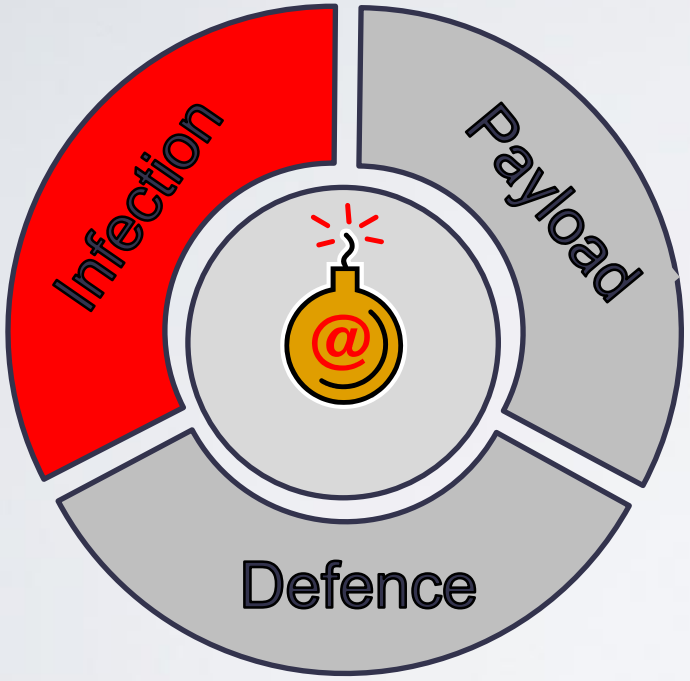
Virus	Worm
A virus infects a system by inserting itself into a file or executable program	A worm infects a system by exploiting a vulnerability
It might delete or alter files or change the location of files in the system	Typically, does not modify any stored programs, it exploits the CPU and memory
It alters a computer system without knowledge or consent of a user	It consumes network bandwidth, system memory – possibly consequence of DoS
A virus cannot spread to other computers without manual intervention	A work can replicate itself and spread across a network
A virus spreads at a uniform rate as programmed	A worm spreads more rapidly than a virus
Viruses are difficult to remove from infected machines	Compared with a virus, a worm can be removed easily

Dimensions of malware behaviour



- Infection
  - reflects how and where users are likely to come into contact with malware
- Payload
  - Determines what the malware will actually *do* and represents the most variable (least predictable) aspect of behaviour
- Defence
  - The ability of the malware to ability to safeguard itself against detection and removal

