Guide to Computer Forensics and Investigations Third Edition

Chapter 1

Computer Forensics and Investigations as a Profession

Objectives

- Define computer forensics
- Describe how to prepare for computer investigations and explain the difference between law enforcement agency and corporate investigations
- Explain the importance of maintaining professional conduct

Understanding Computer Forensics

- **Computer forensics**
  - Involves obtaining and analyzing digital information
    - As evidence in civil, criminal, or administrative cases
- FBI Computer Analysis and Response Team (CART)
  - Formed in 1984 to handle the increasing number of cases involving digital evidence

Understanding Computer Forensics (continued)

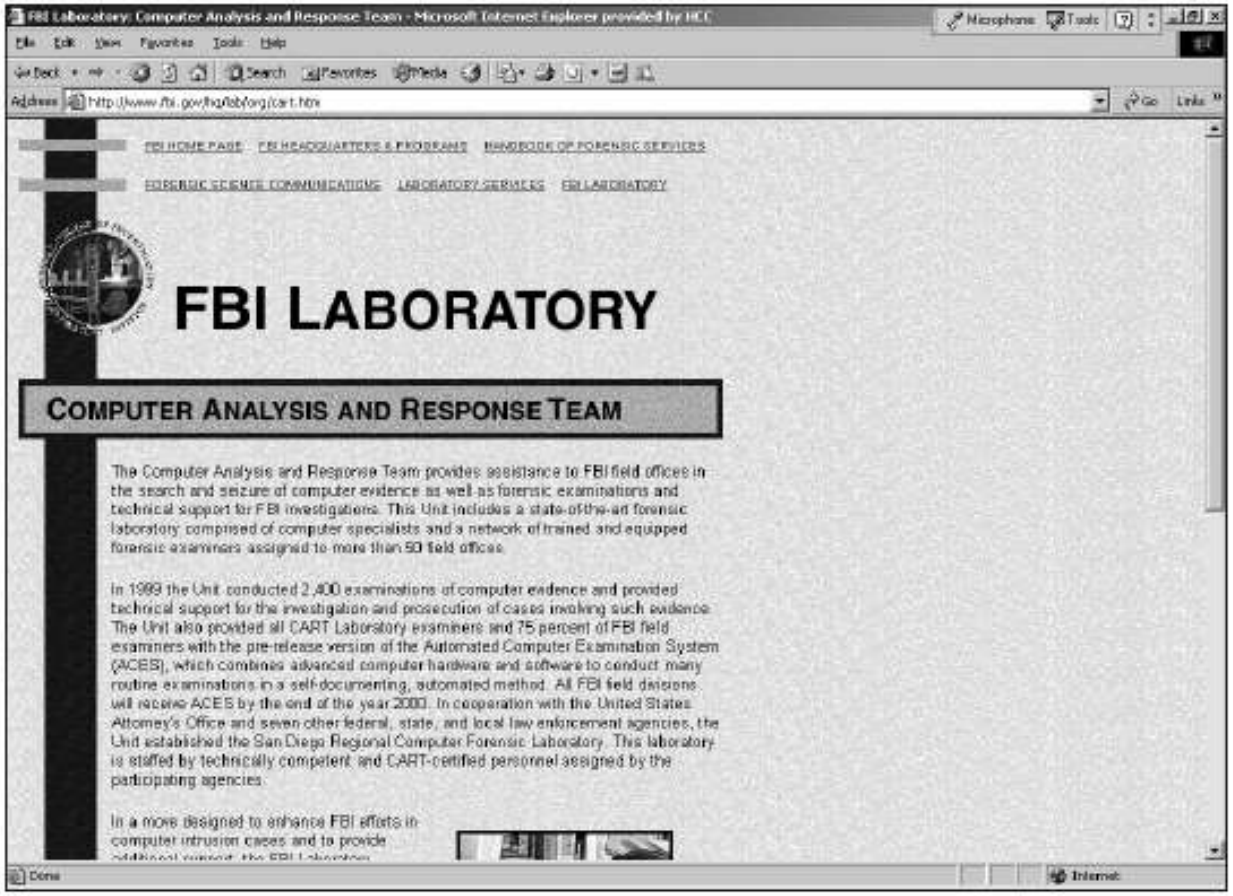


Figure 1-1 The FBI CART Web site

Understanding Computer Forensics (continued)

