Digital Forensics for the Corporation

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Presentation outline

- Digital forensics
- Digital forensics versus computer security
- Issues for an organisation
- Legal considerations
- Current practice
- Resolving technical and organisational issues
- Future challenges and directions

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Why digital forensics ?

- Field has received great interest
  - The CSI effect ☹
- Pervasiveness of computing devices in home and work environments
  - Greater sources of potential evidence
  - Greater amounts of data
- Temporary nature of this evidence
  - The 'future historian' problem

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Digital forensics – a definition(?)

- "*Digital forensics: the study of how people use computers to inflict mischief, hurt and even destruction*" (Mohay et al, 2003)
- "*The application of computer investigation and analysis techniques to determine potential evidence*" (Lin & Seberry, 2003)
- No accepted definition
  - However, generally focuses on investigation and analysis to determine culpability

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Beyond law enforcement

- Wide range of digital forensics activities and tools being used today, e.g.
  - Legal compliance, data recovery, audit, security (Incident Response), etc.
- Increasingly being deployed in organisations
  - Without the robustness of law enforcement processes?
- Organisations understand security but not forensics

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Forensics vs. security

DIGITAL FORENSICS	COMPUTER SECURITY
Attribute culpability	System protection
Multi-disciplinary	Discipline in own right
Emergent field	Established field
No national frameworks/ certification	International frameworks/ certification
Closed forums	Sharing information
Long-term viewpoint (computationally exhaustive)	Short-term viewpoint (reduce computational exhaustion)

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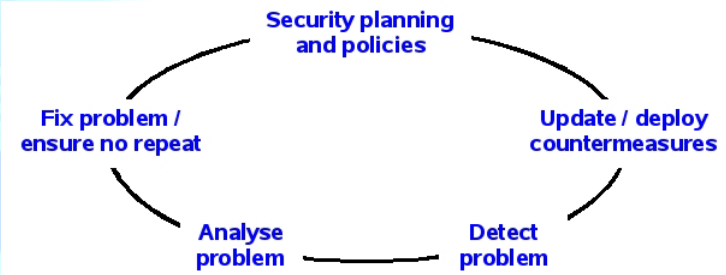
Computer security timeline

- Iterative process
- Focus on system integrity



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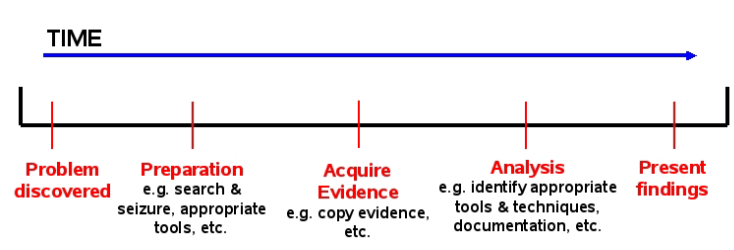
Digital forensics timeline

- Linear process
- Focus on culpability/responsibility



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Issues for an organisation

- No such thing as a typical investigation within an organisation
  - A demoted employee resigns from an organisation and leaves behind a date triggered time bomb program
  - Employees are discovered to be sending sexist or racist emails about a colleague
  - An employee with access to sensitive information offers this data for sale
  - A public company wishing to operate in the US must legally comply

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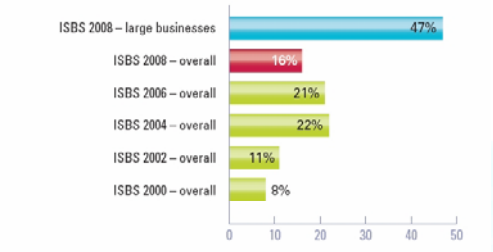
Computer misuse

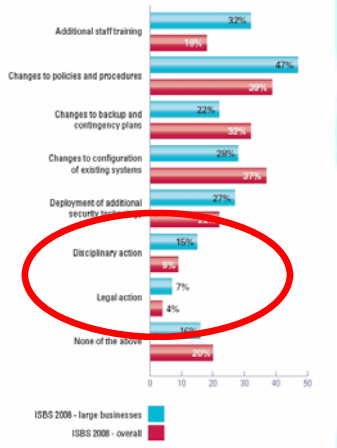
How many UK businesses suffered from staff misuse of information systems?

Figure 62



How did UK businesses address the weakness that caused their worst incident?

Figure 80



Source: BERR Information Security Breaches Survey 2008

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Legal considerations

- Organisations must be aware of / comply with a variety of legislations
- Computer security and digital forensics differ in their relationship with the law
  - Computer security has limited legal implications
    - Focus on policy and integrity
  - Digital forensics requires greater understanding of the law
    - Both judicial law and corporate / employment legislation

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Legal considerations

- Accessing personal data
- **Data Protection Act (1998)**
  - Who owns personal data in a corporate environment?
  - Personal data belonging to customers?
  - Appropriate security measures applied to personal data during investigation
  - DPA does provide some exemptions for detection/ prevention of criminal activities
    - Tax duties, national security, etc.

