Incident Response in a Collegiate University

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OxCERT

- Founded in 1994
- Originally a number of volunteers from across the University who were interested in network security
- Now 3 full time staff members at the Computing Services
  Robin Stevens (Team Leader)
  Jonathan Ashton
  David Ford

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A Collegiate University (Some background)

- 38 Independent, self-governing colleges
- 6 Permanent Private Halls
- Numerous Faculties, Departments, Research Groups
- All with independent computer systems and IT support

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- Over 20,000 full time students
- Over 76,000 registered hosts (in some sense)
- Around 38,000 Users with Accounts

- Each “unit” - typically a college or department gets a single fibre connection to the University Backbone
- The University Backbone then has a connection to the JANET(UK) connecting to the Internet
- The unit then manages their own network

Very Diverse

- Windows (from 3.1 onwards!)
- Mac OS
- Linux
- Solaris
- NeXTStep
- BSD
- Netware
  and anything else you can think of!

OxCERT’s role and remit

- OxCERT’s responsibility lies at the backbone level.
- We do not see what happens beyond an individual Unit’s boundary
- We don’t know what an individual host actually does or what software it is running

Our Role

- *“To protect the integrity of the University backbone network and to keep services running”*
- This can encompass a wide range of threats
- But we’re not the network police, we don’t directly deal with copyright infringements, people viewing inappropriate materials, etc

Typical Incident types

- Keylogging malware
- Port Scanners
- Botnets
- Malicious DHCP/DNS/ARP Spoofing
- Weak Passwords leading to compromises of small or large numbers of systems
- Vulnerable Software Installations
- Spam and Phishing

Attempting to visualise our activities

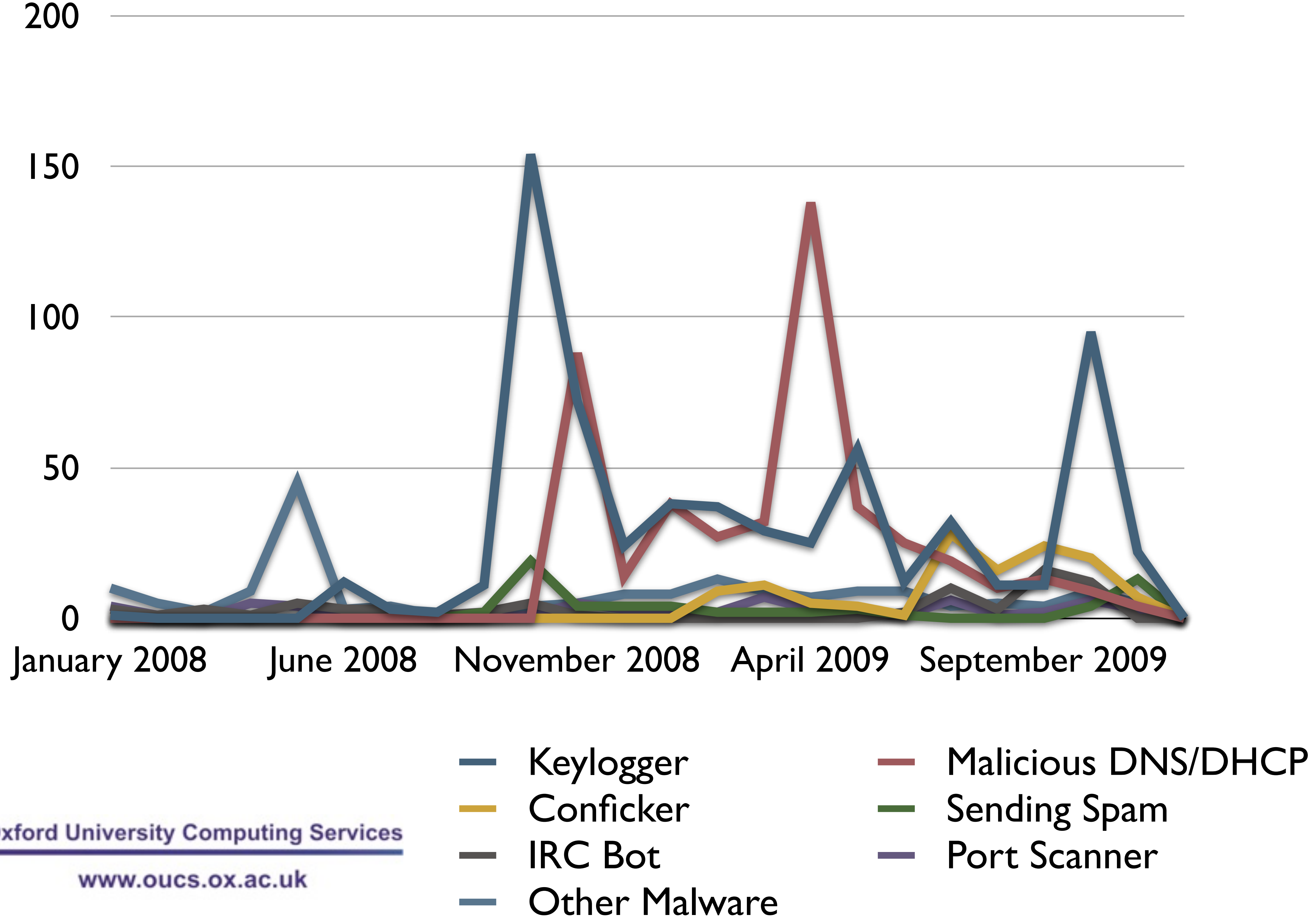
- It’s hard, different types of incident have have different levels of effect on a unit