Infection vectors



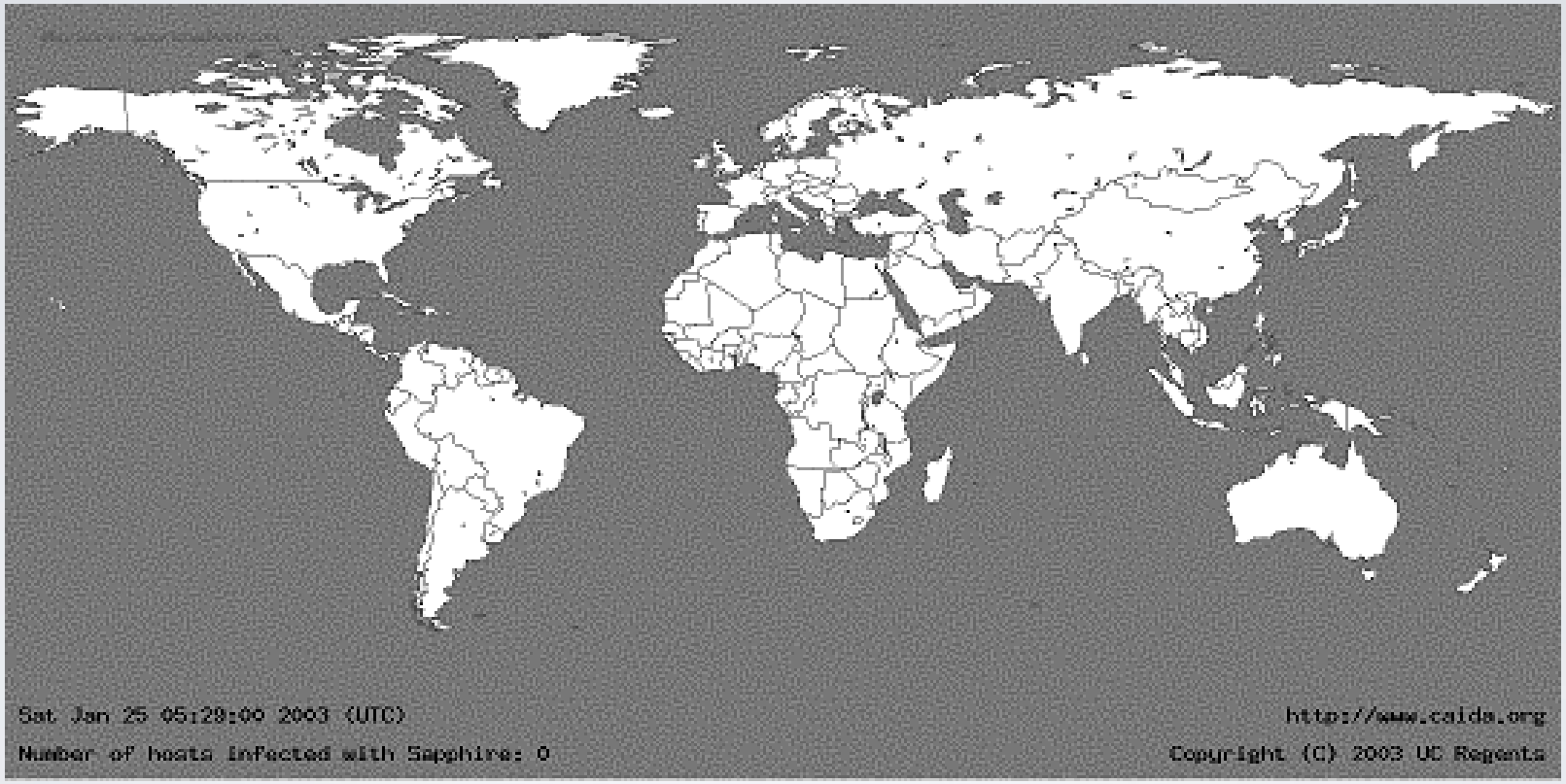
- Email attachments
- Instant messaging
- Peer-to-peer file sharing
- Exploitation of unpatched vulnerabilities
- Compromised websites (drive-by downloads)
- Removable media

Malware	Year	Injection Technique	Propagation Techniques
StormWorm	2007–2008	Email attachments/ File execution	File dropper Overwrite/deletion P2P C2 structure and Fast Flux communication chaining
AutoIT	2008	File execution	Copies generated onto removable drives by overwriting the autorun.inf
Downadup	2009	File execution	File transfer, file sharing, copying itself across network shares or shares with weak passwords
Bacteraloh	2009	File execution (P2P network-based)	Disguised as a crack utility that a user downloads and executes locally
Koobface	2009	Client-side exploit	Spread through social networking sites with a loaded URL linked to the malware through sites such as Facebook, MySpace, Friendster, and LiveJournal

Less reliance upon users

Early 1990s	Relied upon people to exchange disks between systems, to spread boot sector and file viruses
Mid 1990s	A move towards macro viruses, which enabled the malware to be embedded in files that users were more likely to exchange with each other
Late 1990s	The appearance of automated mass mailing functionality, removing the reliance upon users to manually send infected files
Early 2000s	Avoiding the need to dupe the user into opening an infected email attachment, by exploiting vulnerabilities that enable infection without user intervention

