TEL2813/IS2820
Security Management

Lecture 1

Jan 6, 2005

Contact

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- Office Hours: Wednesdays: 1.00 – 3.00 p.m. or By appointments
- GSA: will be announced later

Course objective

- The course is aimed at imparting knowledge and skill sets required to assume the overall responsibilities of administration and management of security of an enterprise information system.

Course objective

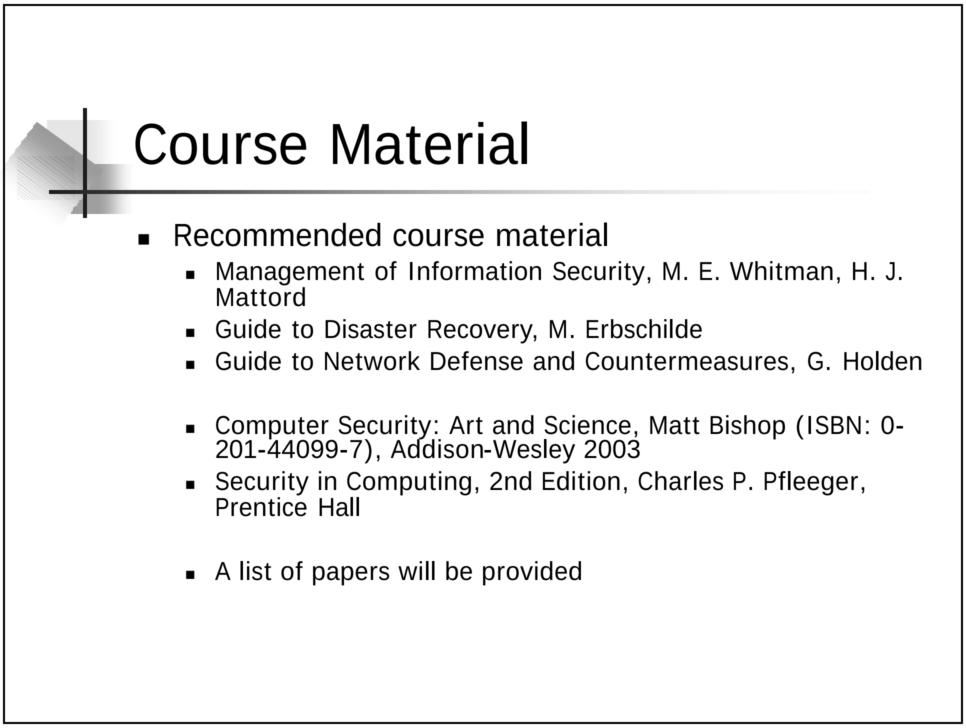
- After the course, ability to to carry out
  - detailed analysis of enterprise security by performing various types of analysis
    - vulnerability analysis, penetration testing,
    - audit trail analysis,
    - system and network monitoring, and
    - Configuration management, etc.
  - Carry out the task of security risk management using various practical and theoretical tools.

Course objective

- After the course, ability to carry out
  - Design detailed enterprise wide security plans and policies, and deploy appropriate safeguards (models, mechanisms and tools) at all the levels due consideration to
    - the life-cycle of the enterprise information systems and networks,
    - legal and social environment
  - Be able to certify products according to IA standards

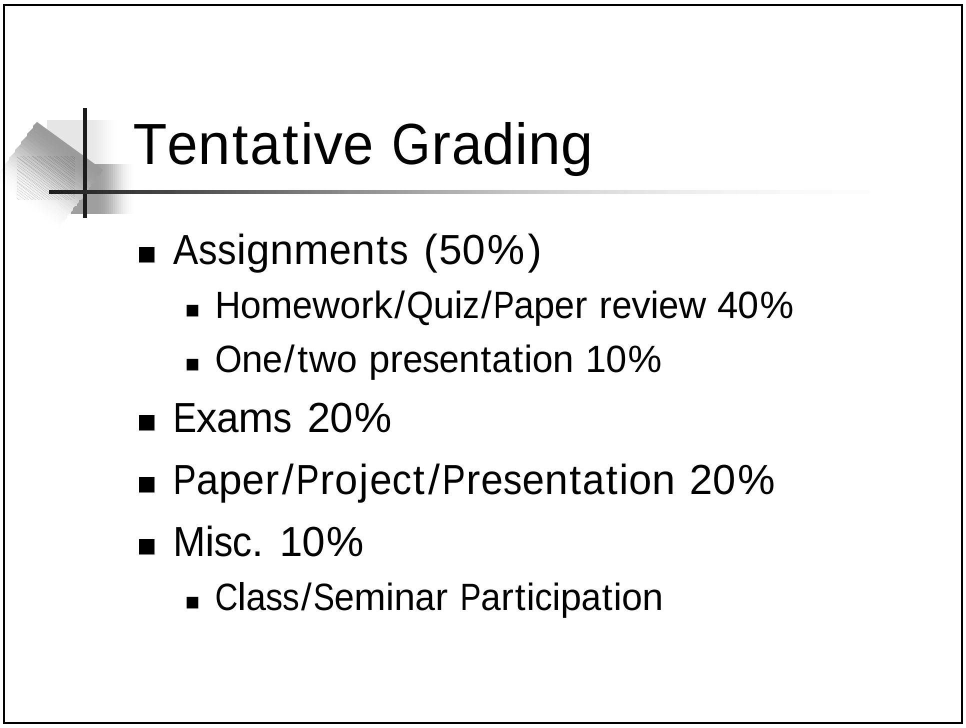
Course content

- Introduction to Security Management
  - Security policies/models/mechanisms
  - Security Management Principles, Models and Practices
  - Security Planning/ Asset Protection
  - Security Programs and Disaster Recovery Plans
- Standards and Security Certification Issues
  - Rainbow Series, Common Criteria
  - Security Certification Process
- National/International Security Laws and Ethical Issues
- Security Analysis and Safeguards
  - Vulnerability analysis (Tools Tech.)
  - Penetration testing
  - Risk Management
  - Protection Mechanisms and Incident handling
    - Access Control and Authentication architecture
    - Configuration Management
    - Auditing systems audit trail analysis
    - Network defense and countermeasures
      - Intrusion Detection Systems (SNORT)
      - Architectural configurations and survivability
      - Firewall configurations
      - Virtual private networks
      - Computer and network forensic
    - Privacy Protection
  - Case studies on OS and application software (e.g., SELinux, Unix and Windows Security)



Course Material

- Recommended course material
  - Management of Information Security, M. E. Whitman, H. J. Mattord
  - Guide to Disaster Recovery, M. Erbschilde
  - Guide to Network Defense and Countermeasures, G. Holden
  - Computer Security: Art and Science, Matt Bishop (ISBN: 0-201-44099-7), Addison-Wesley 2003
  - Security in Computing, 2nd Edition, Charles P. Pfleeger, Prentice Hall
  - A list of papers will be provided

