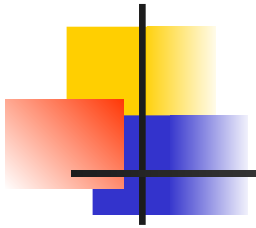
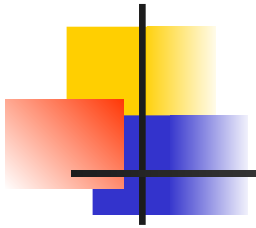


CSE 543
Information Assurance and Security

Security Strategies

Professor Stephen S. Yau

Fall 2022

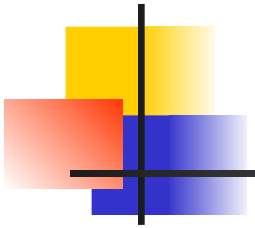


Security Strategies

- Obscurity Strategy
- Perimeter Defense Strategy
- Defense in Depth Strategy

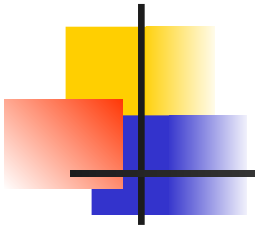
Security by Obscurity Strategy (Stealth)

- If the existence of an organization's IA baseline and critical objects are ***unknown***, the organization might avoid or reduce threats
- Intent to secure the system by ***hiding*** the details of security mechanisms
- IA involves use of obscurity strategy to a variety of extent



Perimeter Defense Strategy

- Focus on threats from ***outsiders***
- Intent to ***control flow of information*** between organization's internal trusted network and untrusted external networks
- Not much IA capabilities is allocated to secure ***internal*** system
- Examples: Firewalls, security access keys, access codes
- Major weaknesses?



Defense in Depth Strategy

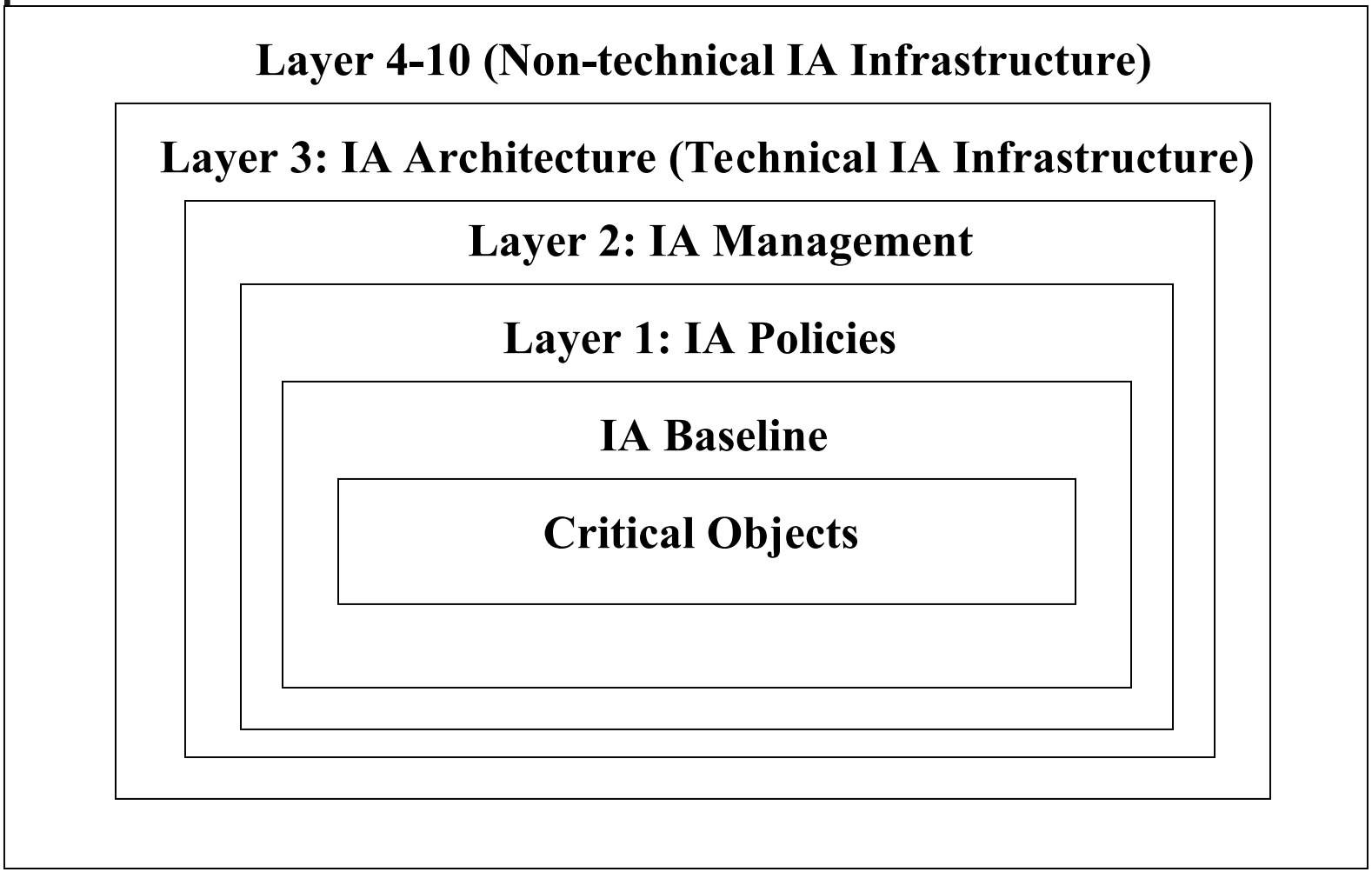
- Define a number of ***inter-operable and complementary technical and non-technical IA layers of defense***
- Separate organization's network into ***enclaves***
  - An ***enclave*** is an environment under control of a single authority with personnel and physical security measures.