- **Fourth Amendment** to the U.S. Constitution
  - Protects everyone's rights to be secure in their person, residence, and property
    - From search and seizure
  - **Search warrants** are needed

Computer Forensics Versus Other Related Disciplines

- Computer forensics
  - Investigates data that can be retrieved from a computer's hard disk or other storage media
- Network forensics
  - Yields information about how a perpetrator or an attacker gained access to a network
- **Data recovery**
  - Recovering information that was deleted by mistake
    - Or lost during a power surge or server crash
  - Typically you know what you're looking for

Computer Forensics Versus Other Related Disciplines (continued)

- Computer forensics
  - Task of recovering data that users have hidden or deleted and using it as evidence
  - Evidence can be **inculpatory** (“incriminating”) or **exculpatory**
- **Disaster recovery**
  - Uses computer forensics techniques to retrieve information their clients have lost
- Investigators often work as a team to make computers and networks secure in an organization

Computer Forensics Versus Other Related Disciplines (continued)

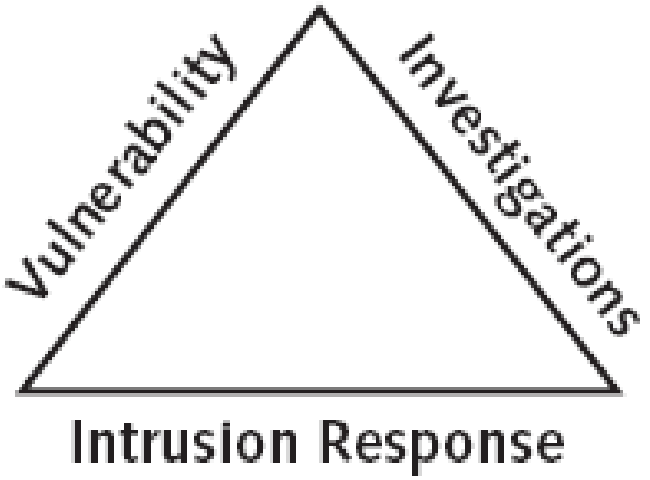


Figure 1-2 The investigations triad

Computer Forensics Versus Other Related Disciplines (continued)

- **Enterprise network environment**
  - Large corporate computing systems that might include disparate or formerly independent systems
- **Vulnerability assessment and risk management** group
  - Tests and verifies the integrity of standalone workstations and network servers
  - Professionals in this group have skills in **network intrusion detection and incident response**

Computer Forensics Versus Other Related Disciplines (continued)

- **Litigation**
  - Legal process of proving guilt or innocence in court
- **Computer investigations** group
  - Manages investigations and conducts forensic analysis of systems suspected of containing evidence related to an incident or a crime

A Brief History of Computer Forensics

- By the 1970s, electronic crimes were increasing, especially in the financial sector
  - Most law enforcement officers didn't know enough about computers to ask the right questions
    - Or to preserve evidence for trial
- 1980s
  - PCs gained popularity and different OSs emerged
  - Disk Operating System (DOS) was available
  - Forensics tools were simple, and most were generated by government agencies

A Brief History of Computer Forensics (continued)

- Mid-1980s
  - Xtree Gold appeared on the market
    - Recognized file types and retrieved lost or deleted files
  - Norton DiskEdit soon followed
    - And became the best tool for finding deleted file
- 1987
  - Apple produced the Mac SE
    - A Macintosh with an external EasyDrive hard disk with 60 MB of storage

A Brief History of Computer Forensics (continued)

Figure 1-3 An 8088 computer

A Brief History of Computer Forensics (continued)