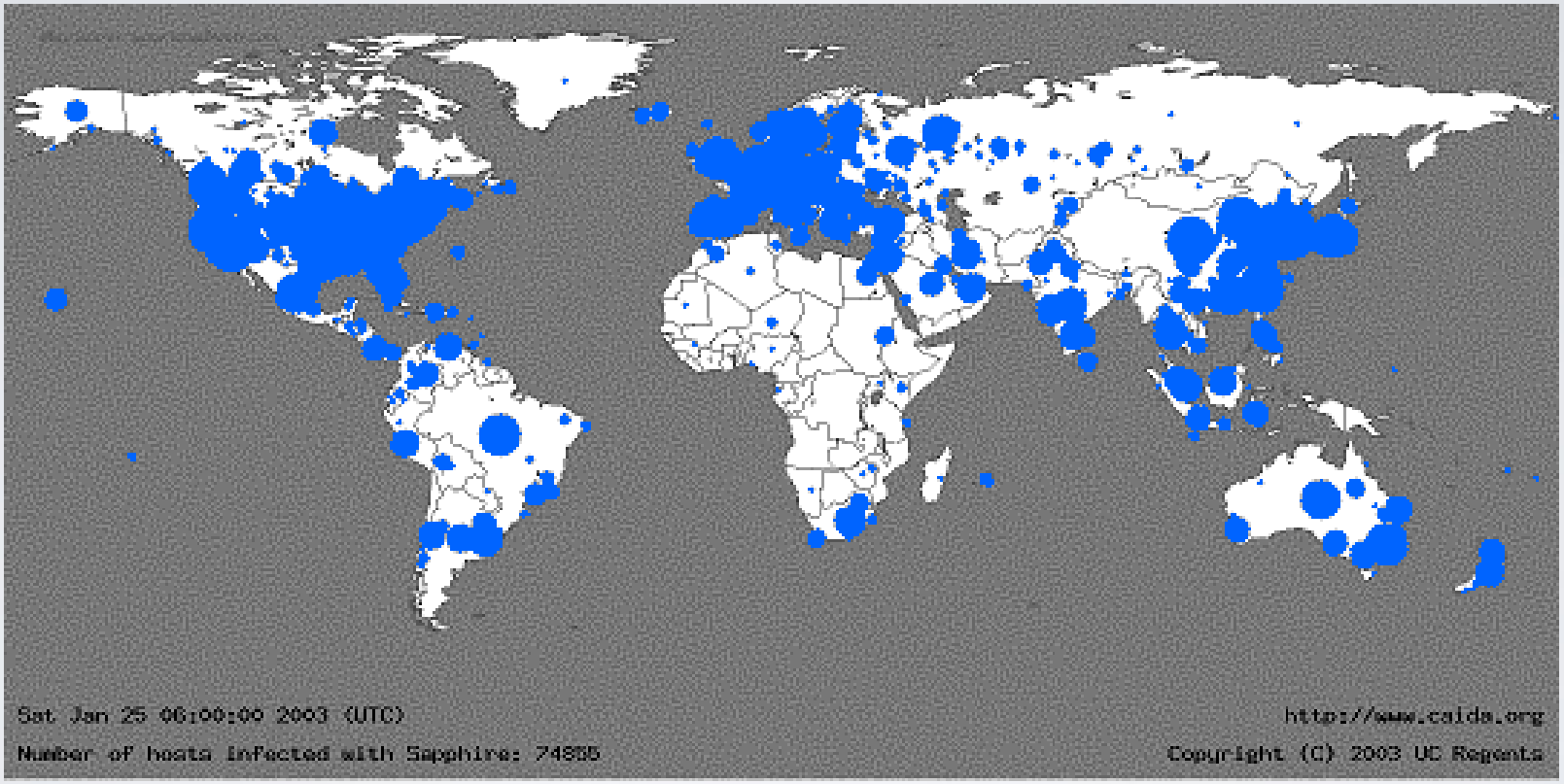
Slammer worm (2003)
Before release …



25 Jan 2003 - 05:29:00 / 0 victims

Slammer infections

… 31 Minutes Later



25 Jan 2003 - 06:00:00 / 74,855 victims

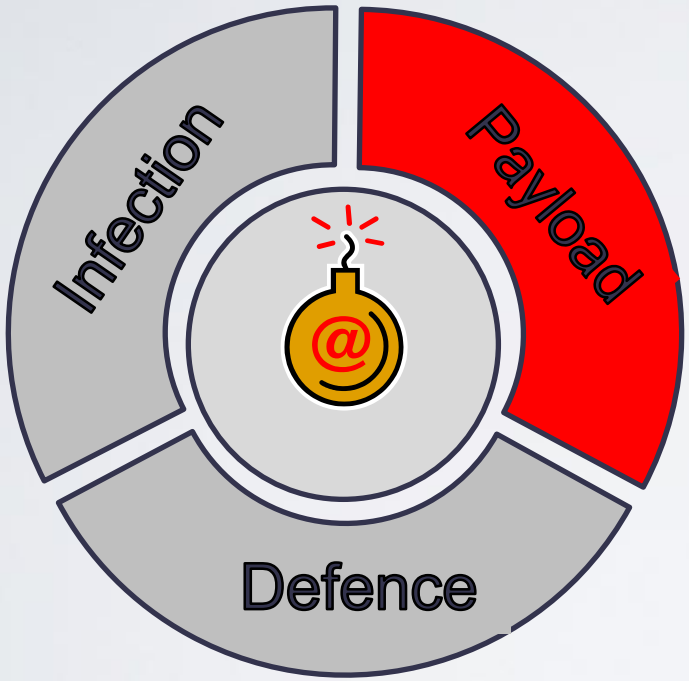
14 years later . . .