Defense in Depth Strategy (cont.)

- ***Perimeter defense*** for each enclave
- ***Complicated and multiple connections*** among enclaves and between an enclave and outside
- Need ***multiple layers*** and ***different solutions for each connection***

Defense in Depth Strategy

--- Layered Architecture Model



Defense in Depth Strategy (cont.)
--- Layered Architecture Model

-Core consists of ***critical objects*** and ***IA baseline*** that collect, input, process, store, output, and communicate with any element in core.

Defense in Depth Strategy (cont.)
--- Layered Architecture Model

-IA Policies (Layer 1) define the actions and behavior required to accomplish the organization's IA needs.

Defense in Depth Strategy (cont.)
--- Layered Architecture Model

-IA Management (Layer 2) monitors and controls implementation of the IA policies.

Defense in Depth Strategy (cont.)
--- Layered Architecture Model

-IA Architecture (Layer 3) provides a means to allocate and integrate technical and non-technical controls

Defense in Depth Strategy (cont.)
--- Layered Architecture Model

- ***Layers 4 - 10***: non-technical implementations of IA policies, and provide ***infrastructure*** for IA Architecture
  - Layer 4 Operational security administration
  - Layer 5 Configuration management
  - Layer 6 Life-cycle security
  - Layer 7 Contingency planning
  - Layer 8 IA education, training, awareness
  - Layer 9 IA policy Compliance Oversight
  - Layer 10 IA incident response and reporting

Layer 3: IA Architecture

- Ensures that at least the minimum level of interoperability and services is available to authorized users to perform their tasks, to coordinate with other users, and to exchange information ***securely***
- Integrates three levels of security:
  - Physical security
  - Procedure security
  - Logical security

Layer 4: Operational Security Administration

- People:
  - Users: general and privileged
  - Separation of roles
  - Prevention
  - Limitation
  - Accountability
  - Detection
  - Deterrence
  - Outsourcing
- Security operations

Layer 5: Configuration Management

- Provide a mechanism to ensure ***documentation of all changes***

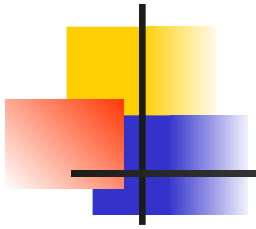
- Identify anticipated ***effects of changes*** on ***cost/schedule*** as a basis for approving or disapproving proposed changes

Layer 5: Configuration Management (cont.)

- Maintain ***integrity of schedule***
- Maintain updated documentation on ***status of each proposed change***
- Ensure all changes ***communicated to appropriate personnel***

Layer 6: Life-Cycle Security

- Security is involved in each state of the system's life cycle:
  - Initiation
  - Definition
  - Design
  - Acquisition
  - Development and Implementation
  - Operation and Maintenance
  - Destruction and Disposal



Layer 7: Contingency Plan

- Planning for the worst
  - Backups
  - Power outage
  - Emergency action plan/disaster recovery plan
  - Continuity of operations plan

Layer 8: IA Education, Training, and Awareness

- IA support services
- IA awareness programs
- IA curriculum development, certification and accreditation
- IA compliance inspection and validation
- Workshop, conference and symposia support

Layer 9: IA Policy Compliance Oversight

- Provide a means of ***detecting, reporting, and correcting noncompliance*** with the ***IA policies***
  - Intrusion detection systems
  - Scanners
    - Probing vulnerabilities of network
    - Specifying IP addresses to check origins of communication (OS, servers, routers, firewalls,…)
  - Automated auditing
  - Virus detectors
  - Periodic assessments of IA management and vulnerabilities

Layer 10: IA Incident Response & Reporting

- No perfect prevention systems, and incidents are expected
- General incident handling procedures:
  1. Determine appropriate response
  2. Collect and safeguard relevant information
  3. Contain the situation
  4. Assemble the incident management team

Layer 10: IA Incident Response & Reporting (cont.)

- General Incidence handling procedures (cont.)
  5. Create evidence disks and printouts
  6. Eradicate/clean up/recover
  7. Prepare preliminary status report for management and other authorities
  8. Document and report all activities
  9. Lesson learned: make improvements

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- J. G. Boyce, D. W. Jennings, *Information Assurance*: *Managing Organizational IT Security Risks*. Butterworth Heineman, 2002, ISBN 0-7506-7327-3
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- Rahul Gupta, "The Need for Mission Assurance". *PRTM Magazine*, 2006.