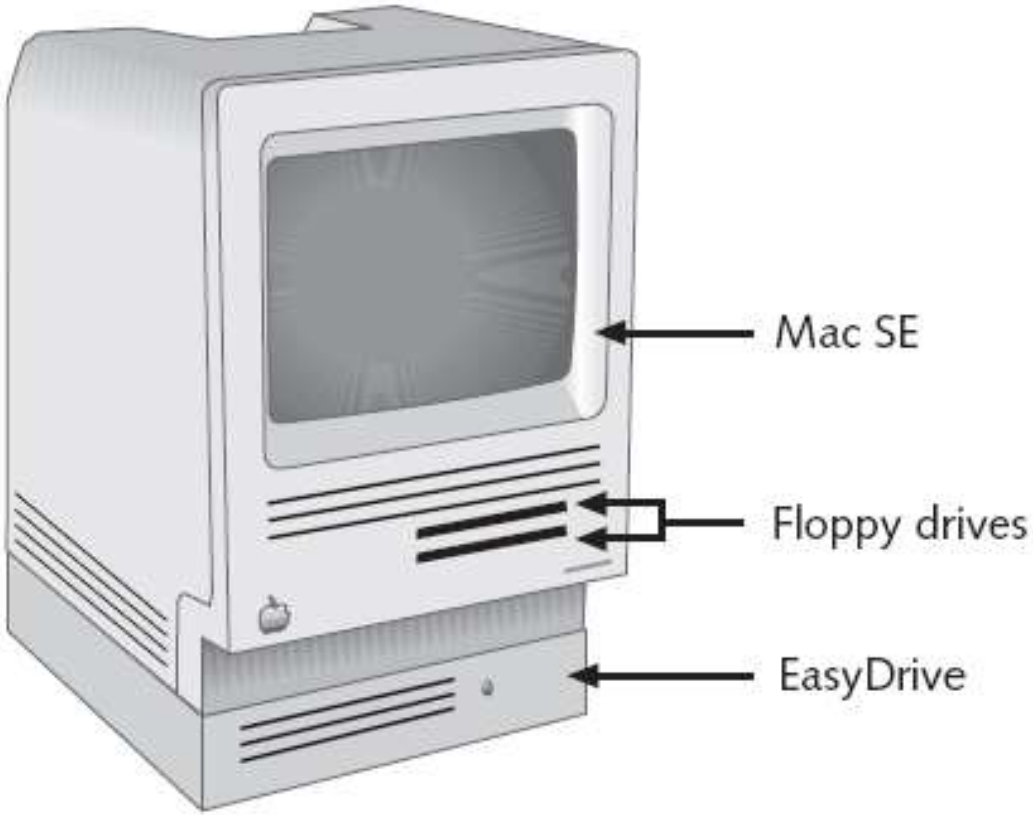


Figure 1-4 A Mac SE with an external EasyDrive hard disk

A Brief History of Computer Forensics (continued)

- Early 1990s
  - Tools for computer forensics were available
  - **International Association of Computer Investigative Specialists (IACIS)**
    - Training on software for forensics investigations
  - IRS created search-warrant programs
  - ExpertWitness for the Macintosh
    - First commercial GUI software for computer forensics
    - Created by ASR Data

A Brief History of Computer Forensics (continued)

- Early 1990s (continued)
  - ExpertWitness for the Macintosh
    - Recovers deleted files and fragments of deleted files
- Large hard disks posed problems for investigators
- Other software
  - iLook
  - AccessData Forensic Toolkit (FTK)

Understanding Case Law

- Technology is evolving at an exponential pace
  - Existing laws and statutes can't keep up change
- Case law used when statutes or regulations don't exist
- Case law allows legal counsel to use previous cases similar to the current one
  - Because the laws don't yet exist
- Each case is evaluated on its own merit and issues

Developing Computer Forensics Resources

- You must know more than one computing platform
  - Such as DOS, Windows 9x, Linux, Macintosh, and current Windows platforms
- Join as many computer user groups as you can
- **Computer Technology Investigators Network (CTIN)**
  - Meets monthly to discuss problems that law enforcement and corporations face