Source: www.scmagazineuk.com/sql-sequel-sequel-slammer-worm-resurfaces-after-more-than-a-decade/article/636251/

"One theory to why it's attempting to make a comeback is that cybercriminals are seeking easy ways to cause DoS and slow down the entire Internet, just like with the recent Mirai botnet … And reusing old malware is the easiest way"

Maya Horowitz
Group manager, Threat Intelligence at Check Point

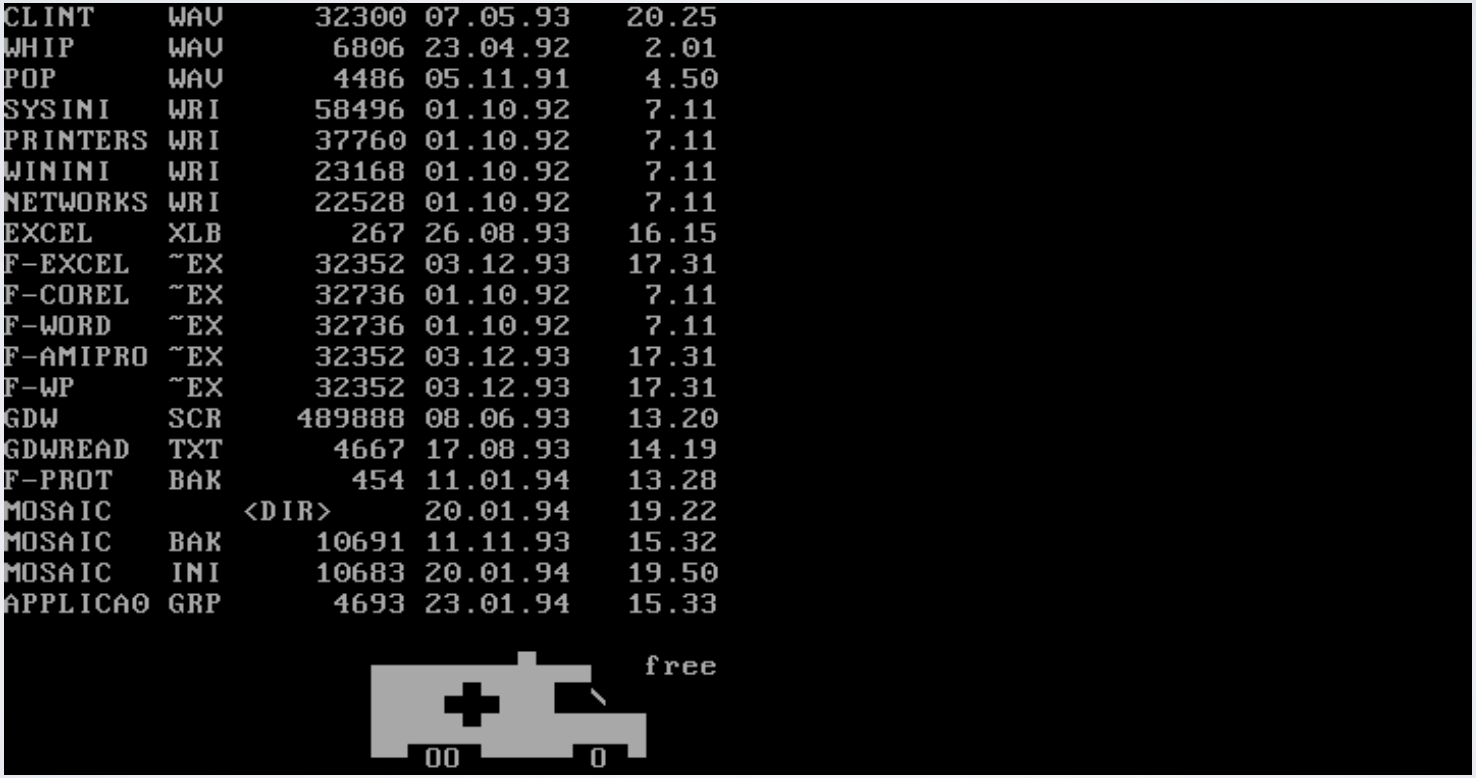
Payload actions



- Damaging systems
  - Damaging and deleting files
  - Corrupting the BIOS
- Stealing information
  - Copying files
  - Keylogging
- Hijacking systems
  - Opening backdoors
  - Remote control (Botnets)