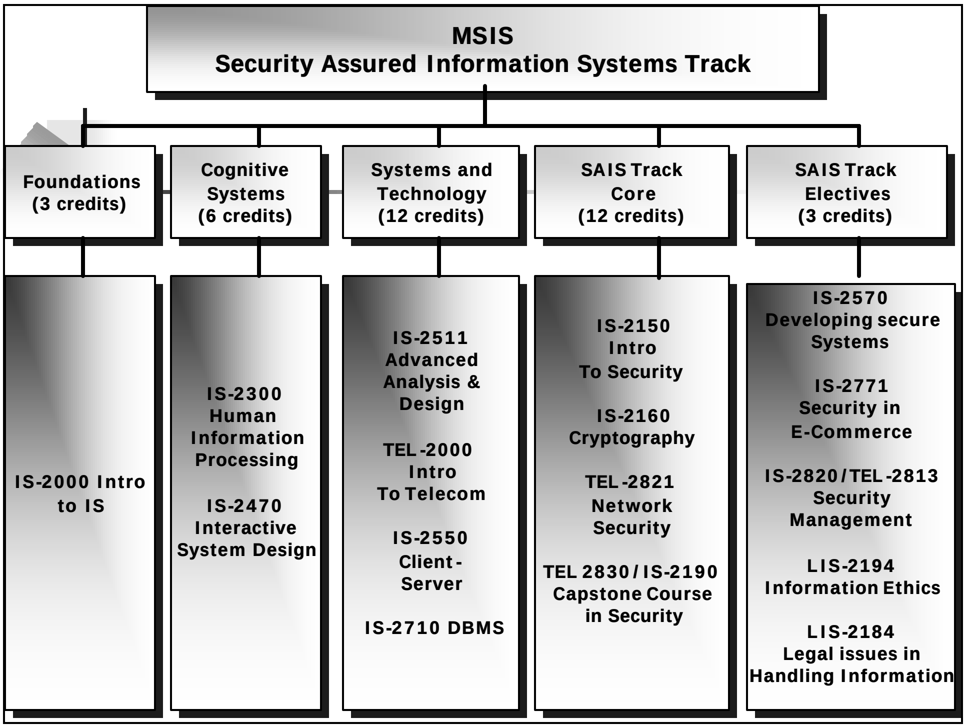


Tentative Grading

- Assignments (50%)
  - Homework/Quiz/Paper review 40%
  - One/two presentation 10%
- Exams 20%
- Paper/Project/Presentation 20%
- Misc. 10%
  - Class/Seminar Participation

Course Policies

- Your work MUST be your own
  - Zero tolerance for cheating/plagiarism
  - You get an F for the course if you cheat in anything however small – NO DISCUSSION
  - Discussing the problem is encouraged
- Homework
  - Penalty for late assignments (15% each day)
  - Ensure clarity in your answers – no credit will be given for vague answers
  - Homework is primarily the GSA’s responsibility
- Check webpage for everything!
  - You are responsible for checking the webpage for updates



MSIS
Security Assured Information Systems Track

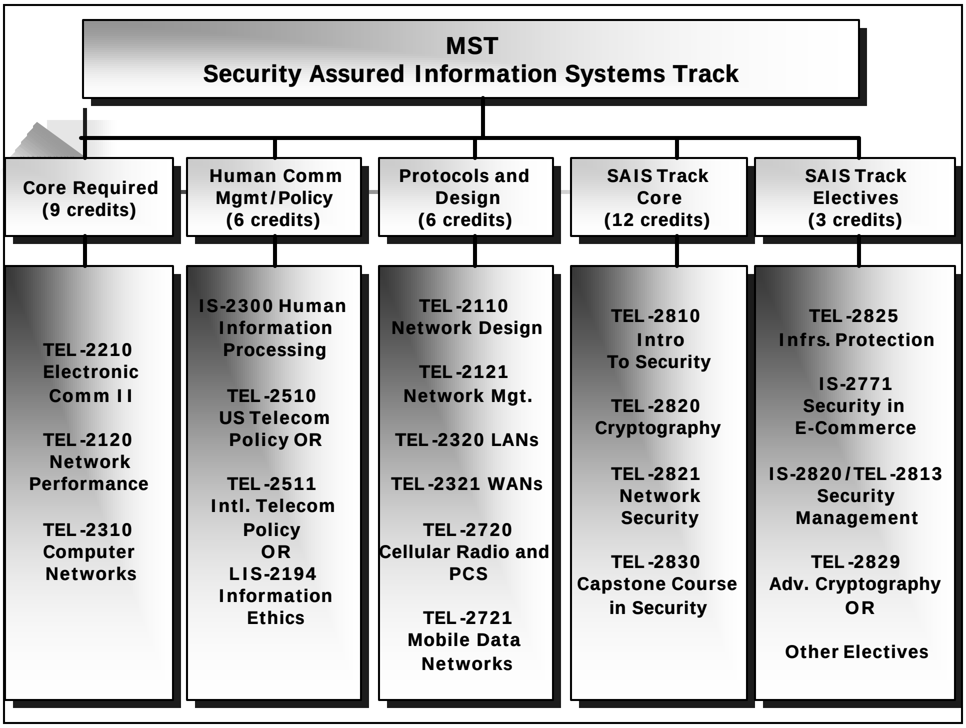
Foundations (3 credits)
IS-2000 Intro to IS

Cognitive Systems (6 credits)
IS-2300 Human Information Processing
IS-2470 Interactive System Design

Systems and Technology (12 credits)
IS-2511 Advanced Analysis & Design
TEL-2000 Intro To Telecom
IS-2550 Client-Server
IS-2710 DBMS