Developing Computer Forensics Resources (continued)

- **High Technology Crime Investigation Association (HTCIA)**
  - Exchanges information about techniques related to computer investigations and security
- User groups can be helpful
- Build a network of computer forensics experts and other professionals
  - And keep in touch through e-mail
- Outside experts can provide detailed information you need to retrieve digital evidence

Preparing for Computer Investigations

- Computer investigations and forensics falls into two distinct categories
  - Public investigations
  - Private or corporate investigations
- Public investigations
  - Involve government agencies responsible for criminal investigations and prosecution
  - Organizations must observe legal guidelines
- Law of **search and seizure**
  - Protects rights of all people, including suspects

Preparing for Computer Investigations (continued)

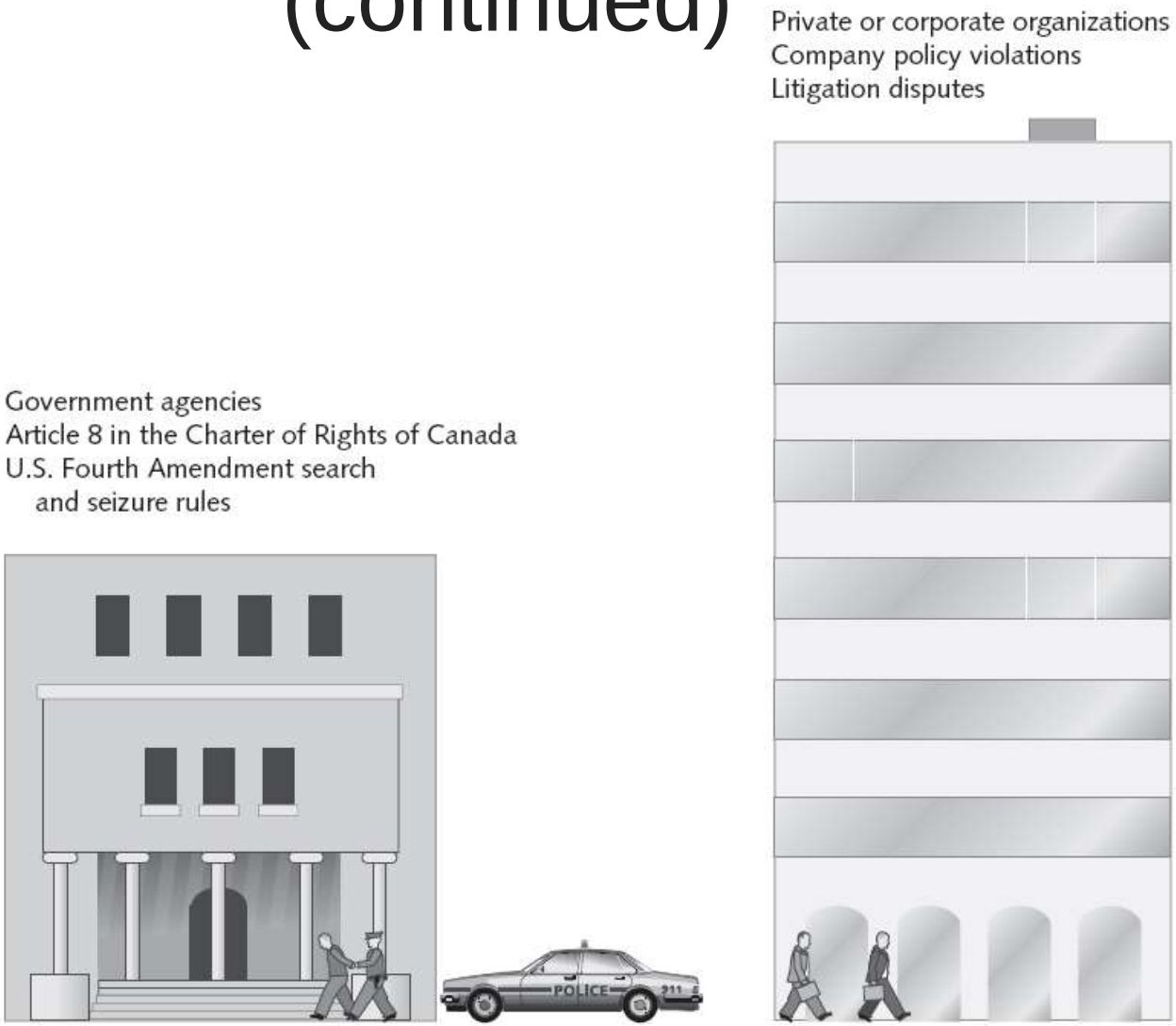


Figure 1-5 Public versus private sector investigations

Preparing for Computer Investigations (continued)

Figure 1-6 The Fourth Amendment

Preparing for Computer Investigations (continued)

- Private or corporate investigations
  - Deal with private companies, non-law-enforcement government agencies, and lawyers
  - Aren't governed directly by **criminal law** or Fourth Amendment issues
  - Governed by internal policies that define expected employee behavior and conduct in the workplace
- Private corporate investigations also involve litigation disputes
- Investigations are usually conducted in civil cases

Understanding Law Enforcements Agency Investigations

- In a **criminal case**, a suspect is tried for a criminal offense
  - Such as burglary, murder, or molestation
- Computers and networks are only tools that can be used to commit crimes
  - Many states have added specific language to criminal codes to define crimes involving computers
- Following the legal process
  - Legal processes depend on local custom, legislative standards, and rules of evidence

Understanding Law Enforcements Agency Investigations (continued)

- Following the legal process (continued)
  - Criminal case follows three stages
    - The complaint, the investigation, and the prosecution