Back in the old days …

- Many early viruses were more of a nuisance than actually harmful

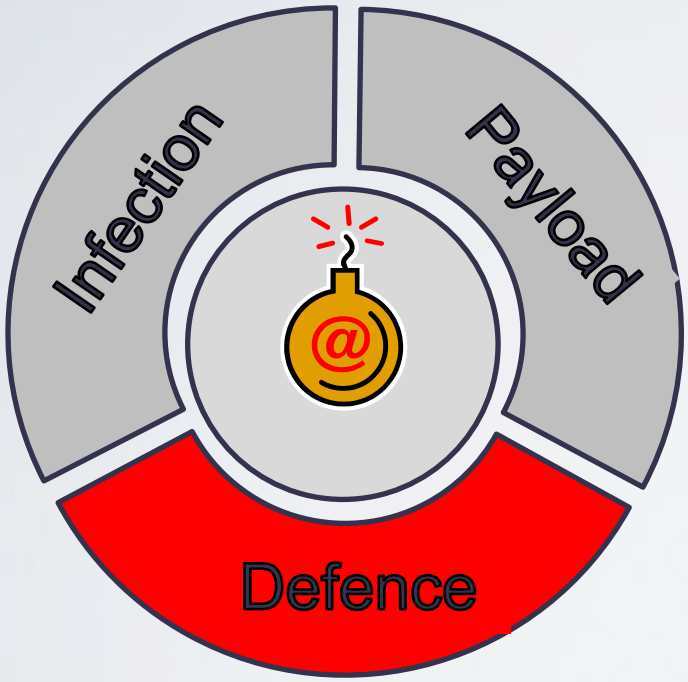


The Ambulance virus (1990)

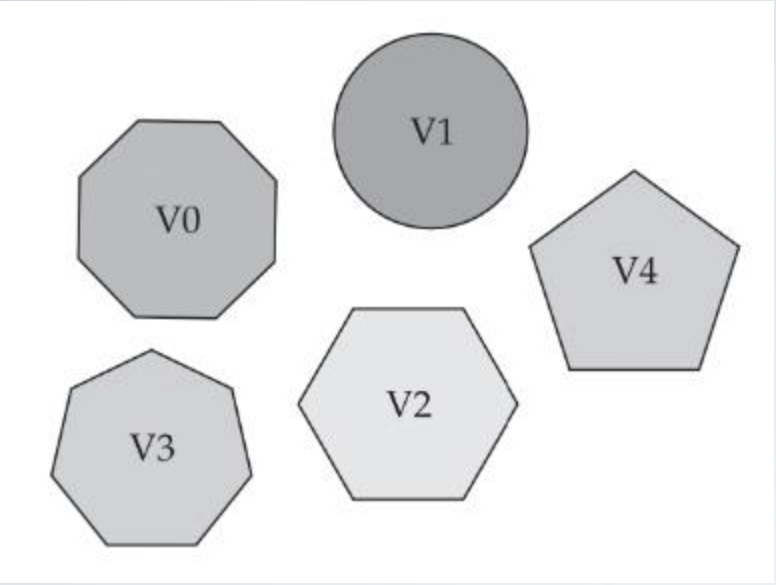
More recently . . .

