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IS/ICT Security and Privacy

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Introduction

- Changing security needs: Real/Perceived
  - → Security for non-specialists
  - → Legacy security
  - → Phishing
  - → Online searches
  - → Mashups/CBSE (Component-Based Software Engineering)
- Privacy – A new assessment?
  - → Video surveillance
  - → Data retention
  - → Data destruction vs. computer forensics
  - → The "digital curriculum"
- Conclusions and outlook

Changing security needs

- Security is discussed broadly today
  - → Large amounts seem to be missing!
    - » Especially regarding computers and networks crime seems to be absolutely soaring!
  - → Compare this to actual numbers of investigations/judgments!
- A shift of responsibility to others exists:
  - → "I must be protected"
    - » Best example: Phishing!
  - → Instead of "I protect myself as far as possible"
    - » Use of common sense, firewall, and virus scanner
- Additionally: All crime must be prevented or at least punished
  - → No place for small crimes to be handled "inofficially"
  - → Example: Video surveillance in English school toilets
    - » No destruction, graffiti, etc. any more! +
    - » No protests, experiencing crime, nonconformity, privacy -

Changing security needs: Consequence for software design

- Bringing security to the end-user
  - → Not everything can and should be kept from them
    - » Example: Brake lights on cars → Security device for others
      - – Not helpful for you at all
    - » Comparable: Firewall
      - – Not helpful for you (false positives!); protects others from zombies
- Guidelines:
  - → Secure default configuration, difficult to "unsecure"
    - » End-users will not buy security services or read the manual
  - → Ease of use in fully secured mode
    - » Doesn't work → disable security → works ⇒ Will stay disabled!
  - → Logging to ensure traceability
    - » Instead of continuous monitoring, keep evidence (securely)
  - → Rules for destroying information
    - » Sometimes information should just be destroyed
      - – Otherwise: It will be used very soon…

Security problems: Restricted security

- Security for non-specialists
  - → Simple security configuration
    - » Example: Bluetooth keyboard: Press button, enter keycode
      - – Or: Wizard for configuring a secure customized configuration
  - → "Security driving license"
    - » Computer driving license → How to use something
      - – Not: How to secure something/use something securely!
    - » Advantage: No relocating to an "insecure" country!
      - – Spam senders can relocate, but they cannot move their zombies!
- Legacy security
  - → Often legacy systems must be used which do not support or even allow (complete) security
    - » Example: Application does not support encryption
    - » Example: Software conflicts with security patch
  - → More focus on "stable" interoperability and wrappers
    - » Not everyone will always, immediately, and only use latest version
    - » Especially important for computer science education

Security problems: Voluntary disclosure

- Phishing
  - → Combating phishing is extremely difficult
    - » The user does what he intends to do and should be able to do!
    - » Move security back to the user!
  - → Changing security methods is very dangerous
    - » From TAN to iTAN to mTAN, …→ Users enter TANs everywhere
  - → Start with very high security from the start, so there is no need for a later "upgrade"
    - » And use internal configuration to reduce security if performance, laws etc. require it for now!
      - – Example: Use el. signatures → reduced key length for interoperability, speed etc.
- Online searches
  - → Currently hotly disputed, especially in Germany
    - » Already occurred in reduced form in the USA
  - → Secret online search of computers
    - » How to do this securely? The police should be able to access the computer, but not hackers!

Security problems: Loss through assembly

- Mashups/CBSE are based on assembling elements from third-parties into a single "unit" for deployment
  - → Security danger from compound =
    - » Security loss from each and every element
      - – Chain – Weakest element is the limit!
    - » Security loss from the assembly
      - – Elements previously separated are now operating in the same space
  - → When users enter information → Where is it sent to?
    - » To which system(**s**)?
    - » What is the privacy policy of the system as a whole?
  - → Special mashup problem: Was element intended for mashup, i.e. exists a semantic description what is really does?
  - → Special CBSE problem: Research focus on assembly at runtime → What about investigating the search profile?
  - → Logging is special here:
    - » Inside-logging difficult/rare; Interface logging large effort
    - » But absolutely necessary to identify the "culprit" element!

Privacy - A new assessment?

- Continuous erosion of privacy
  - → More security → Less privacy
    - » "I don't have anything to conceal"
      - – So: A webcam in every single room at home and at the office!
- Privacy is only appreciated "after the fact"
  - → When one was target of a breach of privacy
  - → See also: Users read more privacy policies if they understood the ones they read before!
    - » Lawyers - TODO: Write understandable policies!
- One possible reason:
  - → Past: Reciprocity and local restriction
    - » You knew everyone in your hamlet and they knew you…
  - → IS/ICT:
    - » Observation is one-way only:
      You are watched, but you cannot observe the watcher
    - » Practically (not legally!) unrestricted distribution

