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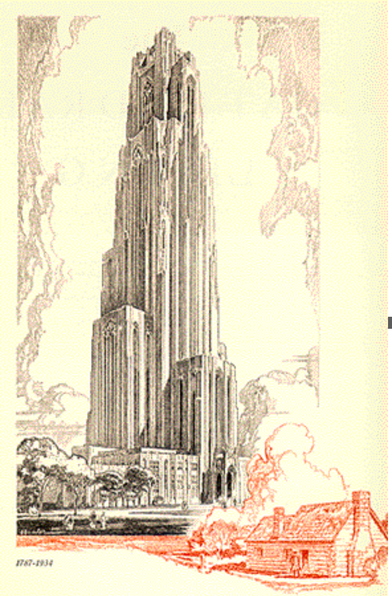
Security Management



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Associate Professor

Lecture 2

Jan 22, 2014

Contingency Planning

InfoSec Policy, & Program

Security Management Models

Contingency Planning

What Is Contingency Planning?

- Contingency planning (CP)
  - Overall planning for unexpected events
  - to prepare for, detect, react to, and recover from undesirable events
- Main goal:
  - restoration to normal modes of operation with minimum cost and disruption to normal business activities after an unexpected event

CP Components

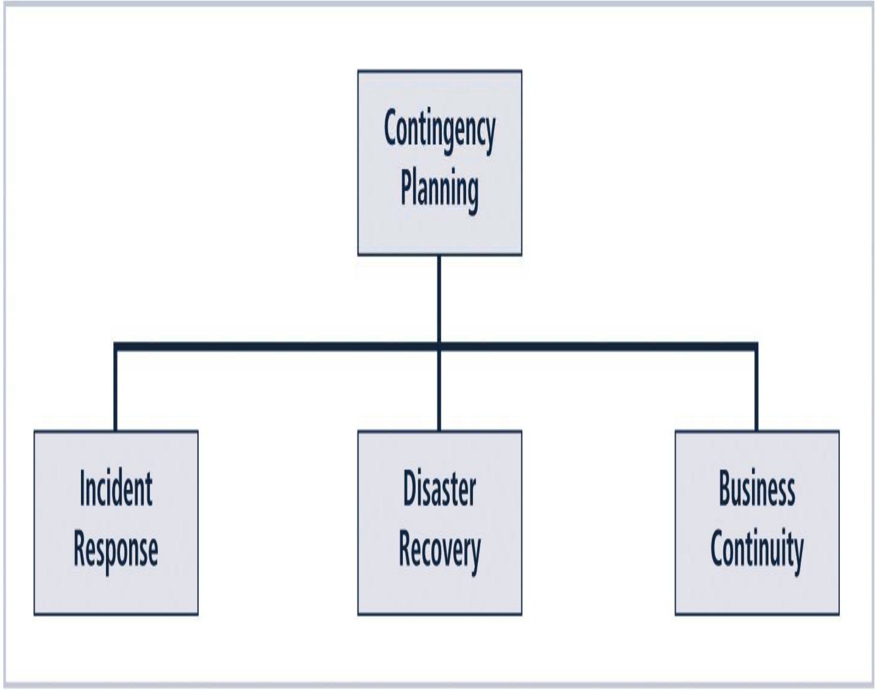


FIGURE 3-1 Contingency Planning Hierarchies

- Incident response (IRP)
  - focuses on immediate response
- Disaster recovery (DRP)
  - focuses on restoring operations at the primary site after disasters occur
- Business continuity (BCP)
  - facilitates establishment of operations at an alternate site

CP Components (Continued)