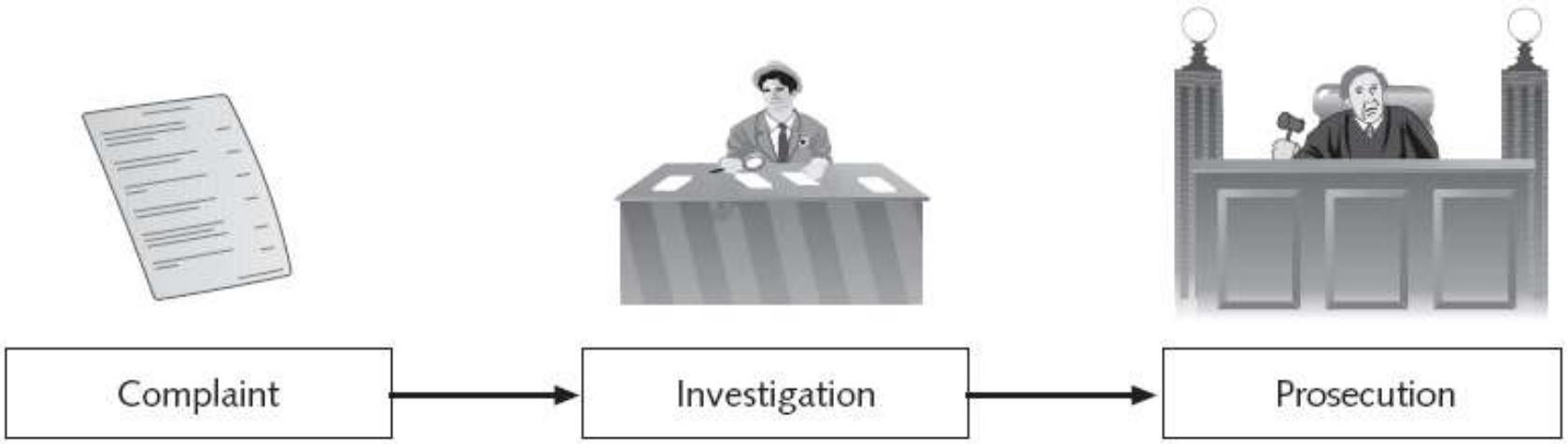


Figure 1-7 The public-sector case flow