Video surveillance

- Study of the Great Britain home office:
  - → Small benefits in certain areas through video surveillance
    - » Improvements: Small closed areas & premeditated crimes
      - – Especially: Car theft from parking lots
  - → Increased feeling of safety
    - » See bank robberies: 100% surveillance, but ….
  - → From the police perspective: Video surveillance is a replacement for many guards with perfect memory
    - » But: Best results come from manually guided cameras!
  - → See also: London city center car tax ⇔ divorce proceedings
    - » Employing the law to uphold morality!
- Against terrorism: Identifying the persons afterwards
  - → Will only help against certain attacks sometimes
- As soon as video can be "searched" for persons reliably, privacy will almost be gone!
  - → Tracking the location of every person in London the whole day

Data retention

- Data retention = Keeping logs for future use
  - → No problem at all, depending on who stores/may access them
  - → Similar to video surveillance
    - » No prevention, only detection and prosecution is enhanced
- Not really usable against serious crime
  - → Music sharing cannot be transferred to other countries
  - → But serious hackers, terrorists can easily relocate!
- Data retention (IP address, E-Mail, VoIP) according to the EU directive can easily be circumvented
  - → Closed group: Trivial protection (example: Alternate port)
  - → Current use of retained data: Identifying filesharing users
- Very important is, when the information can be used
  - → I.e., which initial suspicion is required for disclosure
    - » Recent reports revealed, that an IP address in many instances would not be a good source at all!
      - – Open WLANs, incorrectly configured DSL, time differences, …

Data (non-) destruction

- Merging security and privacy: Data often disposed incorrectly
  - → Privacy laws require deletion of data after some time/event
    - » But what about backups? Removing single records?!?
  - → Harddisks with sensitive information: Formatted, not wiped
- Many precautions are easy, they just must be "done"!
  - → There exists no "conscience of privacy"
    - » If people thought about it, they would wipe harddisks
    - » If people thought about it, software would have deletion facilities
    - » …
  - → Somewhat different in the USA:
    - » Identity theft is an actual and widespread problem
    - » This lead to more secure data disposal
      - – Privacy still seen as less important, but that level is "enforced"!
      - – Example: Shredding of invoices against dumpster diving

Computer forensics – A replacement for data retention or online searches?

- Computer forensics can recover a whole lot of information
  - → Often much more than data retention!
    - » Example: Local file content which was already deleted, traces of encrypted traffic, …
  - → But "local" data can always be deleted or modified
    - » The evidence value is typically rather low for information to be missing (as opposed to information still present!)
      - – Finding deleted child pornography images → Conviction
      - – Finding a wiped harddisk → Inconclusive (many reasons possible)!
- Some programs actively try to protect privacy
  - → Deleting personal information on request/automatically
  - → This increases the drive for hidden searches
    - » Such information would not be available in data retention and can be difficult or impossible to find through computer forensics

A backside: The "digital curriculum"

- Prospective employee history has always been important
  - → But some filtering existed:
    - » What was presented
    - » What could be obtained from previous employers
  - → Legal requirements also figure largely as protection
- But traces remaining on the Internet change this
  - → Searching newsgroups for postings from many years ago
  - → Profiles on sites: Dating, hobbies, picture/video-sharing, …
    - » Not all are created by yourself
    - » Difficult to remove later: Copies, RSS syndication, web archives!
  - → Problem: Persons with the same name, forgeries etc.
- Countermeasures are difficult
  - → Use pseudonyms/anonymity right from the start
  - → Insist on deletion, no permission for publication, time limit, …

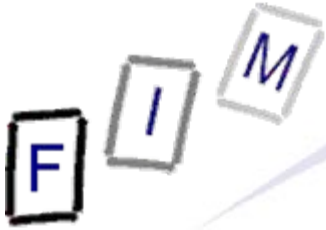
Conclusions

- The more privacy is enforced or used, the more anti-privacy measures will be asked for!
  - → This contradiction can only be solved politically
- Investigation must focus on professionals
  - → Data retention working only against "amateurs" is useless!
    - » 31% of incidents are hackers, 60% stolen hardware, insider abuse/theft, administrative errors, accidentally exposing data
    - » **But:** 45% of disclosed data happened through hackers!
  - → Hackers are therefore "professionals"!
    - » Measures against them must take this into account!
- Collecting data "just in case" is therefore not going to help!
  - → This is just data which will later be "mis-"used
  - → More "extreme" measures, but only for the "hard" cases!

The first counter-example, the dig. curriculum, has just arrived

Outlook

- Lacking privacy:
  - → Drawbacks will be felt increasingly and by more and more people in the next years
- Erosion of security:
  - → Information is stored (retained) in more places
  - → Explicit subversion of security for monitoring
- Measures to be introduced:
  - → Neither forensics, data retention, nor hidden online searches can fulfil all requirements
    - » A combination of all of them may be required
- Possible countermeasures:
  - → Users should be educated regarding security
  - → Technical requirements and legal obligations for security
  - → Strict and permanent safeguards for investigative measures



Questions?

Thank you for your attention!