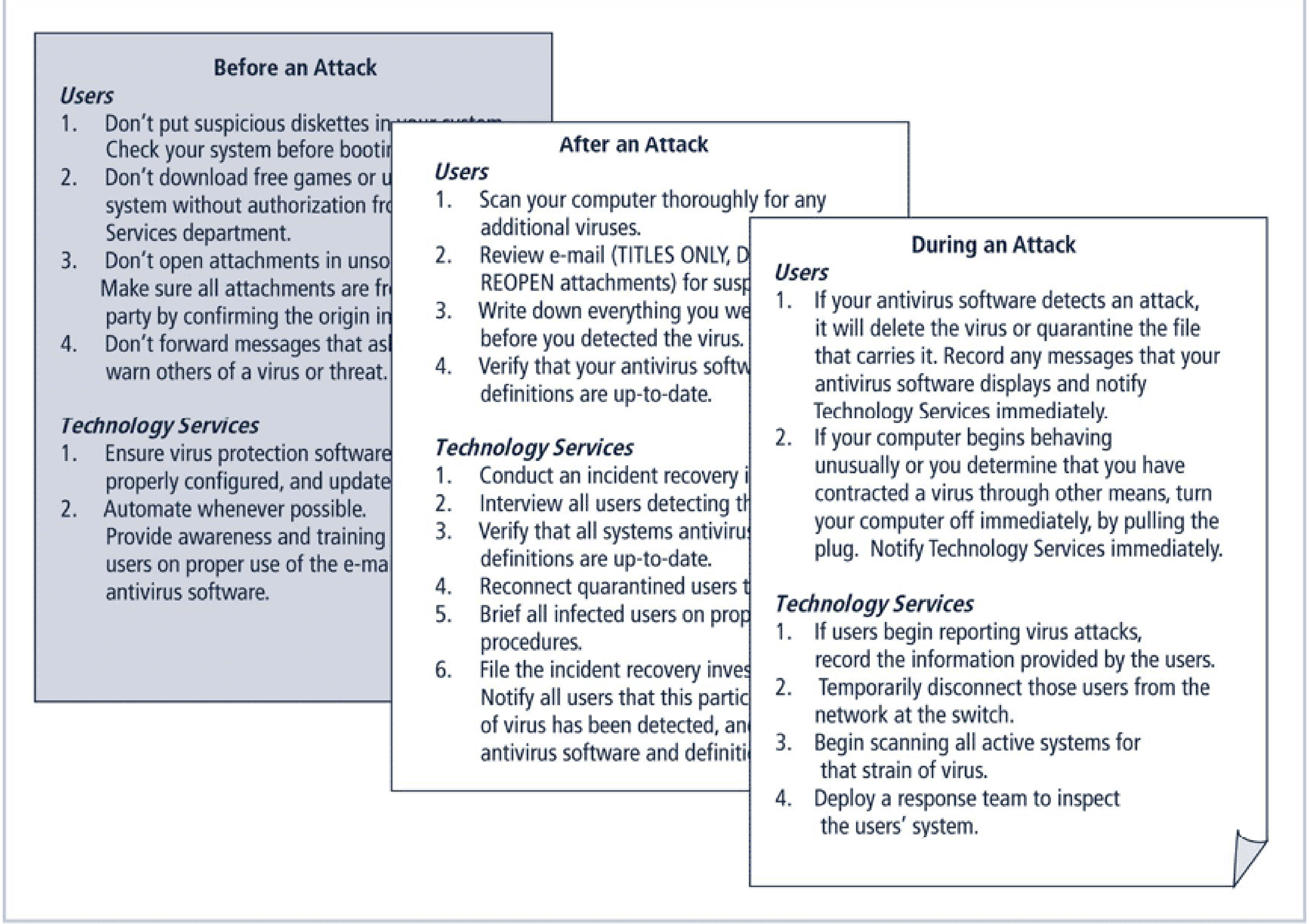
- Contingency planners should:
  - Identify the mission- or business-critical functions
  - Identify resources that support critical functions
  - Anticipate potential contingencies or disasters
  - Select contingency planning strategies
  - Implement selected strategy
  - Test and revise contingency plans
- Teams involved in contingency planning/operations:
  - CP team
  - Incident recovery (IR) team
  - Disaster recovery (DR) team
  - Business continuity plan (BC) team

Incident Response Plan

- IRP:
  - Detailed set of processes and procedures that anticipate, detect, and mitigate the impact of an unexpected event that might compromise information resources/assets
- Incident response (IR):
  - Set of procedures that commence when an incident is detected
  - Is a reactive measure, not a preventive one

Incident-handling procedures

- IR Planning team drafts a set of procedures,
  - For Before the Incident
    - Details of data backup schedules
    - Disaster recovery preparation
    - Training schedules
    - Testing plans
    - Copies of service agreements
    - Business continuity plans
  - For During the Incident
    - These procedures are grouped and assigned to various roles
    - Planning committee drafts a set of function-specific procedures
  - For After the Incident
    - planners develop and document the procedures that must be performed immediately after the incident has ceased
    - Separate functional areas may develop different procedures



Before an Attack

Users

1. Don't put suspicious diskettes in
   Check your system before bootir
2. Don't download free games or u
   system without authorization fro
   Services department.
3. Don't open attachments in unso
   Make sure all attachments are fr
   party by confirming the origin in
4. Don't forward messages that asl
   warn others of a virus or threat.