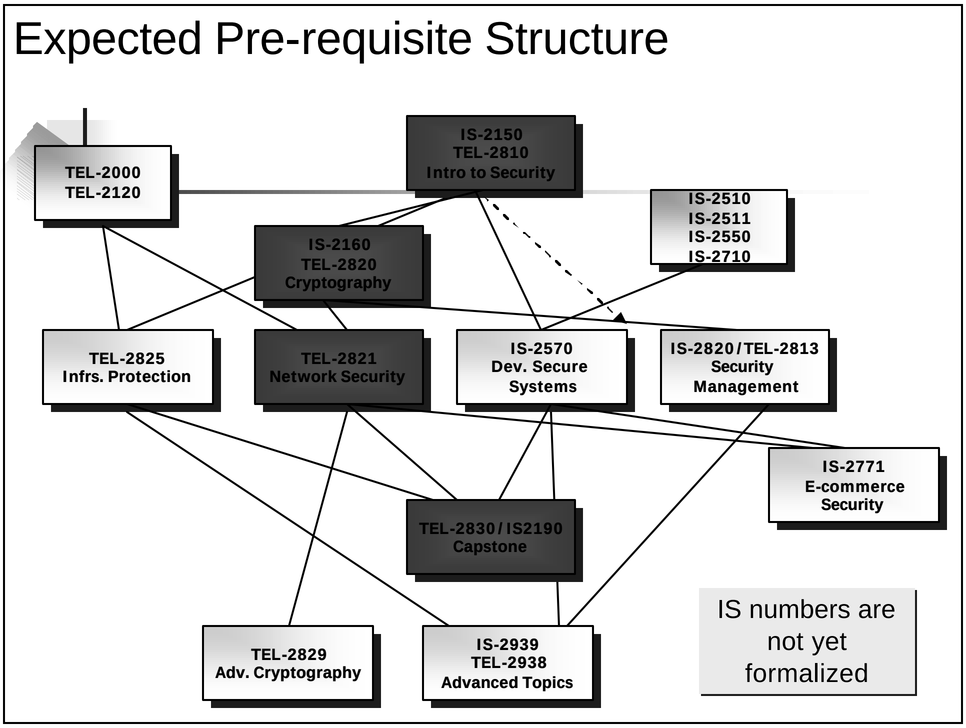
SAIS Track Core (12 credits)
IS-2150 Intro To Security
IS-2160 Cryptography
TEL-2821 Network Security
TEL 2830/IS-2190 Capstone Course in Security

SAIS Track Electives (3 credits)
IS-2570 Developing secure Systems
IS-2771 Security in E-Commerce
IS-2820/TEL-2813 Security Management
LIS-2194 Information Ethics
LIS-2184 Legal issues in Handling Information



MST
Security Assured Information Systems Track

Core Required (9 credits)	Human Comm Mgmt/Policy (6 credits)	Protocols and Design (6 credits)	SAIS Track Core (12 credits)	SAIS Track Electives (3 credits)
TEL-2210 Electronic Comm II TEL-2120 Network Performance TEL-2310 Computer Networks	IS-2300 Human Information Processing TEL-2510 US Telecom Policy OR TEL-2511 Intl. Telecom Policy OR LIS-2194 Information Ethics	TEL-2110 Network Design TEL-2121 Network Mgt. TEL-2320 LANs TEL-2321 WANs TEL-2720 Cellular Radio and PCS TEL-2721 Mobile Data Networks	TEL-2810 Intro To Security TEL-2820 Cryptography TEL-2821 Network Security TEL-2830 Capstone Course in Security	TEL-2825 Infrs. Protection IS-2771 Security in E-Commerce IS-2820/TEL-2813 Security Management TEL-2829 Adv. Cryptography OR Other Electives



Expected Pre-requisite Structure

TEL-2000
TEL-2120

IS-2150
TEL-2810
Intro to Security

IS-2510
IS-2511
IS-2550
IS-2710

IS-2160
TEL-2820
Cryptography

TEL-2825
Infrs. Protection

TEL-2821
Network Security

IS-2570
Dev. Secure
Systems

IS-2820/TEL-2813
Security
Management

IS-2771
E-commerce
Security

TEL-2830/IS2190
Capstone

TEL-2829
Adv. Cryptography

IS-2939
TEL-2938
Advanced Topics

IS numbers are not yet formalized

National Center of Academic Excellence in Information Assurance Education

(2004-2007)

Certified for

CNSS 4011

ation Security Profess

CNSS 4012

Designated Approving Authority (DAA)

CNSS 4013

System Administrator in Information Systems Security

CNSS 4014

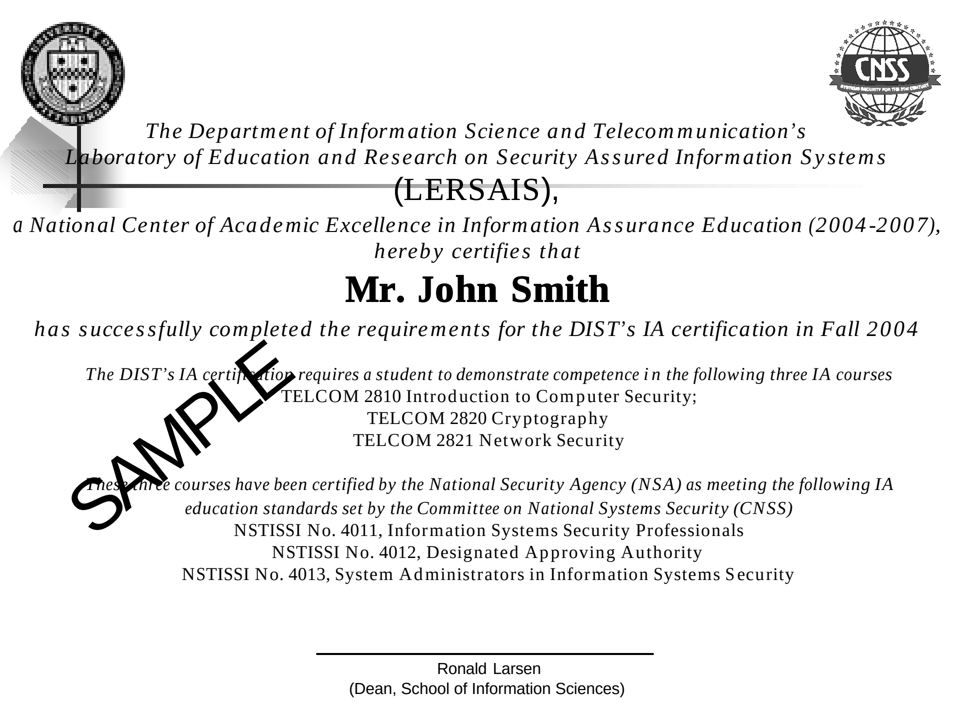
4014 Information Systems Security Officers

CNSS 4015

System Certifiers

DoD IA Scholarship Program

- Upto 2-years support
  - MS degree,
  - 2 years of PhD
- US Citizens only
- Requires 2 years work with federal agency
- URL:http:
  - //www.sis.pitt.edu/~lersais/DoDIASP



The Department of Information Science and Telecommunication's
Laboratory of Education and Research on Security Assured Information Systems
(LERSAIS),
a National Center of Academic Excellence in Information Assurance Education (2004-2007),
hereby certifies that

Mr. John Smith

has successfully completed the requirements for the DIST's IA certification in Fall 2004