- Also our level of involvement will differ depending on the type of incident, so numeric comparisons may not be helpful

- I’ve tried to split things into three groups (but it is slightly arbitrary):

- workstation compromises/server compromises/ social issues are not included

Typical "Workstation" malware



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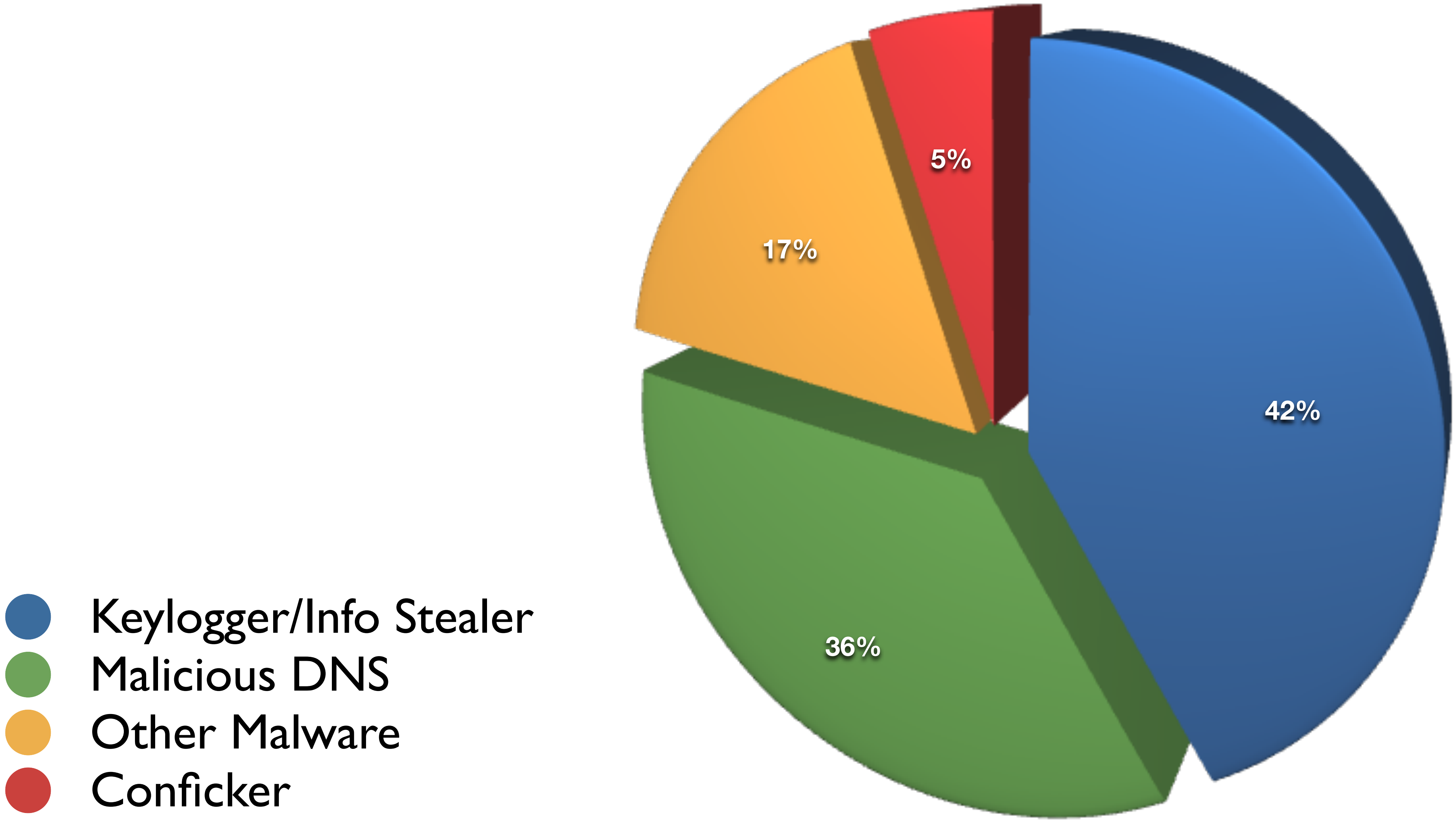
More simply (Oct 2008 - Jun 2009)