Technology Services

1. Ensure virus protection software
   properly configured, and update
2. Automate whenever possible.
   Provide awareness and training
   users on proper use of the e-ma
   antivirus software.

After an Attack

Users

1. Scan your computer thoroughly for any
   additional viruses.
2. Review e-mail (TITLES ONLY, D
   REOPEN attachments) for susp
3. Write down everything you we
   before you detected the virus.
4. Verify that your antivirus softw
   definitions are up-to-date.

Technology Services

1. Conduct an incident recovery i
2. Interview all users detecting th
3. Verify that all systems antiviru
   definitions are up-to-date.
4. Reconnect quarantined users t
5. Brief all infected users on prop
   procedures.
6. File the incident recovery inves
   Notify all users that this partic
   of virus has been detected, an
   antivirus software and definiti

During an Attack

Users

1. If your antivirus software detects an attack, it will delete the virus or quarantine the file that carries it. Record any messages that your antivirus software displays and notify Technology Services immediately.
2. If your computer begins behaving unusually or you determine that you have contracted a virus through other means, turn your computer off immediately, by pulling the plug. Notify Technology Services immediately.

Technology Services

1. If users begin reporting virus attacks, record the information provided by the users.
2. Temporarily disconnect those users from the network at the switch.
3. Begin scanning all active systems for that strain of virus.
4. Deploy a response team to inspect the users' system.

FIGURE 3-2 Incident Response Planning

Incident Detection

- Challenge
  - determining whether an event is routine system use or an actual incident
- Incident classification
  - process of examining a possible incident and determining whether or not it constitutes actual incident
- Ways to track and detect incident candidates
  - Initial reports from end users, IDS, virus detection software, and systems administrators

- Careful training is needed to allow everyone to relay vital information to the IR team

Incident Indicators

- Possible Indicators
  - Presence of unfamiliar files
  - Presence or execution of unknown programs or processes
  - Unusual consumption of computing resources
  - Unusual system crashes

- Probable Indicators
  - Activities at unexpected times
  - Presence of new accounts
  - Reported attacks
  - Notification from IDS

- Definite Indicators
  - Use of dormant accounts
  - Changes to logs
  - Presence of hacker tools
  - Notifications by partner or peer
  - Notification by hacker

- Actual occurrences
  - Loss of availability
  - Loss of integrity
  - Loss of confidentiality
  - Violation of policy
  - Violation of law

Incident Response

- In the incident response phase,
  - Action steps taken by the IR team and others must occur quickly and concurrently
- Notify right people ASAP,
  - Alert roster: *sequential*, *hierarchical*
  - Alert message:
    - scripted description of incident
  - Other key personnel:
    - must also be notified only after incident has been confirmed,
    - before media or other external sources learn of it
- DOCUMENT: Record the who, what, when, where, why and how of each action taken while the incident is occurring
  - Legal side, due care

Incident Containment Strategies

- IR team can stop the incident and attempt to recover control by means of several strategies:
  - Disconnect affected communication circuits
  - Dynamically apply filtering rules to limit certain types of network access
  - Disable compromised user accounts
  - Reconfigure firewalls to block problem traffic
  - Temporarily disable compromised process/service
  - Take down conduit application or server
  - Stop all computers and network devices

Control incident escalation

Initiating Incident Recovery

- Incident recovery
  - Done after the incident has been contained, and system control regained
  - Inform Human resources
  - Assess full extent of damage in order to determine what must be done to restore systems – and use IRP to carry out IR operations
- Incident damage assessment
  - Determine the scope of the breach of confidentiality, integrity, and availability of information assets
  - Document damage and Preserve evidence
    - In case the incident is part of a crime or results in a civil action