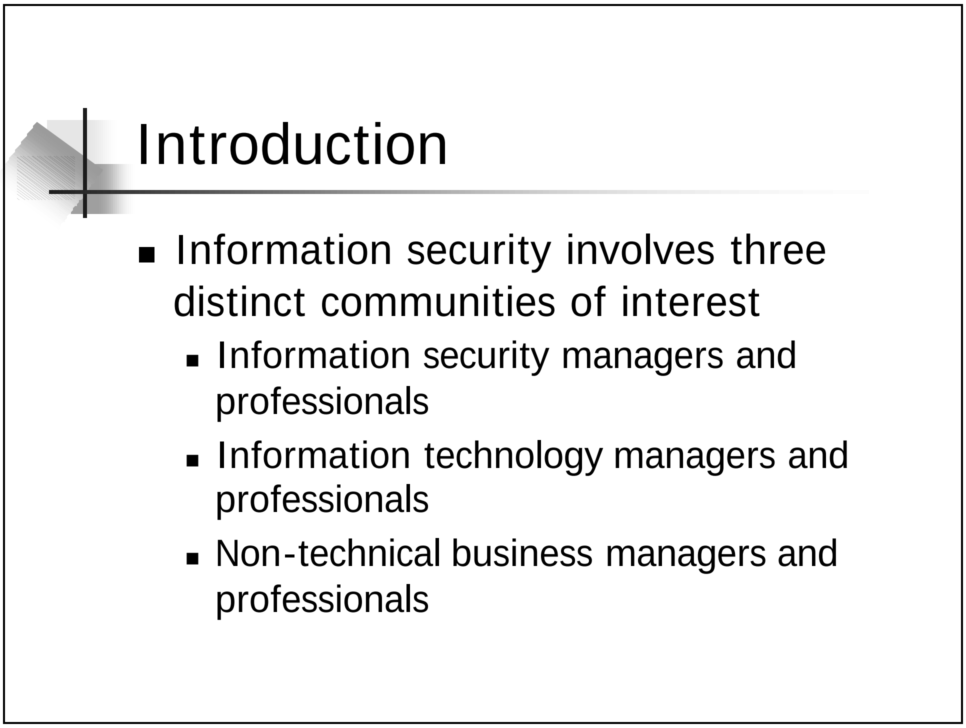
The DIST's IA certification requires a student to demonstrate competence in the following three IA courses
TELCOM 2810 Introduction to Computer Security;
TELCOM 2820 Cryptography
TELCOM 2821 Network Security

These three courses have been certified by the National Security Agency (NSA) as meeting the following IA education standards set by the Committee on National Systems Security (CNSS)
NSTISSI No. 4011, Information Systems Security Professionals
NSTISSI No. 4012, Designated Approving Authority
NSTISSI No. 4013, System Administrators in Information Systems Security

Ronald Larsen
(Dean, School of Information Sciences)

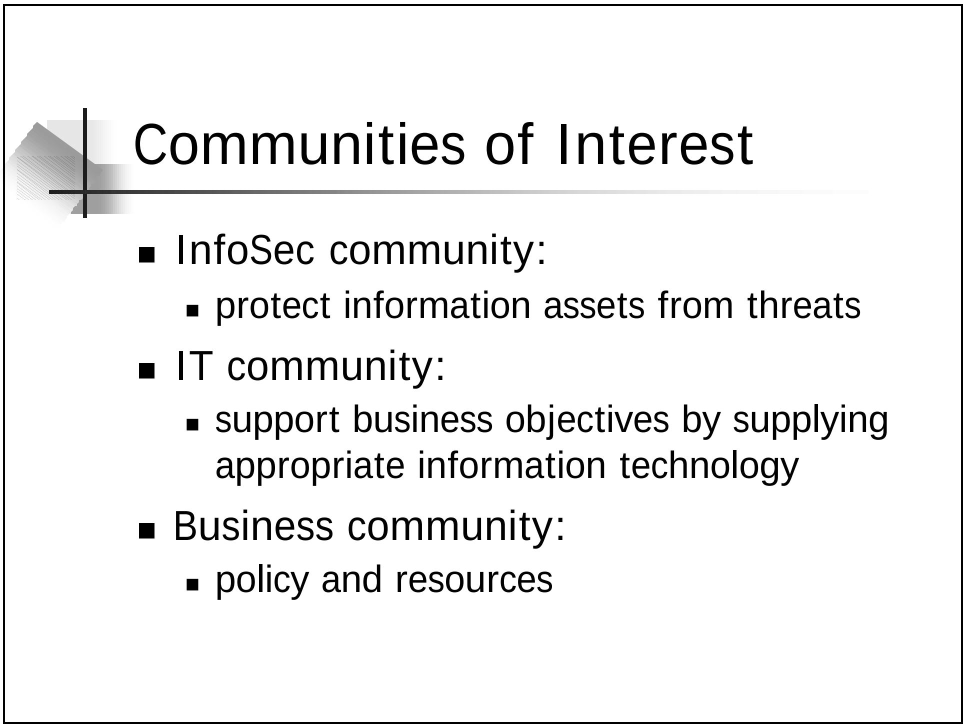
Introduction

- Information technology is critical to business and society
- Computer security is evolving into information security
- Information security is the responsibility of every member of an organization, but managers play a critical role



Introduction

- Information security involves three distinct communities of interest
  - Information security managers and professionals
  - Information technology managers and professionals
  - Non-technical business managers and professionals



Communities of Interest

- InfoSec community:
  - protect information assets from threats
- IT community:
  - support business objectives by supplying appropriate information technology
- Business community:
  - policy and resources

What Is Security?

- “The quality or state of being secure—to be free from danger”
- Security is achieved using several strategies simultaneously

Security and Control

- Examples
  - Physical security
  - Personal security
  - Operations security
  - Communications security
  - Network security
- Controls
  - Physical Controls
  - Technical Controls
  - Administrative
  - Prevention – Detection – Recovery
  - Deterrence, Corrective

InfoSec Components

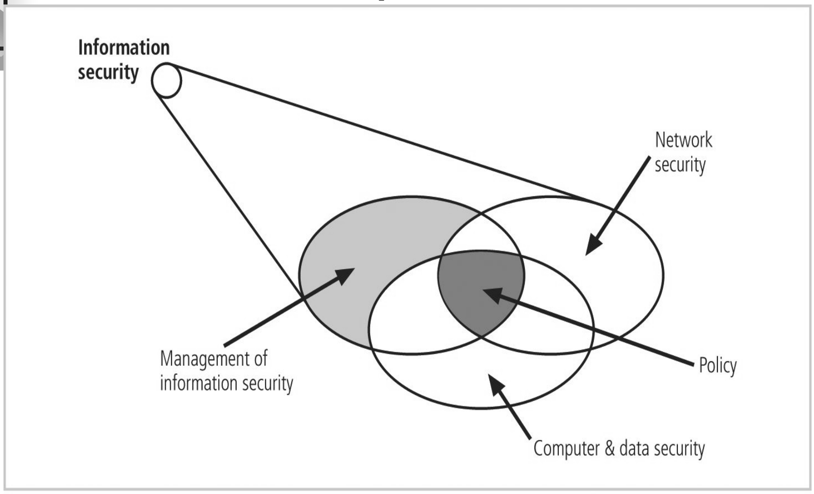


FIGURE 1-1 Components of Information Security

CIA Triangle

- The C.I.A. triangle is made up of
  - Confidentiality
  - Integrity
  - Availability
- Over time the list of characteristics has expanded, but these three remain central
- CNSS model is based on CIA

