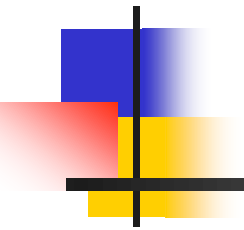


Physical and Personal Security for Information Systems

Professor Stephen S. Yau

Importance of Physical Security

- Most focus on protecting ***data and logical systems***
- The ***physical systems*** (computer hardware) to run the programs and data must be protected
  - Physical security deals with who have access to buildings, computer rooms, and the devices within them
  - Protect sites from natural and man-made physical threats

Physical Security Threats

- **Weather**
  - Tornadoes, hurricanes, floods, fire, snow, ice, heat, cold, humidity
- **Fire/chemical**
  - Explosions, toxic waste/gases, smoke, fire
- **Earth movement**
  - Earthquakes, mudslides, tsunami
- **Structural failure**
  - Building collapse due to snow/ice/load weight, or moving objects (cars, trucks, airplanes, etc.)

Physical Security Threats (Cont.)

- **Energy**
  - Loss of power, radiation, magnetic wave interference,
- **Biological**
  - Virus, bacteria
- **Human**
  - Strikes, theft, sabotage, terrorism and war

Physical Security Areas

- Educating personnel
- Administrative controls
- Physical security controls
- Technical controls
- Environmental/life-safety controls

Educating Personnel

- Security staff should be prepared for ***potential of unforeseen acts***
- Other employees should be reminded ***periodically*** of ***importance of helping their surroundings secure***
  - Being mindful of ***physical and environmental considerations*** required to protect information systems
  - Adhering to ***emergency and disaster plans***
  - ***Monitoring unauthorized use*** of equipment and services, and ***reporting*** those activities to security personnel
  - ***Recognizing security objectives*** of organization
  - ***Accepting individual responsibilities*** associated with their jobs and that of their coworkers

Administrative Controls

- **Restricting Work Areas**
  - Identify access rights to the ***site in general***
  - Decide various access rights ***required by each location*** (rooms, elevators, buildings) within the site
- **Escort Requirements and Visitor Control**
  - In many government facilities or facilities with strong government ties, ***foreign nationals*** are not allowed unescorted access to any site within the facility. Escorted access requires ***background clearance and onsite identity check***
  - For less secure sites, each visitor must have a clear ***purpose for visit and a confirmed contact*** within the site. A temporary badge will be given after the visitor sign-in at the security desk

Administrative Controls (cont.)

- **Site Selection**
  - **Visibility**
    - Most data centers are not descriptive, and do not advertise what they are and attract undue attention
  - **Locale considerations**
    - Neighborhood, local ordinances and variances, crime rate, hazardous sites nearby, such as landfills, waste dumps, and nuclear reactors.
  - **Natural disasters**
  - **Transportation**
    - Airport, highways, railroads, etc.

Physical Security Controls

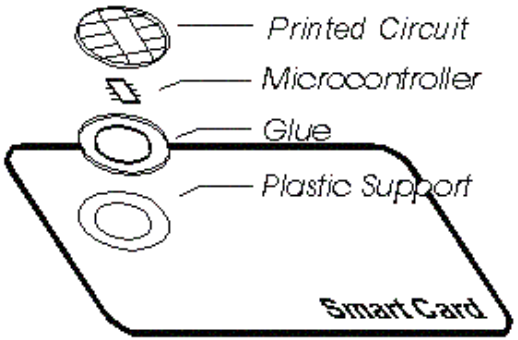
- **Perimeter Security Controls**
  - Gates, fences, turnstiles, mantraps
- **Badging**
  - Photo identification that not only authenticates an individual, but also continues to identify the individual while inside the facility

Physical Security Controls (Cont.)

- **Keys and Combination Locks**
  - Mechanical locks , password locks, electronic locks, etc.
- **Security Dogs**
  - Well-trained dogs are good at detecting intruders or sniffing out explosives
- **Lighting**
  - Proper lighting could serve as a deterrent

Technical Controls

- **Smart card**
  - Semiconductor chip with logic and nonvolatile memory
  - Software that detects unauthorized tampering and intrusions to the chip and if detected, can lock or destroy the contents of the chip to prevent disclosure or unauthorized uses
  - Three major types: contact, contact-less and combinations of the two.