Recovery Process

- Once the extent of the damage has been determined, the recovery process begins:
  - Identify and resolve vulnerabilities that allowed the incident
  - Address, install, and replace/upgrade safeguards that failed to stop or limit the incident, or were missing
  - Evaluate monitoring capabilities to improve detection and reporting methods, or install new monitoring capabilities
  - Restore data from backups as needed – need a backup strategy!
  - Restore services and processes in use
  - Continuously monitor system - maintain vigilance
  - Restore the confidence of the members of the organization’s communities of interest

After Action Review

- Before returning to routine duties,
  - the IR team must conduct an after-action review (AAR):
    - detailed examination of events that occurred
- All team members:
  - Review their actions during the incident
  - Identify areas where the IR plan worked, didn’t work, or should improve

Law Enforcement Involvement

- When incident violates civil or criminal law,
  - Make sure to notify proper authorities
  - Selecting appropriate law enforcement agency
    - Federal, State, or Local (depending on crime)
- Involvement of law enforcement (advantages and disadvantages):
  - Usually much better at processing evidence, obtaining statements from witnesses, and building legal cases
  - Does the org have Computer Forensics capability
  - Involvement can result in loss of control of chain of events following an incident
  - What is the legal obligation – to report or not?

Disaster Recovery

- DRP
  - Preparation for and recovery from a disaster, whether natural or man made
- In general, an incident is a disaster when:
  - organization is unable to contain or control the impact

    OR
  - level of damage or destruction from incident is so severe, the organization is unable to quickly recover
- Key role of DRP:
  - defining how to reestablish operations at location where organization is usually located

Disaster Classifications

- A DRP can classify disasters in a number of ways
  - Most common:
    - Separate natural disasters from man-made disasters
  - Another way: by speed of development
    - Rapid onset disasters
      - Earthquake, floods, storms, tornadoes
    - Slow onset disasters
      - Droughts, famines, env degradation, deforestation, pest infestation

Planning for Disaster

- Categorize threat level of potential disasters
  - Uses Scenario development and impact analysis
- DRP must be tested regularly
- Key points in the DRP:
  - Clear delegation of roles and responsibilities
  - Execution of alert roster and notification of key personnel
  - Clear establishment of priorities
  - Documentation of the disaster
  - Action steps to mitigate the impact
  - Alternative implementations for various systems components

Crisis Management

- DRP should refer to a CM process
  - Set of focused steps taken during and after a disaster that deal primarily with people involved
- Crisis management team manages event:
  - Supporting personnel and their loved ones during crisis
  - Determining event's impact on normal business operations, when necessary, making a disaster declaration
  - Keeping public informed about event
  - Communicating with outside parties
- Two key tasks of crisis management team:
  - Verifying personnel status
  - Activating alert roster

Responding to the Disaster

- Actual events often outstrip even best of plans
- To be prepared, DRP should be flexible
- If physical facilities are intact, begin restoration there
- If organization’s facilities are unusable, take alternative actions
- When disaster threatens organization at the primary site, DRP becomes BCP

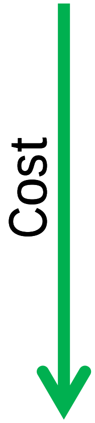
Business Continuity Planning (BCP)

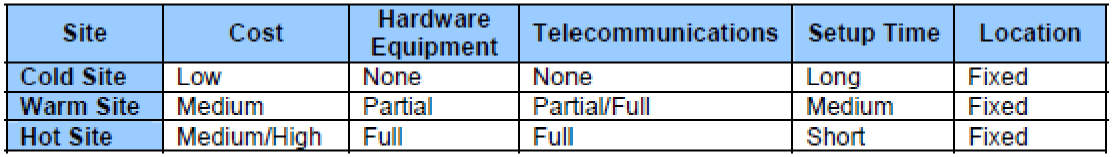
- Ensures critical business functions can continue in a disaster
- Most properly managed by CEO of organization
- Activated and executed concurrently with the DRP when needed
- Reestablishes critical functions at alternate site (DRP focuses on reestablishment at primary site)
- Relies on identification of critical business functions and the resources to support them

Continuity Strategies

- Several continuity strategies for business continuity
  - Determining factor is usually cost

- Three exclusive-use options:
  - Hot sites
    - Fully configured computer facility with all services
    - Where 24/7 support is needed
  - Warm sites
    - Like hot site, but software applications not kept fully prepared
  - Cold sites
    - Only rudimentary services and facilities kept in readin