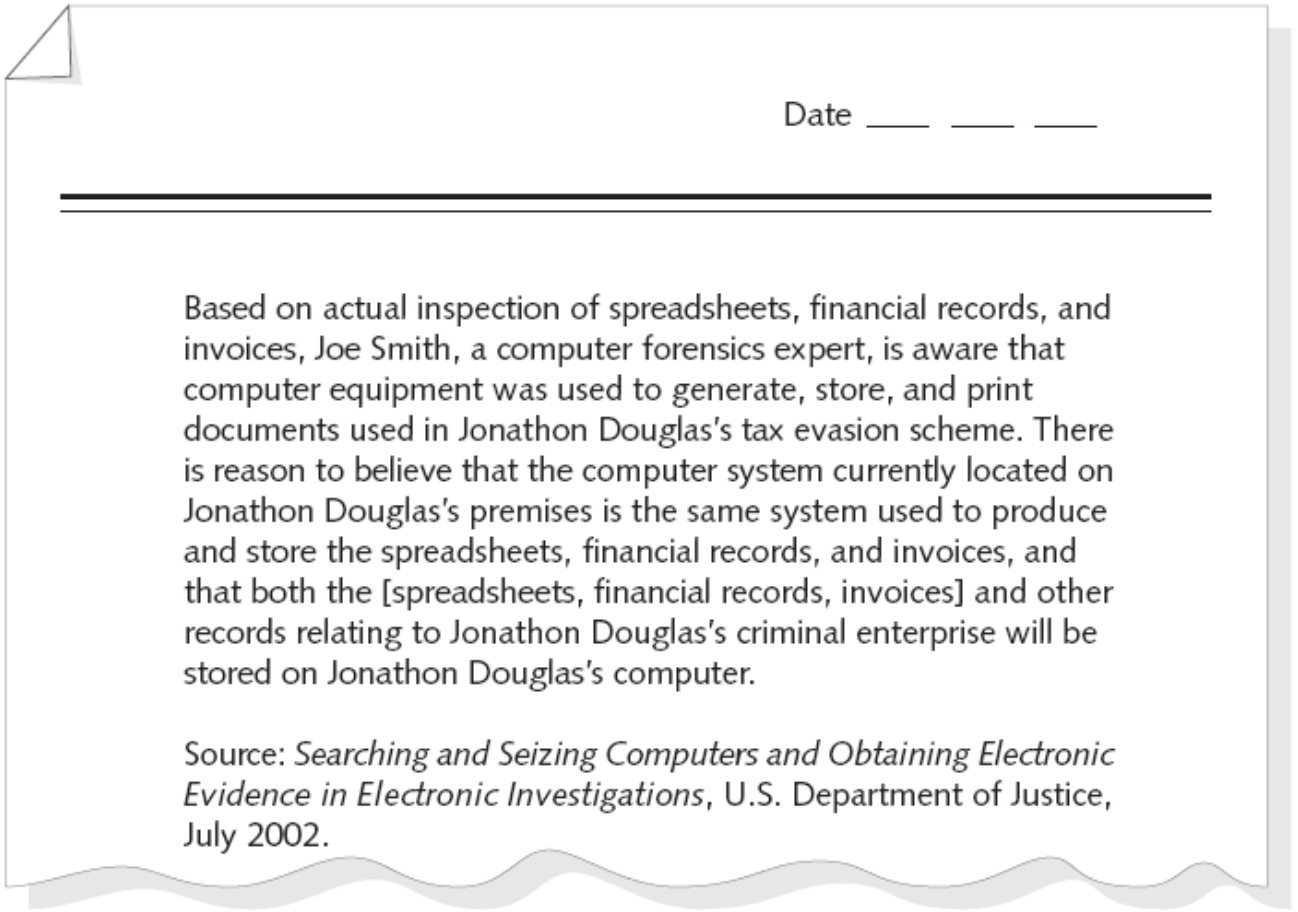
Understanding Law Enforcements Agency Investigations (continued)