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Other Incidents

- Major server compromises, averaging 1-2 a month, but rather more variable, we will look at one of these in detail later
- Phishing responses, numbers vary - typically more common at the start of the year, we are trying to increase user education

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OxCERT's Process

- Identify Compromised systems (or be notified of them)
  typically using a combination of network flows, darknets, DNS redirection and highly targeted snort rules

- Alert the "Unit" owning the IP of the incident (and impose a router block where ever possible preventing further malicious traffic)

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- We do more detailed investigation, especially for major incidents, and wait for the unit to report back to us
- In some cases unit may not need further assistance, in other cases, we may be able to perform log analysis, rudimentary malware analysis, or give names of suspicious filenames/ other details to look for
- Unit may report back the usage of the system at this point (eg desktop, server, student system)

- Attempt to identify potential impact:
- Other Infected Hosts
- Compromised Accounts
- Other Accounts using the same passwords
- sensitive material that may have been breached

- How did the attackers get in?
- Attempting to prevent a recurrence - often a challenge, it may well be simpler and quicker for an IT officer to immediately reinstall than to identify the cause
- But **we** want to avoid repeat incidents
- Also, we wish to improve our detection - what signatures/IPs/DNS-RRs would have identified this earlier

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Case study: A typical large incident

- We focus here on one example
- In this case a Compromise of a Windows Domain supplying core services to a single unit
- It could equally be a Linux or Mac set of servers

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- Detected by us, due to port scanning
- Brief network flow analysis suggested a compromise via Remote Desktop
- We followed our standard process as outlined earlier

Impact

- All servers used the compromised hosts for DNS, they lost external DNS
- The compromise of 4-5 hosts was leading to several hundred machines losing full connectivity

- Frequently we have incidents where there has been little planning/prior anticipation of impact of an outage
- Small IT departments make this more likely
- Sometimes we have to evaluate what impact our blocks are having and produce a work-around that minimises the impact, whilst keeping the risk of further compromise acceptable

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Reports/Lessons

- We produced a full report to the affected unit, including a number of suggestions as to how to reduce the risk of a recurrence
- Unfortunately many of these seem to be common issues in a great many compromises