Site	Cost	Hardware Equipment	Telecommunications	Setup Time	Location
Cold Site	Low	None	None	Long	Fixed
Warm Site	Medium	Partial	Partial/Full	Medium	Fixed
Hot Site	Medium/High	Full	Full	Short	Fixed

Shared Use Options

- Timeshares
  - Like an exclusive use site but leased – lower cost
  - Disadvantages
    - More than one may need it simultaneously
    - Data and info asset from many different organizations
- Service Bureaus
  - Agency that provides physical facilities/data storage – for a fee
  - Renegotiation periodically
- Mutual Agreements
  - Contract between two organizations to assist (or units within)
- Specialized alternatives/variations:
  - Rolling mobile site
  - Mirrored
  - Externally stored resources

Off-Site Disaster Data Storage

- To get any BCP site running quickly,
    - organization must be able to move data to new site
- Options include:
    - Electronic vaulting:
        - bulk batch-transfer of data to an off-site facility
        - Leased lines may be used
    - Remote Journaling:
        - transfer of live transactions to an off-site facility (not focused on data archives)
    - Database shadowing
        - storage of duplicate online transaction data and duplicate databases on redundant server
        - Combines electronic vaulting and remote journaling

Contingency Plan Implementation Timeline

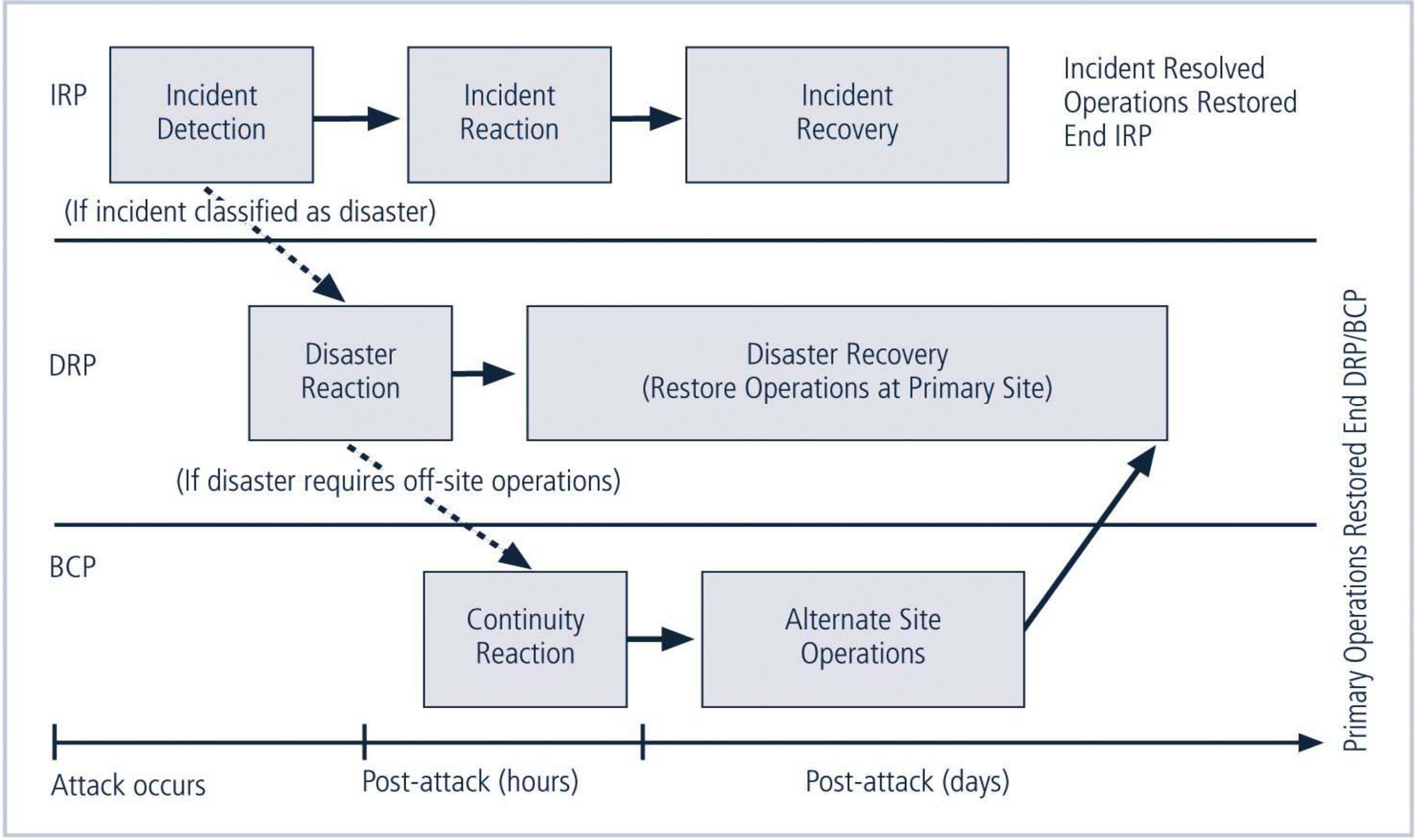


FIGURE 3-5 Contingency Plan Implementation Timeline

- The CP team should include:
  - Champion
  - Project Manager
  - Team Members
    - Business managers
    - Information technology managers
    - Information security managers

Major Tasks in Contingency Planning (for CP team)