NSTISSC Security Model

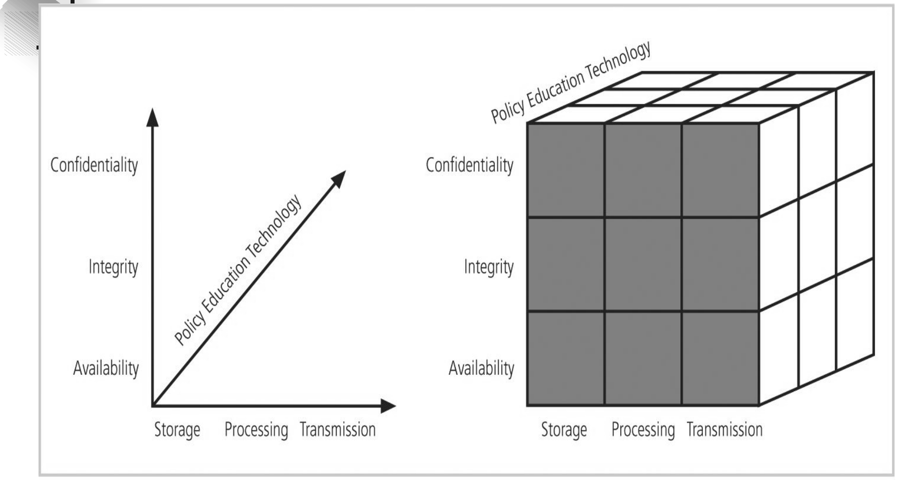


FIGURE 1-2 NSTISSC Security Model

Key Concepts: Confidentiality

- Confidentiality
  - only those with sufficient privileges may access certain information
- Confidentiality model
  - Bell-LaPadula
    - No write down & No read up
  - TCSEC/TNI (Orange, Red Book)

- Some threats
  - Hackers
  - Masqureaders
  - Unauthorized users
  - Unrotected download of files
  - LANS
  - Trojan horses

Key Concepts: Integrity

- Integrity
  - Integrity is the quality or state of being whole, complete, and uncorrupted
- Integrity model
  - Biba/low water mark
    - No write up & No read down
  - Clark-Wilson
    - Separation of duty
  - Lipner
- Other issues
  - Origin integrity
  - Data integrity

Key Concepts: Availability

- Availability
  - making information accessible to user access without interference or obstruction
- Survivability
  - Ensuring availability in presence of attacks

Key Concepts: privacy

- Privacy
  - Information is to be used only for purposes known to the data owner
  - This does not focus on freedom from observation, but rather that information will be used only in ways known to the owner

Key Concepts: Identification

- Identification
  - Information systems possess the characteristic of identification when they are able to recognize individual users
  - Identification and authentication are essential to establishing the level of access or authorization that an individual is granted

Key Concepts: Authentication & Authorization

- Authentication
  - Authentication occurs when a control provides proof that a user possesses the identity that he or she claims
- Authorization
  - authorization provides assurance that the user has been specifically and explicitly authorized by the proper authority to access the contents of an information asset

Key Concepts: Accountability; Assurance

- Accountability
  - The characteristic of accountability exists when a control provides assurance that every activity undertaken can be attributed to a named person or automated process
- Assurance
  - Assurance that all security objectives are met

What Is Management?

- A process of achieving objectives using a given set of resources
- To manage the information security process, first understand core principles of management
- A manager is “someone who works with and through other people by coordinating their work activities in order to accomplish organizational goals”

Managerial Roles

- Informational role: Collecting, processing, and using information to achieve the objective
- Interpersonal role: Interacting with superiors, subordinates, outside stakeholders, and other
- Decisional role: Selecting from alternative approaches and resolving conflicts, dilemmas, or challenges

Differences Between Leadership and Management

- The leader influences employees so that they are willing to accomplish objectives
- He or she is expected to lead by example and demonstrate personal traits that instill a desire in others to follow
- Leadership provides purpose, direction, and motivation to those that follow
- A manager administers the resources of the organization, budgets, authorizes expenditure

Characteristics of a Leader

1. Bearing
2. Courage
3. Decisiveness
4. Dependability
5. Endurance
6. Enthusiasm
7. Initiative
8. Integrity
9. Judgment
10. Justice
11. Knowledge
12. Loyalty
13. Tact
14. Unselfishness

What Makes a Good Leader? Action plan

1. Know yourself and seek self-improvement
2. Be technically and tactically proficient
3. Seek responsibility and take responsibility for your actions
4. Make sound and timely decisions
5. Set the example
6. Know your [subordinates] and look out for their well-being
7. Keep your subordinates informed
8. Develop a sense of responsibility in your subordinates
9. Ensure the task is understood, supervised, and accomplished
10. Build the team
11. Employ your team in accordance with its capabilities

Leadership quality and types

- A leader must:
  - BE a person of strong and honorable character
  - KNOW you, the details of your situation, the standards to which you work, human nature, and your team
  - DO by providing purpose, direction, and motivation to your team
- Three basic behavioral types of leaders:
  - Autocratic
  - Democratic
  - Laissez-faire

Characteristics of Management

- Two well-known approaches to management:
  - Traditional management theory using principles of planning, organizing, staffing, directing, and controlling (POSDC)
  - Popular management theory using principles of management into planning, organizing, leading, and controlling (POLC)