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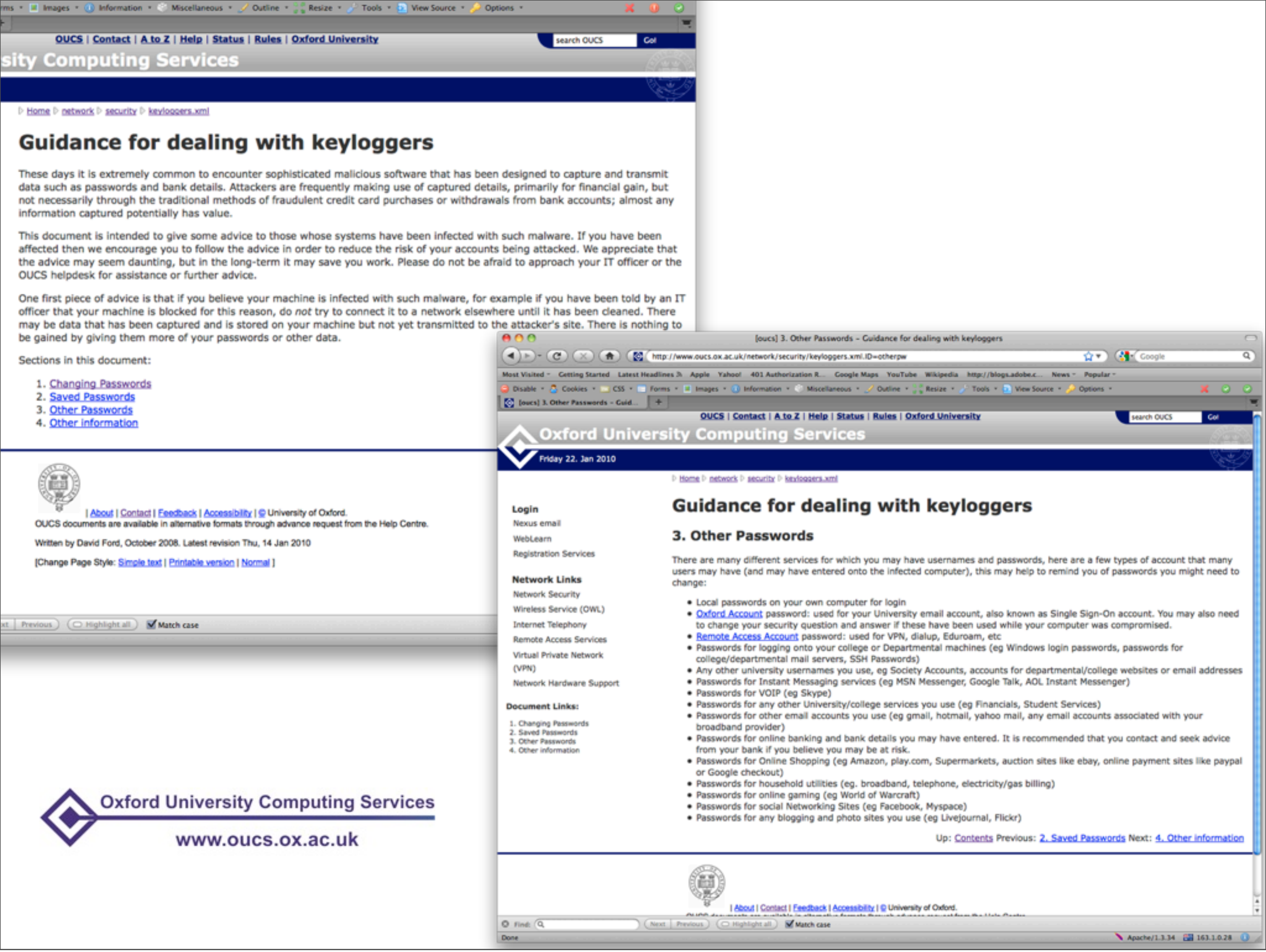
- Poor planning for incidents, assumption problems won’t happen, lack of ideas as to how to deal with things when they do
- Lack of good staff resources to deal with the unexpected
- Poor patching processes