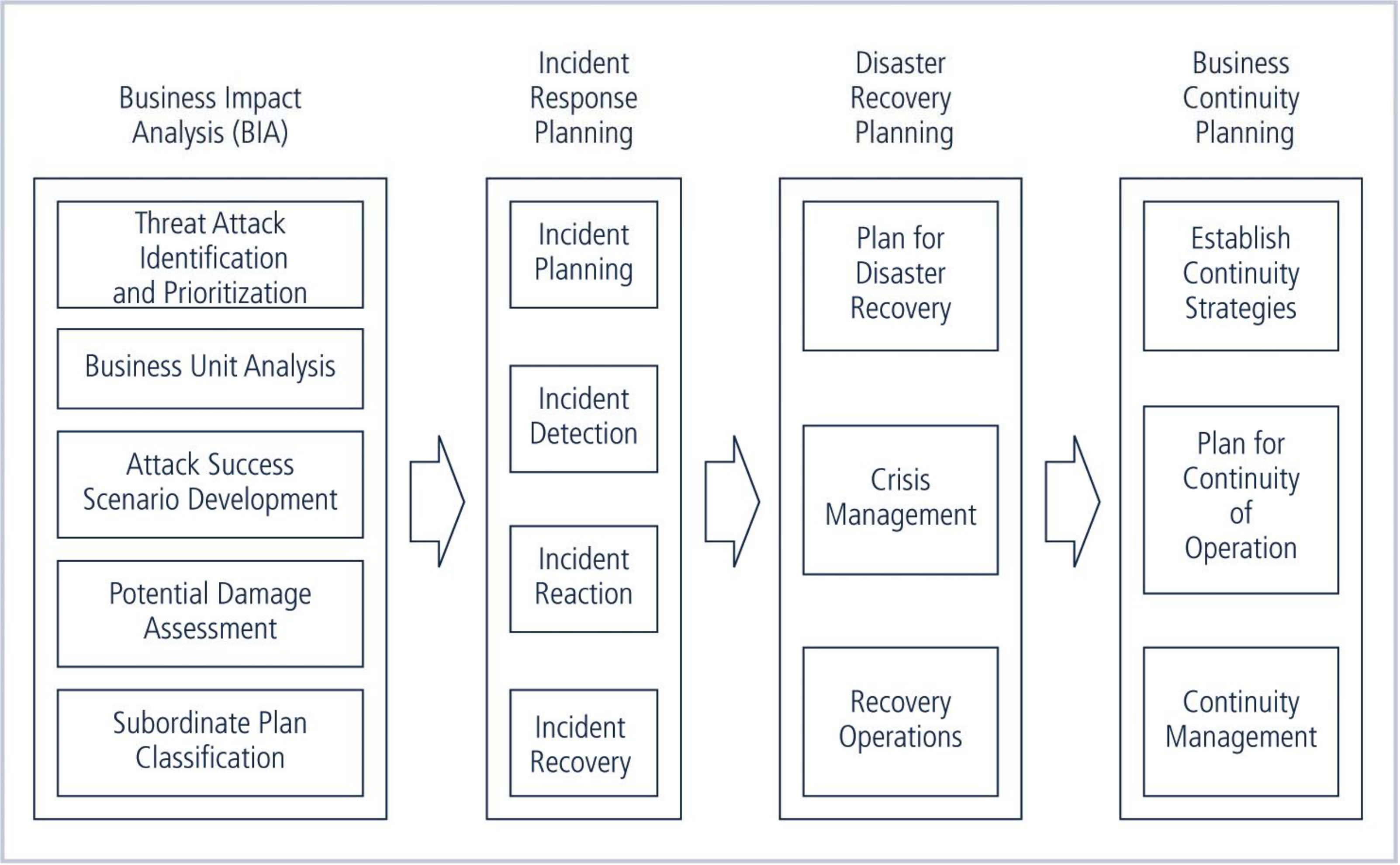

Business Impact Analysis (BIA)
Threat Attack Identification and Prioritization
Business Unit Analysis
Attack Success Scenario Development
Potential Damage Assessment
Subordinate Plan Classification
Incident Response Planning
Incident Planning
Incident Detection
Incident Reaction
Incident Recovery
Disaster Recovery Planning
Plan for Disaster Recovery
Crisis Management
Recovery Operations
Business Continuity Planning
Establish Continuity Strategies
Plan for Continuity of Operation
Continuity Management

FIGURE 3-6 Major Tasks in Contingency Planning

Business Impact Analysis (BIA)

- BIA
  - Provides information about systems/threats and detailed scenarios for each potential attack
  - Not risk management
    - RM focuses on identifying threats, vulnerabilities, and attacks to determine controls
    - BIA assumes controls have been bypassed or are ineffective and attack was successful
- CP team conducts BIA in the following stages:
  - Threat attack identification
  - Business unit analysis
  - Attack success scenarios
  - Potential damage assessment
  - Subordinate plan classification

Business Impact Analysis

- Threat/Attack Identification and Prioritization
  - Add the attack profile to identified and prioritized threats
    - risk management process will have identified and prioritized threats
  - Attack profile:
    - detailed description of activities that occur during an attack
    - (handout page)
- Business Unit Analysis
  - Analysis and prioritization of business functions within the organization
  - Each unit should be considered separately

BUA, ASSD, PDA

- Attack Success Scenario Development
  - Create a series of scenarios on each functional area
  - Attack profiles should include scenarios attack including:
    - Methodology
    - Indicators
    - Broad consequences
  - More details are added including
    - alternate outcomes—best, worst, and most likely
- Potential Damage Assessment
  - Estimate the cost of the best, worst, and most likely outcomes
  - Identify what must be done to recover from each possible case
- Subordinate Plan Classification
  - Identify a related plan from among existing plans
  - Categorize attack scenario case as disastrous or not

Combined DRP and BCP

- DRP and BCP are closely related,
  - Most organizations prepare them concurrently and
  - May combine them into a single document
  - Plan must support reestablishment of operations
    - Immediately at alternate site
    - Eventually back at primary site
- A single team can develop combined DRP/BRP,
  - but execution requires separate teams