- Following the legal process (continued)
  - A criminal case begins when someone finds evidence of an illegal act
  - Complainant makes an **allegation**, an accusation or supposition of fact
  - A police officer interviews the complainant and writes a report about the crime
    - **Police blotter** provides a record of clues to crimes that have been committed previously
  - Investigators delegate, collect, and process the information related to the complaint

Understanding Law Enforcements Agency Investigations (continued)

- Following the legal process (continued)
  - After you build a case, the information is turned over to the prosecutor
  - **Affidavit**
    - Sworn statement of support of facts about or evidence of a crime
      - Submitted to a judge to request a search warrant
    - Have the affidavit **notarized** under sworn oath
  - Judge must approve and sign a search warrant
    - Before you can use it to collect evidence

Understanding Law Enforcements Agency Investigations (continued)



Date ____ ____ ____

Based on actual inspection of spreadsheets, financial records, and invoices, Joe Smith, a computer forensics expert, is aware that computer equipment was used to generate, store, and print documents used in Jonathon Douglas's tax evasion scheme. There is reason to believe that the computer system currently located on Jonathon Douglas's premises is the same system used to produce and store the spreadsheets, financial records, and invoices, and that both the [spreadsheets, financial records, invoices] and other records relating to Jonathon Douglas's criminal enterprise will be stored on Jonathon Douglas's computer.

Source: *Searching and Seizing Computers and Obtaining Electronic Evidence in Electronic Investigations*, U.S. Department of Justice, July 2002.

Figure 1-8 Typical affidavit language

Understanding Corporate Investigations

- Private or corporate investigations
  - Involve private companies and lawyers who address company policy violations and litigation disputes
- Corporate computer crimes can involve:
  - E-mail harassment
  - Falsification of data
  - Gender and age discrimination
  - Embezzlement
  - Sabotage
  - **Industrial espionage**

Understanding Corporate Investigations (continued)

- Establishing company policies
  - One way to avoid litigation is to publish and maintain policies that employees find easy to read and follow
  - Published company policies provide a **line of authority**
    - For a business to conduct internal investigations
  - Well-defined policies
    - Give computer investigators and forensic examiners the authority to conduct an investigation
- Displaying Warning Banners
  - Another way to avoid litigation

Understanding Corporate Investigations (continued)

- Displaying Warning Banners (continued)
  - **Warning banner**
    - Usually appears when a computer starts or connects to the company intranet, network, or virtual private network
    - Informs end users that the organization reserves the right to inspect computer systems and network traffic at will
    - Establishes the right to conduct an investigation
  - As a corporate computer investigator
    - Make sure company displays well-defined warning banner

Understanding Corporate Investigations (continued)