Figure 1-3 The Planning–Controlling Link

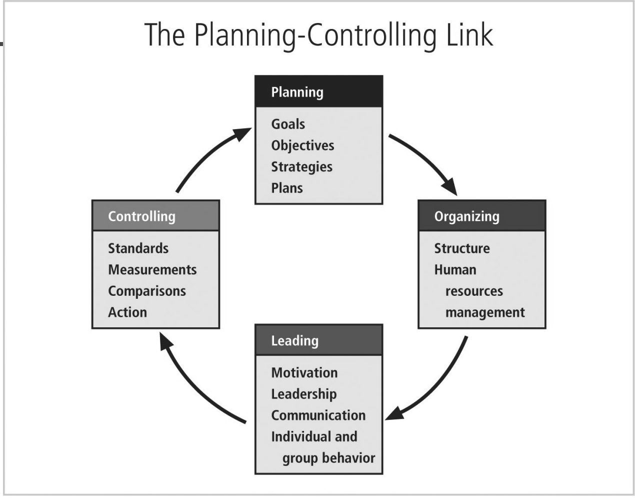


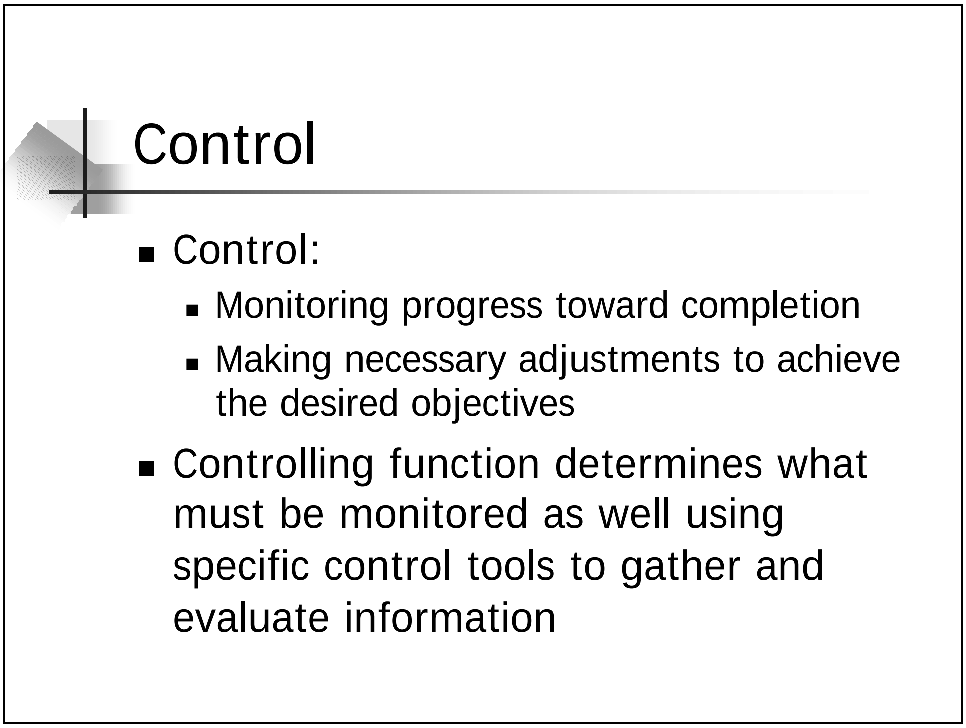
FIGURE 1-3 The Planning-Controlling Link[8]

Planning & Organization

- Planning: process that develops, creates, and implements strategies for the accomplishment of objectives
- Three levels of planning
  - Strategic
  - Tactical
  - Operational
- Organization: structuring of resources to support the accomplishment of objectives

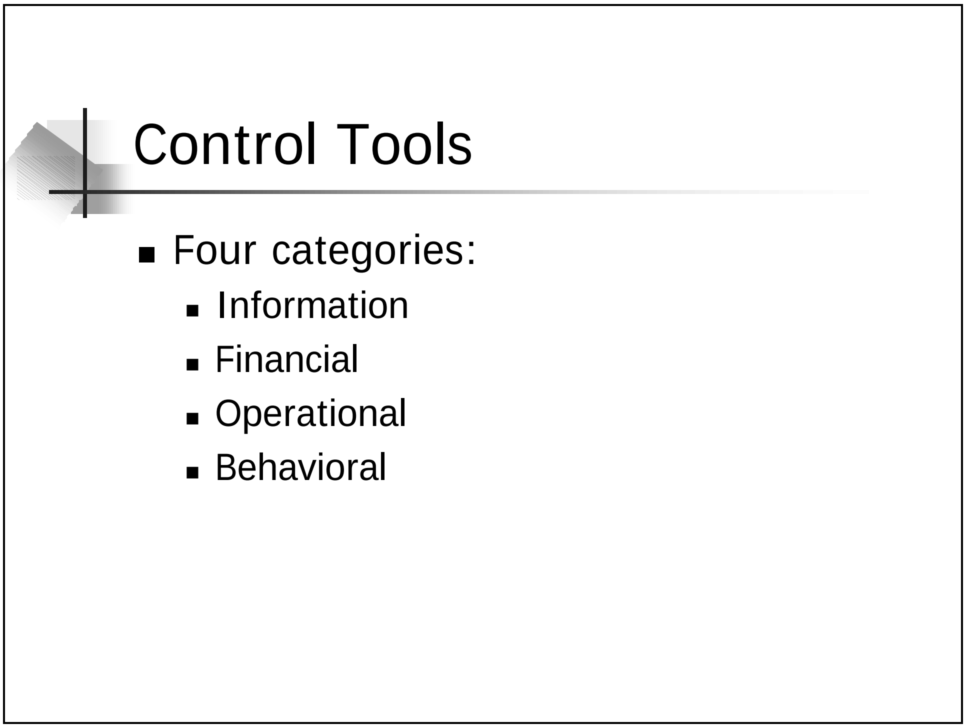
Leadership

- Encourages the implementation of the planning and organizing functions, including supervising employee behavior, performance, attendance, and attitude
- Leadership generally addresses the direction and motivation of the human resource



Control

- Control:
  - Monitoring progress toward completion
  - Making necessary adjustments to achieve the desired objectives
- Controlling function determines what must be monitored as well using specific control tools to gather and evaluate information



Control Tools

- Four categories:
  - Information
  - Financial
  - Operational
  - Behavioral

The Control Process

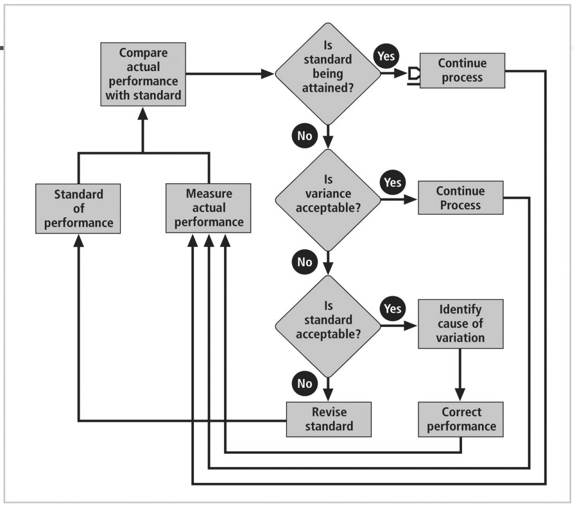


FIGURE 1-4 The Control Process

Solving Problems

- Step 1: Recognize and Define the Problem
- Step 2: Gather Facts and Make Assumptions
- Step 3: Develop Possible Solutions
- Step 4: Analyze and Compare the Possible Solutions (Feasibility analysis)
- Step 5: Select, Implement, and Evaluate a Solution