- **WannaCry** (May 2017)
  - Also known as WannaCrypt or WanaCrypt0r
  - An example of Crypto Ransomware
  - Infection of 200,000 computers across 150 countries
  - Notable victim was the UK National Health Service, due to continued use of unsupported (and hence unpatched) Windows XP

Defences

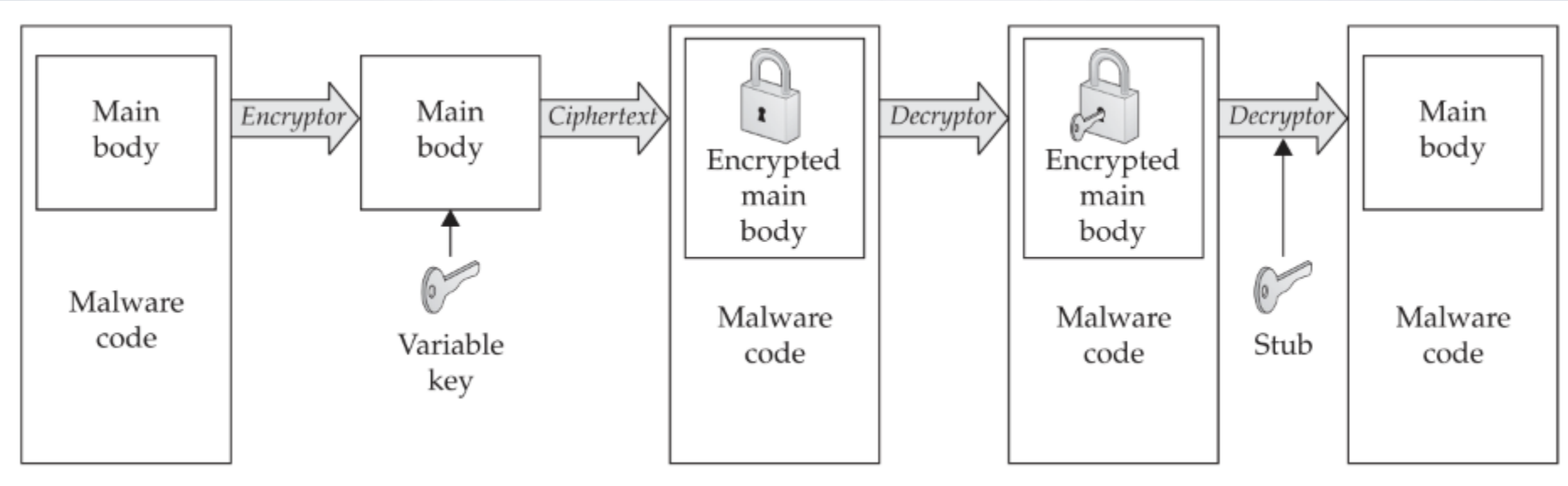


- Passive techniques (hiding)
  - Stealth techniques
  - Polymorphism and metamorphism
- Active techniques (attacking)
  - Changing system configuration so that security software no longer runs at start up
  - Blocking access to over antivirus (AV) vendors' sites to prevent updates
  - Terminating processes relating to AV and firewall processes



metamorphism

polymorphism



Evolving self-defence

- Brain virus (1986)
  - intercepted any attempts to read the infected boot sector
  - if anyone tried to inspect the disk, they would be presented with a copy of the original, uninfected boot sector
- Gaobot worm (2005)
  - blocked access to 35 security-related sites and had a list of over 420 different processes that it tried to terminate

Evolving self-defence

- Shifu Trojan (2015)
  - A banking Trojan, which affected Japanese banks and financial institutions in Aug/Sept 2015
  - Based upon techniques reused from a variety of previously detected malware (e.g. Zeus, Conficker)
  - Notably *included its own anti-malware module* to ward off other banking Trojans and ensure that it retains control of the compromised systems

http://news.softpedia.com/news/shifu-banking-trojan-comes-with-its-own-antivirus-to-keep-other-malware-at-bay-490580.shtml

Malware on the move

- Malware now commonly targets smartphones and tablets as well as desktops and laptops
- Android has proven to be a very popular malware platform due to:
  - large user base
  - unrestricted deployment of apps

Conclusions

- The range and number of cybercrime incidents is increasing
- IT is increasingly be the native environment for crime
  - New threats are likely to emerge in the future, alongside new end-user Internet services
- Malware continues to be the major category of incident for most users
  - The threat has continually evolved to target new services
  - Has spawned and sustained a whole subset of the industry
- No single solution
  - appropriate technologies ***and*** suitable awareness initiatives are required

Activities

1. GDPR, Cyber Threats & Adversarial Behaviours quizzes on DLE
2. Summarise the cyber threat trend in year 2022 from a report of a popular organisation (cyber security breaches survey of UK government, Risk based security, SANS,…)
3. Identify the infection, payload, defence of Wannacry
4. Find an example of the usage of Cyber Kill Chain

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