- Systems allowing privileged access to the world (eg ssh, RDP) when there is no need
- Poor logging and auditing of logs to identify compromises when they happen
- Lack of appropriate separation of privileges (eg using the same credentials for administration on every workstation and server)

Other Activities

- Besides dealing with 600-1300 incidents a year
- Malware Analysis project looking at identifying what malware does so we can trace it, and give advice on how to clean it up
- Resources eg. Keylogger Guidance, NAT logging guidance



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Guidance for dealing with keyloggers

These days it is extremely common to encounter sophisticated malicious software that has been designed to capture and transmit data such as passwords and bank details. Attackers are frequently making use of captured details, primarily for financial gain, but not necessarily through the traditional methods of fraudulent credit card purchases or withdrawals from bank accounts; almost any information captured potentially has value.

This document is intended to give some advice to those whose systems have been infected with such malware. If you have been affected then we encourage you to follow the advice in order to reduce the risk of your accounts being attacked. We appreciate that the advice may seem daunting, but in the long-term it may save you work. Please do not be afraid to approach your IT officer or the OUCS helpdesk for assistance or further advice.

One first piece of advice is that if you believe your machine is infected with such malware, for example if you have been told by an IT officer that your machine is blocked for this reason, do *not* try to connect it to a network elsewhere until it has been cleaned. There may be data that has been captured and is stored on your machine but not yet transmitted to the attacker's site. There is nothing to be gained by giving them more of your passwords or other data.

Sections in this document:

1. Changing Passwords
2. Saved Passwords
3. Other Passwords
4. Other information

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OUCS documents are available in alternative formats through advance request from the Help Centre.

Written by David Ford, October 2008. Latest revision Thu, 14 Jan 2010

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[oucs] 3. Other Passwords - Guidance for dealing with keyloggers

http://www.oucs.ox.ac.uk/network/security/keyloggers.xml.ID=otherpw

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Friday 22. Jan 2010

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Wireless Service (OWL)
Internet Telephony
Remote Access Services
Virtual Private Network (VPN)
Network Hardware Support

Document Links:
1. Changing Passwords
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Guidance for dealing with keyloggers

3. Other Passwords

There are many different services for which you may have usernames and passwords, here are a few types of account that many users may have (and may have entered onto the infected computer), this may help to remind you of passwords you might need to change:

- Local passwords on your own computer for login
- Oxford Account password: used for your University email account, also known as Single Sign-On account. You may also need to change your security question and answer if these have been used while your computer was compromised.
- Remote Access Account password: used for VPN, dialup, Eduroam, etc
- Passwords for logging onto your college or Departmental machines (eg Windows login passwords, passwords for college/departmental mail servers, SSH Passwords)
- Any other university usernames you use, eg Society Accounts, accounts for departmental/college websites or email addresses
- Passwords for Instant Messaging services (eg MSN Messenger, Google Talk, AOL Instant Messenger)
- Passwords for VOIP (eg Skype)
- Passwords for any other University/college services you use (eg Financials, Student Services)
- Passwords for other email accounts you use (eg gmail, hotmail, yahoo mail, any email accounts associated with your broadband provider)
- Passwords for online banking and bank details you may have entered. It is recommended that you contact and seek advice from your bank if you believe you may be at risk.
- Passwords for Online Shopping (eg Amazon, play.com, Supermarkets, auction sites like ebay, online payment sites like paypal or Google checkout)
- Passwords for household utilities (eg. broadband, telephone, electricity/gas billing)
- Passwords for online gaming (eg World of Warcraft)
- Passwords for social Networking Sites (eg Facebook, Myspace)
- Passwords for any blogging and photo sites you use (eg Livejournal, Flickr)

Up: Contents Previous: 2. Saved Passwords Next: 4. Other information

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Other Activities Continued

- Working with others in Academia
  eg darknet mesh project
- Monthly/Annual reports
- Security Bulletins
- Advice on where to find help with other "security" matters

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Comments/Questions

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