Feasibility Analyses

- Economic feasibility assesses costs and benefits of a solution
- Technological feasibility assesses an organization’s ability to acquire and manage a solution
- Behavioral feasibility assesses whether members of the organization will support a solution
- Operational feasibility assesses if an organization can integrate a solution

Principles Of Information Security Management

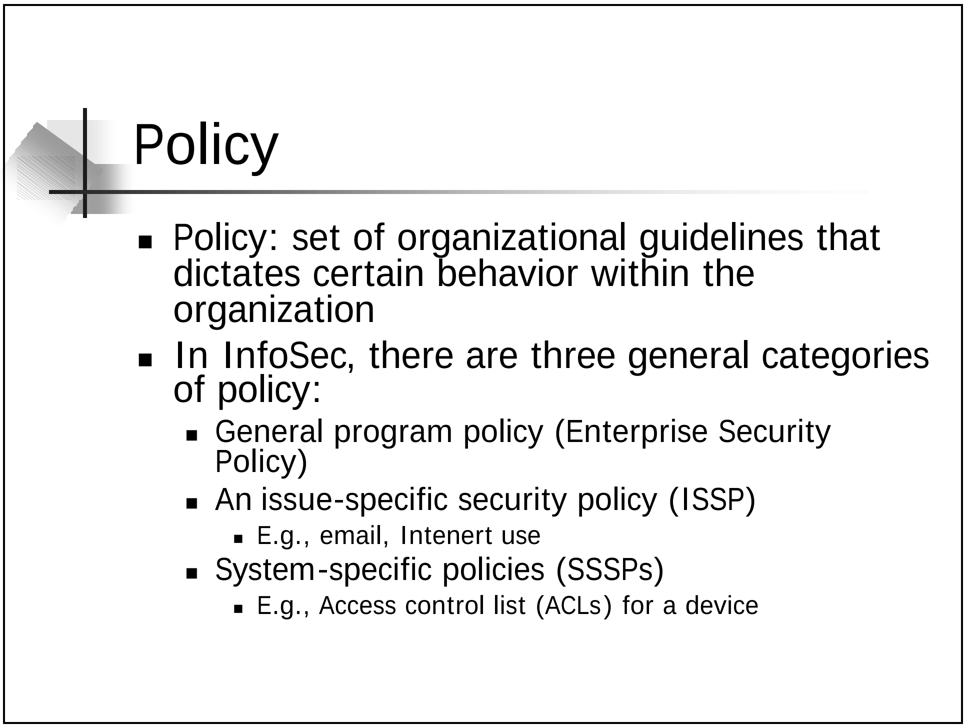
- The extended characteristics of information security are known as the six Ps:
  - Planning
  - Policy
  - Programs
  - Protection
  - People
  - Project Management

InfoSec Planning

- Planning as part of InfoSec management is an extension of the basic planning model discussed earlier in this chapter
- Included in the InfoSec planning model are activities necessary to support the design, creation, and implementation of information security strategies as they exist within the IT planning environment

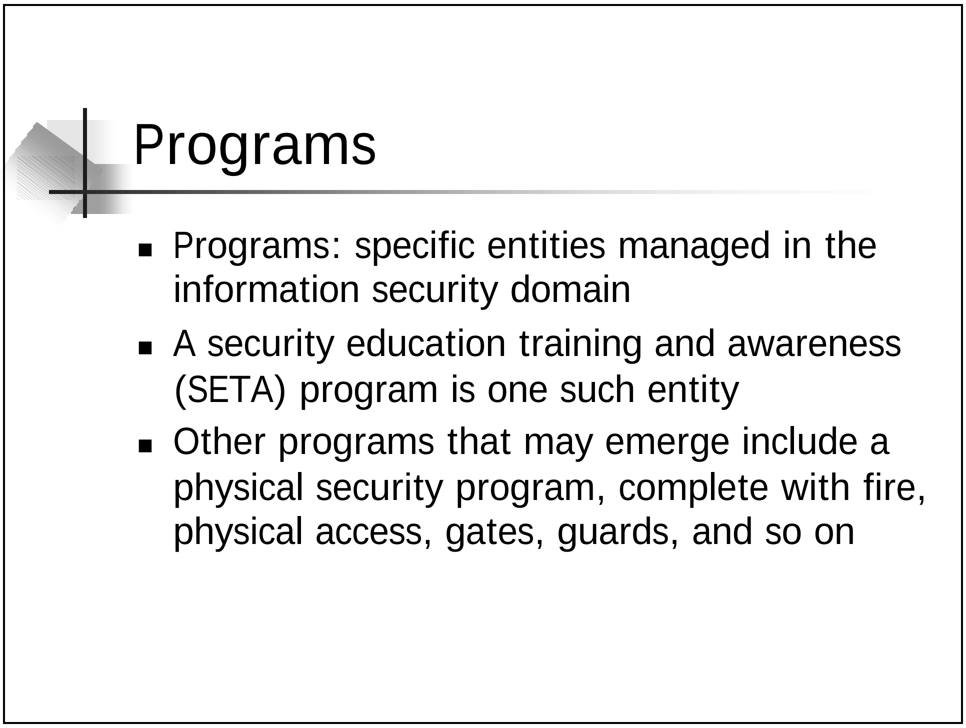
InfoSec Planning Types

- Several types of InfoSec plans exist:
  - Incident response
  - Business continuity
  - Disaster recovery
  - Policy
  - Personnel
  - Technology rollout
  - Risk management and
  - Security program including education, training and awareness