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Legal considerations

- Monitoring computer networks
- **Regulation of Investigatory Powers Act (2000)**
  - Unlawful to intercept any communications in the course of transmission without consent or lawful authority
  - Differentiates communications / traffic data from content
  - Part III of RIPA – encryption keys

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Legal considerations

- Procedures for corporate digital forensics investigations
- **Criminal Procedure and Investigations Act (1996) and Amendments to the Criminal Justice Act (2003) – Part 5**
  - Covers the legal requirements to provide evidence in support of a prosecution should the case end up in a court of law
  - 'Live investigation' – notes to be handed over

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Legal considerations

- Offences that must be handed over to the Police
- **Money Laundering Regulations [MLR] (2003) and Sexual Offences Act [SOA] (2003)**
  - MLR concerned with falsifying of computer records
  - SOA is concerned with indecent images of children and evidence handling of such evidence

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Legal considerations

- Relevant non-UK legislation
- **US Sarbanes-Oxley (2002)**
  - Came into being after Enron scandal
  - Any company wishing to do business with US must comply with this law
  - Section 802 imposes explicit penalties for the destruction of essential files
  - Forensic investigations should be performed so as to (where possible) ensure no alteration to corporate computer files

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Legal considerations

- What about outcome of corporate case?
- **Employment Act (2002) and Employment Rights (Dispute Resolution) Act (1998) or Employment Tribunals Act (1996)**
  - Many forensics investigations will not come under judicial law
  - Employment Act covers disciplinary and dismissal procedures
  - Employment Rights Act covers dismissal and unfair dismissal

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Current practice

- Time consuming and laborious!
- Collect evidence and copy taken
- Forensics tools to reconstruct logical structure of underlying OS
- View extant / deleted files
- Report relevant / suspicious data / files with supporting evidence
  - Time files were created/accessed/modified, etc.
- Present case

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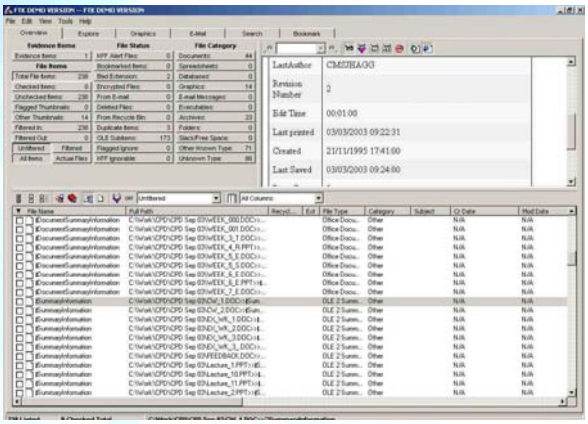
Current practice

- Forensics ToolKit (Access Data)



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Issues with current practice

- **Technical issues:** current tools have some issues, e.g.
  - Not designed for current HDD capacities
  - File system reconstruction and MD5 reliance
  - Intangible versus tangible evidence
- **Organisational issues:** are organisations ready to conduct an investigation?
  - No existing frameworks
  - Lack of understanding
  - Lack of experience

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Resolving technical issues

- Development of new tools to meet today's requirements
- **FORSIGS** (and FORWEB)
  - Fast automated searches of storage media for malicious multimedia
    - Use signature analysis and searches HDD rather than OS
- **EET**
  - Email analysis to quantify and measure intangible evidence

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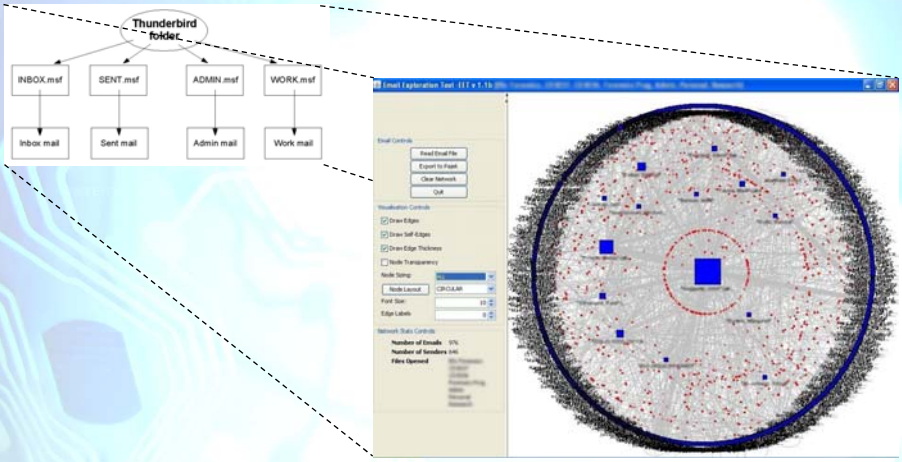
EET



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Resolving organisational issues

- Focus on technical issues not enough
  - Need to look at processes and procedures
- Requirement for robust framework
  - Law enforcement have ACPO Guide, but organisations have no framework
- Taylor, Haggerty & Gresty (2007) *Organisational Model for Computer Forensics Investigations*
  - High-level, 4-stage model, simplified procedures

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OMCFI model

Stage 1 Investigation preparation	a. identify the purpose of investigation
	b. identify resources required
Stage 2 Evidence acquisition	a. identify sources of digital evidence
	b. preserve digital evidence
Stage 3 Analysis of evidence	a. identify tools and techniques to use
	b. process data
	c. interpret analysis results
Stage 4 Results dissemination	a. report findings
	b. present findings

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Future challenges

- Academia well placed to address future issues (throw out goalposts?)
- To name a few
  - Move to mobile/pervasive networked devices
  - Expanding memory availability
  - User security
  - Secure networked applications (e.g. Skype)
  - Frameworks
  - Law and technology

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Future directions

- Some future directions of the field
  - Process automation
  - Accepted applications used by all
  - Development of scalable tools and techniques
  - Development of standards outside law enforcement
  - Utilization of intangible evidence
  - Addressing geo-political constraints
  - Visual analytics for forensics

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Summary

- Computer forensics and computer security are complementary but distinct fields
- Organisations require an understanding of investigation processes and relevant laws
- Current practice is fairly robust but improvements are required
- A number of challenges exist with the change in the digital landscape

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