Chapter 1: Introduction

- Components of computer security
- Threats
- Policies and mechanisms
- The role of trust
- Assurance
- Operational Issues
- Human Issues

Basic Components

- Confidentiality
  - Keeping data and resources hidden
- Integrity
  - Data integrity (integrity)
  - Origin integrity (authentication)
- Availability
  - Enabling access to data and resources

Classes of Threats

- Disclosure
  - Snooping
- Deception
  - Modification, spoofing, repudiation of origin, denial of receipt
- Disruption
  - Modification
- Usurpation
  - Modification, spoofing, delay, denial of service

Policies and Mechanisms

- Policy says what is, and is not, allowed
  - This defines "security" for the site/system/*etc*.
- Mechanisms enforce policies
- Composition of policies
  - If policies conflict, discrepancies may create security vulnerabilities

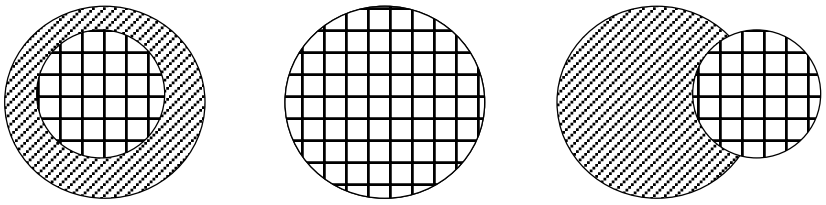
Goals of Security

- Prevention
  - Prevent attackers from violating security policy
- Detection
  - Detect attackers' violation of security policy
- Recovery
  - Stop attack, assess and repair damage
  - Continue to function correctly even if attack succeeds

Trust and Assumptions

- Underlie *all* aspects of security
- Policies
  - Unambiguously partition system states
  - Correctly capture security requirements
- Mechanisms
  - Assumed to enforce policy
  - Support mechanisms work correctly

Types of Mechanisms



 set of reachable states

 set of secure states

Assurance

- Specification
  - Requirements analysis
  - Statement of desired functionality
- Design
  - How system will meet specification
- Implementation
  - Programs/systems that carry out design

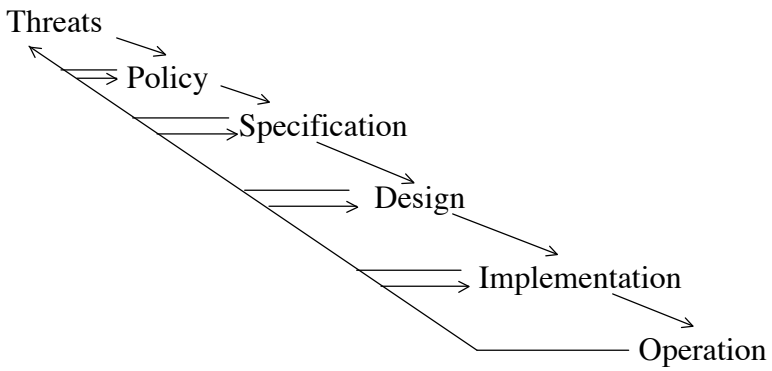
Operational Issues

- Cost-Benefit Analysis
  - Is it cheaper to prevent or recover?
- Risk Analysis
  - Should we protect something?
  - How much should we protect this thing?
- Laws and Customs
  - Are desired security measures illegal?
  - Will people do them?

Human Issues

- Organizational Problems
  - Power and responsibility
  - Financial benefits
- People problems
  - Outsiders and insiders
  - Social engineering

Tying Together



Chapter 13: Design Principles

- Overview
- Principles
  - Least Privilege
  - Fail-Safe Defaults
  - Economy of Mechanism
  - Complete Mediation
  - Open Design
  - Separation of Privilege
  - Least Common Mechanism
  - Psychological Acceptability

Overview

- Simplicity
  - Less to go wrong
  - Fewer possible inconsistencies
  - Easy to understand
- Restriction
  - Minimize access
  - Inhibit communication

Least Privilege

- A subject should be given only those privileges necessary to complete its task
  - Function, not identity, controls
  - Rights added as needed, discarded after use
  - Minimal protection domain

Fail-Safe Defaults

- Default action is to deny access
- If action fails, system as secure as when action began