ICS 132: Organizational Information Systems

Security

what is security?

- the techno-geek answer:
  - cryptosystems, access control, intrusion detection
- the 132 answer:
  - security is about managing risk
    - risks can come from many sources
      - failure as well as malicious damage
    - *managing* risk rather than *eliminating* risk
      - the most secure system is one that can't be used
      - there's an inherent tension between security and practicality

why is it important?

- security for internal needs
  - protecting against failure or attacks
  - ensuring robustness and ability to deliver
  - failure recovery is costly!
- security for competitive advantage
  - customers require secure services
  - clients won't trust us with their information
  - everyone else is doing it…

security is a *system* feature

- security issues arise at specific points
  - giving out credit card details
  - identifying myself
  - using passwords
- but… think about the *temporal* issues
  - electronic systems make ephemeral information permanent
  - accumulated information yields patterns
    - and patterns provide information that you never thought you'd disclosed

sources of risk

- hardware malfunctions
- software bugs
- data errors
- damage to physical facilities
- inadequate system performance

- the overriding question: *liability*

threats of computer crime

- theft
- unauthorised use
- entering fraudulent data
- stealing/modifying data
- modifying software
  - back doors
  - trojans
  - viruses

other factors

- increasing complexity
  - systems are growing larger and more complex
  - increasing interdependence between components
  - failure modes interact and multiply
    - example: Three Mile Island
- human limitations
  - memory
  - attention
- business pressures
  - do more and do it faster

security and trust

- we think we understand trust
  - everyday phenomenon
  - based on personal contact and experience
- trust in the electronic domain?
  - what are the cues that engender trust for us?
  - who do you trust?
    - paul@dourish.com?
    - jpd013902@hotmail.com?

security and trust

- security is *manufactured trust*
  - if I trust my infrastructure, everything is fine
  - but if I don't, I need to put something into place
  - security measures allow me to trust the system
    - making guarantees about integrity
    - detecting intrusions and problems
- aspects of security
  - authentication
  - authorisation
  - accounting

manufacturing trust

- authentication
  - "I am who I say I am"
    - password systems
    - challenge/response
    - smart cards
    - biometrics

manufacturing trust

- authorisation
  - "I can do this"
    - capabilities
      - absolute capabilities
      - inference systems
    - delegation
    - revokable rights
    - physical access

manufacturing trust

- accounting
  - maintaining an audit trail
    - the ability to reconstruct what's happened
    - the ability to "roll back time"
  - accurately logging and billing
    - managing scarce resources

manufacturing trust

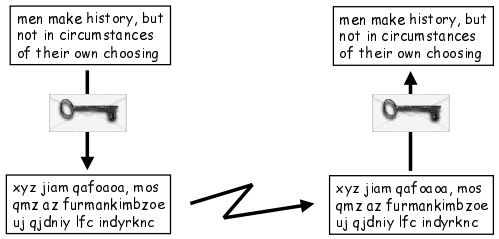
- privacy
  - privacy is more than not disclosing information
  - knowing *what* I disclose, *when*, to *whom*, and *why*
    - these are the conditions on which I can make an informed decision
  - what happens when the policy changes?
- two issues in privacy
  - trusting the recipient
  - trusting the channel

security strategies

- "security through obscurity"
- open access, strong firewall
- secure channels
- layered security

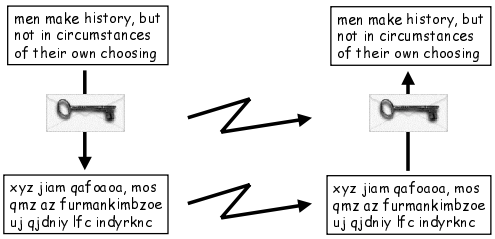
cryptosystems

- private key encryption



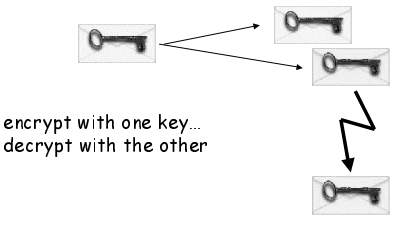
cryptosystems

- private key encryption



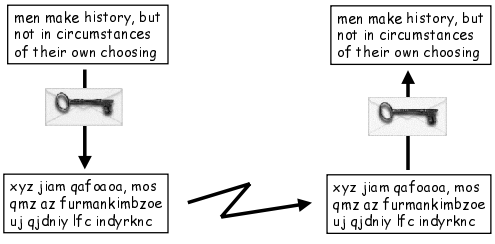
cryptosystems

- public key encryption



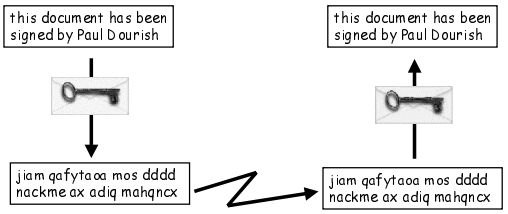
cryptosystems

- public key encryption
  - encrypt with the RECIPIENT's public key



cryptosystems

- public key encryption – digital signature
  - encrypt with YOUR OWN private key



cryptosystems

- technology is only part of the problem
  - it is well understood, but think about *implementation*
- infrastructure obstacles
  - how do I find someone's public key?
  - what and whom do I trust?
- legislative obstacles
  - governments don't approve
    - in turn, this affects the atmosphere in which adoption occurs
  - encryption is an international phenomenon
    - governments have little reason to collaborate
      - encryption is okay for us, but not for you

security and usability

- remember, this is about trust
  - trust isn't a technical phenomenon
  - trust is an outcome of someone's evaluation
    - so, it needs to be comprehensible to the end party
- the inherent tension
  - security involves putting up barriers
  - usability involves tearing them down
- which barriers to use?
  - example: email deletion

the usability of passwords

- an example of the tension
  - the system manager's view
    - passwords should be obscure and hard to guess
  - the user's view
    - passwords should be simple and easy to remember
  - common results…
    - people set the same password everywhere
    - passwords written on post-it notes

visualising system security

- security is an end-to-end phenomenon
  - modern networks are remarkably bad at handling end-to-end issues
    - when I connect to Amazon.COM, who is responsible for security?
    - when I login from home to read my email, where does security reside?
  - example – S/Key and SecurID

the cost of security

- remember cost-benefit analysis
  - what does some level of security cost?
    - adds complexity to implementation
    - imposes restrictions on use
    - limits performance
  - what benefits result?
    - secure *enough*
  - example: Placeless Documents
    - SSL-based security model
    - Java 2 security model
      - the dangers of all or nothing!

summary

- security is an increasingly important issue
  - more work moved online
    - increases risks
  - new domains for interaction with customers
    - increases need for mechanisms of trust
- security is risk management
  - supporting informed decision making
  - making consequences clear

next time

- project
  - due on Monday
- the week after next
  - review lecture
    - let me know if there are specific topics
- next week's topics:
  - e-commerce
  - case studies