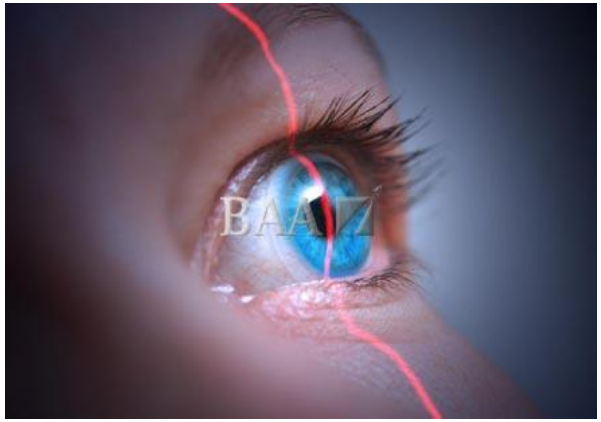


Technical Controls (Cont.)

- **Audit Trails/Access Logs**
- **Physical Intrusion Detection**
  - Metallic foil tape, infrared light beams, motion sensors
- **Alarm Systems**
  - Systems like ADT that monitors and responds to intrusion alert from a central location

Technical Controls (Cont.)

- **Biometrics**
  - Use characteristics of a human, such as face, eyes (iris), voice, fingerprints, DNA, hands, signature, body temperature.
  - Use biometrics in conjunction with standard forms of authentication, such as password and smart card
  - Need to balance convenience with security



Environmental/Life-safety Controls

- **Power**
  - When there is a power-outage, emergency lights and continuing functioning of those electronic gates are needed
  - Uninterrupted: Uninterrupted Power Service (UPS) and emergency power-off switch
  - Constant voltage and current: regulator

Environmental/ Life-safety Controls (Cont.)

- **Fire/Chemical Detection and Suppression**
  - Targets: explosions, toxic waste/gases, smoke, fire
  - Detectors: heat sensor, flame detector, smoke detector
  - Extinguishing systems: water-sprinkler or gas-discharge system
- **Heating, Ventilation and Air Conditioning**

What Is Personnel Security?

- Security mechanisms reducing risks of human errors, thefts, frauds or misuse of facilities within an organization
- Not just an IT issue
  - Human Resource (HR) is the main player
  - Cross reference (refer to other organizations' IA in HR) and provide input to HR policies

Types of Implementation

- Background checks
- Security clearances
- Employment agreements
- Hiring and termination practices
- Job descriptions
- Job rotation
- Separation of duties and responsibilities

Background Checks

- Personnel controlling IT resources
  - Security Personnel
  - Net Administrators
  - Managers
  - Auditors
- Support hiring decisions
- Provide some protection and assurance

Background Checks (Cont.)

- What can be checked on an applicant?
  - Credit (financial) report
  - SSN searches
  - Workers compensation reports
  - Criminal record
  - Motor vehicle report
  - Education verification
  - Reference checks
  - Prior employment verification

Security Clearances

- Applicable to
  - Uniformed members of the military
  - Civilian employees working for government agencies
  - Employees of government contractors

Employment Agreements

- *Non-competitive:*
  - Will not compete with your employer by engaging in any business of similar nature as an employee, independent contractor, owner, partner, significant investor, etc.
  - May broadly limit from working in same field, even if employee does not work for a direct competitor. May restrict in both time and locations

Employment Agreements (Cont.)

- *Non-disclosure:*
  - Used when employer with unpatented ideas wants employees to maintain the idea confidential
  - Restricts dissemination of corporate information to unauthorized entities, especially competitors, press, analysts, and foreign agents

Hiring and Termination Practices

- Strict HR policies
- Hiring manager responsible for review of background checks
- Managers must take timely and appropriate disciplinary actions
- Applicable to contractors/sub-contractors.

Hiring and Termination Practices (Cont.)

- From IT perspective
  - Starting/closing accounts
  - Notifying employee of account information
  - Forwarding e-mail and voice-mail
  - Changing locks and number-combinations
  - Changing system passwords
  - Notifying all personnel

Job Descriptions

- Based on designated position sensitivity
- Based on sensitivity of information handled
- Addressing security responsibilities of the position
- Considered in performance evaluation

Job Rotation

- Implemented where feasible
  - Discourages fraud, waste, and abuse
  - Discourages collusion (secret agreement or cooperation especially for illegal or deceitful purpose)
  - Promotes cross-training
  - Often not possible in highly specialized jobs

Separation of Duties

- Ensure people *checking* for inappropriate use of IT resources
- No one individual should be responsible for completing a task involving sensitive, valuable, or critical information from beginning to end
- A person must not be responsible for approving his/her own work
- What to separate?
  - Security from audit
  - Accounts payable from accounts receivable
  - Development from production

Summary

- Make sure to hire “good guys” as much as possible, i.e. competent, honest, and dependable guys
- Make sure employees know their responsibilities
- Practices to encourage being good guys
- Know how to handle if good guys are discovered to turn bad