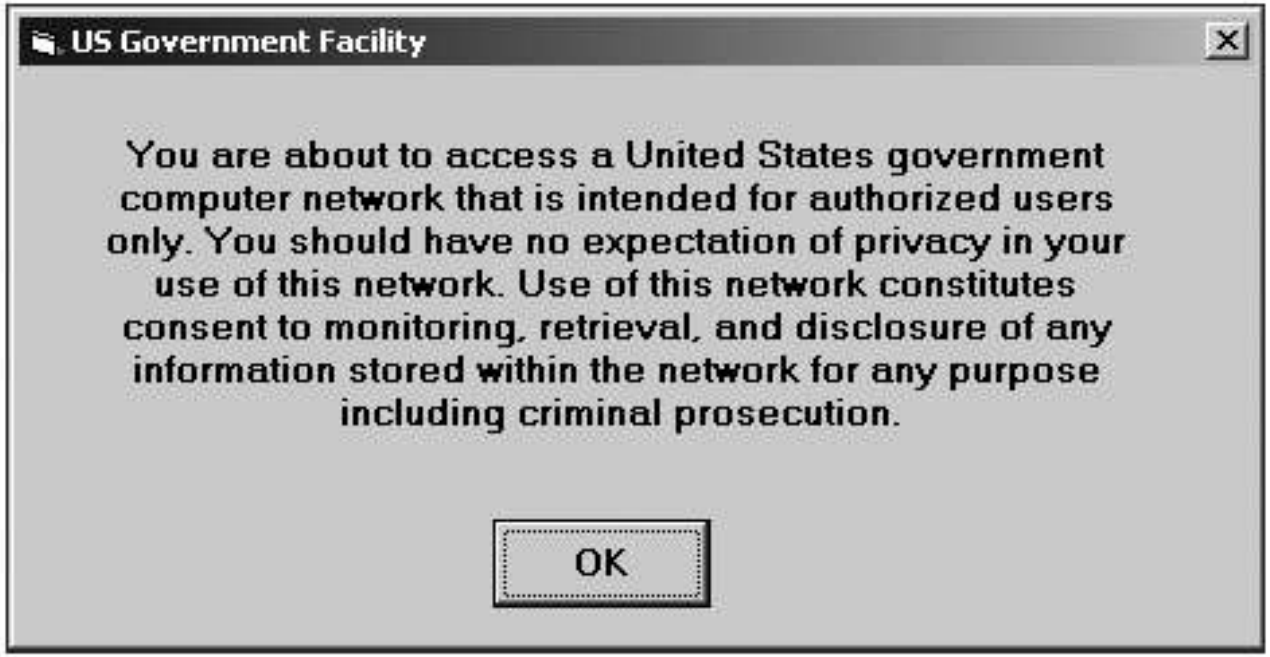


Figure 1-9 A sample warning banner

Understanding Corporate Investigations (continued)

- Designating an authorized requester
  - **Authorized requester** has the power to conduct investigations
  - Policy should be defined by executive management
  - Groups that should have direct authority to request computer investigations
    - Corporate Security Investigations
    - Corporate Ethics Office
    - Corporate Equal Employment Opportunity Office
    - Internal Auditing
    - The general counsel or Legal Department

Understanding Corporate Investigations (continued)

- Conducting security investigations
  - Types of situations
    - Abuse or misuse of corporate assets
    - E-mail abuse
    - Internet abuse
  - Be sure to distinguish between a company's abuse problems and potential criminal problems
  - Corporations often follow the **silver-platter doctrine**
    - What happens when a civilian or corporate investigative agent delivers evidence to a law enforcement officer

Understanding Corporate Investigations (continued)

- Distinguishing personal and company property
  - Many company policies distinguish between personal and company computer property
  - One area that's difficult to distinguish involves PDAs, cell phones, and personal notebook computers
  - The safe policy is to not allow any personally owned devices to be connected to company-owned resources
    - Limiting the possibility of commingling personal and company data

Maintaining Professional Conduct

- **Professional conduct**
  - Determines your credibility
  - Includes ethics, morals, and standards of behavior
- Maintaining objectivity means you must form and sustain unbiased opinions of your cases
- Maintain an investigation's credibility by keeping the case confidential
  - In the corporate environment, confidentiality is critical
- In rare instances, your corporate case might become a criminal case as serious as murder

Maintaining Professional Conduct (continued)

- Enhance your professional conduct by continuing your training
- Record your fact-finding methods in a journal
- Attend workshops, conferences, and vendor courses
- Membership in professional organizations adds to your credentials
- Achieve a high public and private standing and maintain honesty and integrity

Summary

- Computer forensics applies forensics procedures to digital evidence
- Laws about digital evidence established in the 1970s
- To be a successful computer forensics investigator, you must know more than one computing platform
- Public and private computer investigations are different

Summary (continued)

- Use warning banners to remind employees and visitors of policy on computer and Internet use
- Companies should define and limit the number of authorized requesters who can start an investigation
- Silver-platter doctrine refers to handing the results of private investigations over to law enforcement because of indications of criminal activity
- Computer forensics investigators must maintain professional conduct to protect their credibility