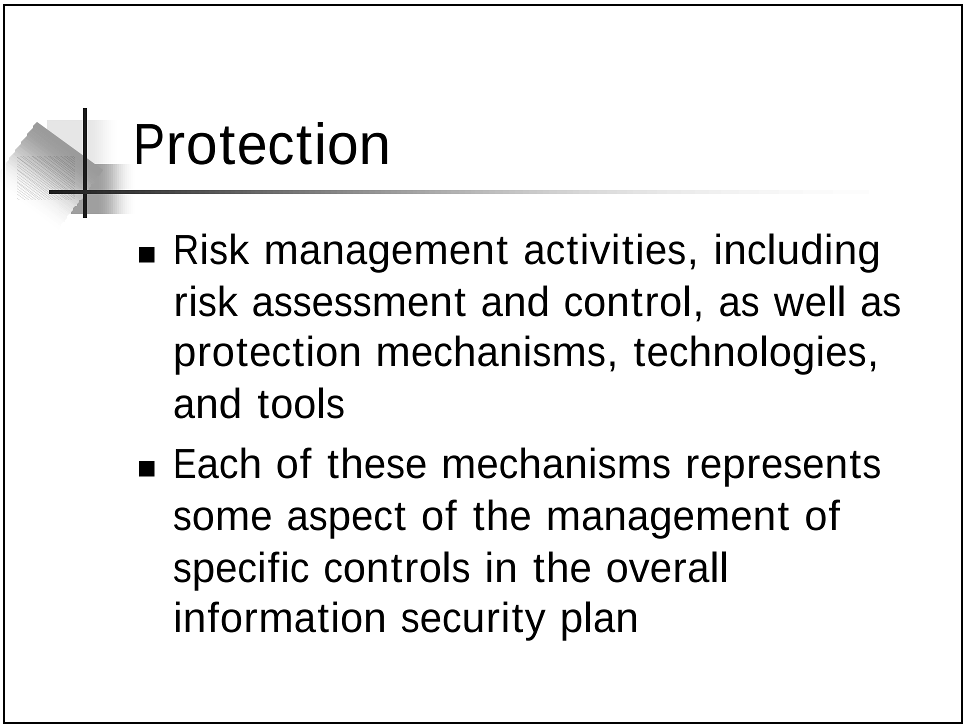
Policy

- Policy: set of organizational guidelines that dictates certain behavior within the organization
- In InfoSec, there are three general categories of policy:
  - General program policy (Enterprise Security Policy)
  - An issue-specific security policy (ISSP)
    - E.g., email, Intenert use
  - System-specific policies (SSSPs)
    - E.g., Access control list (ACLs) for a device



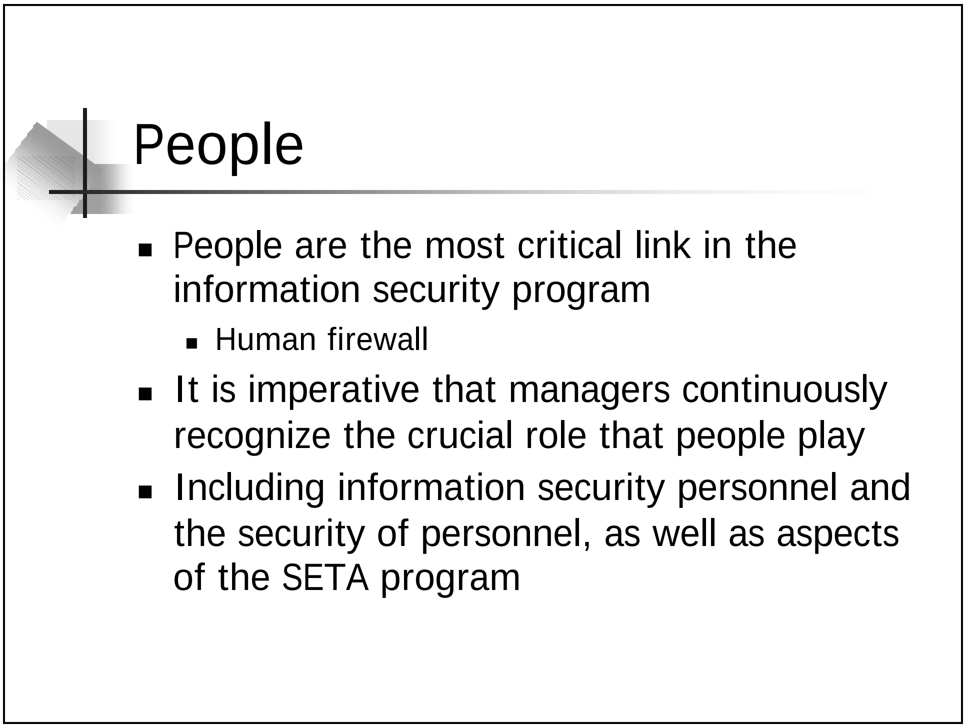
Programs

- Programs: specific entities managed in the information security domain
- A security education training and awareness (SETA) program is one such entity
- Other programs that may emerge include a physical security program, complete with fire, physical access, gates, guards, and so on



Protection

- Risk management activities, including risk assessment and control, as well as protection mechanisms, technologies, and tools
- Each of these mechanisms represents some aspect of the management of specific controls in the overall information security plan

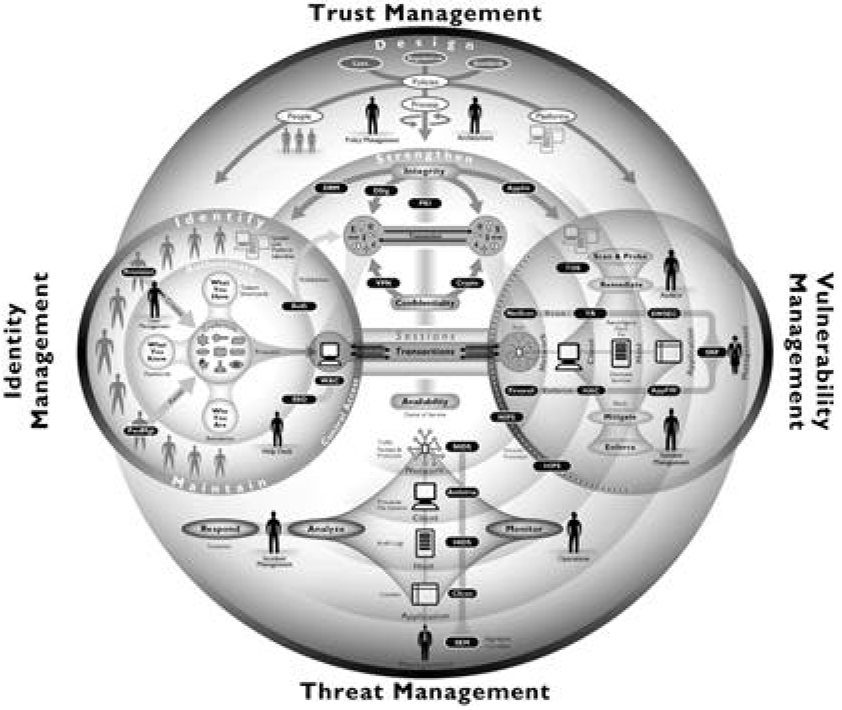


People

- People are the most critical link in the information security program
  - Human firewall
- It is imperative that managers continuously recognize the crucial role that people play
- Including information security personnel and the security of personnel, as well as aspects of the SETA program

Project Management

- Project management discipline should be present throughout all elements of the information security program
- Involves
  - Identifying and controlling the resources applied to the project
  - Measuring progress and adjusting the process as progress is made toward the goal


Trust Management
Design
Policies
Process
People
Platforms
Strengthen
Integrity
Identity
What You Have
What You Know
Who You Are
Help Desk
Maintain
Sessions
Transactions
Confidentiality
Availability
Scan & Probe
Remediate
Mitigate
Enforce
Network
Client
Host
Application
Respond
Analyze
Monitor
Identity Management
Vulnerability Management
Threat Management