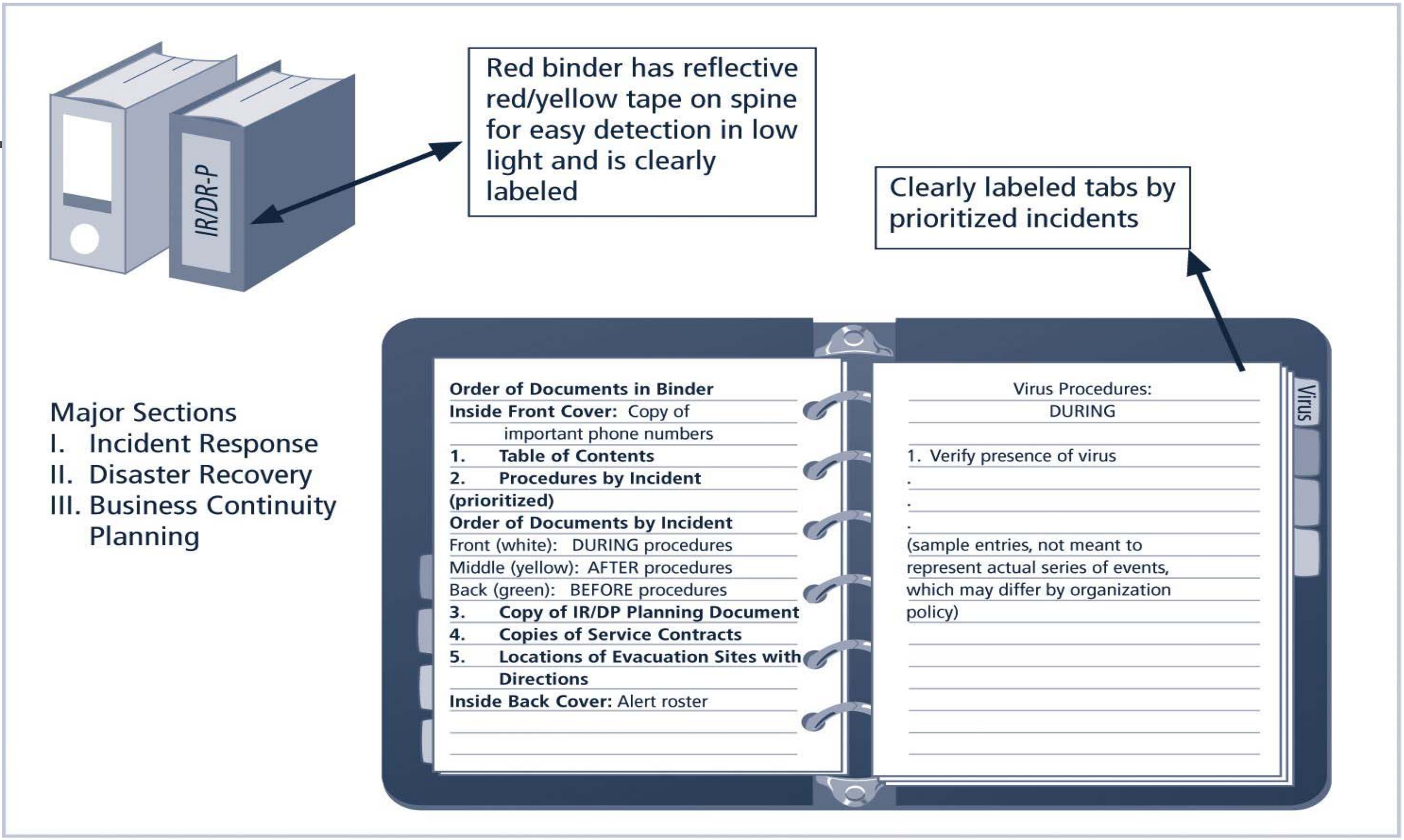
Sample Disaster Recovery Plan

- Name of agency
- Date of completion or update of the plan and test date
- Agency staff to be called in the event of a disaster
- Emergency services to be called (if needed) in event of a disaster
- Locations of in-house emergency equipment and supplies
- Sources of off-site equipment and supplies
- Salvage Priority List
- Agency Disaster Recovery Procedures
- Follow-up Assessment

Testing Contingency Plans

- After testing process,
  - improvements can be made, and the resulting plan can be relied on in times of need
- There are five testing strategies that can be used to test contingency plans:
  - Desk Check
  - Structured walkthrough
  - Simulation
  - Parallel testing
  - Full interruption

A Single Contingency Plan Format



Red binder has reflective red/yellow tape on spine for easy detection in low light and is clearly labeled

Clearly labeled tabs by prioritized incidents

Major Sections
I. Incident Response
II. Disaster Recovery
III. Business Continuity Planning

Order of Documents in Binder
Inside Front Cover: Copy of important phone numbers
1. Table of Contents
2. Procedures by Incident (prioritized)
Order of Documents by Incident
Front (white): DURING procedures
Middle (yellow): AFTER procedures
Back (green): BEFORE procedures
3. Copy of IR/DP Planning Document
4. Copies of Service Contracts
5. Locations of Evacuation Sites with Directions
Inside Back Cover: Alert roster

Virus Procedures:
DURING

1. Verify presence of virus
.
.
.
(sample entries, not meant to represent actual series of events, which may differ by organization policy)

Continuous Process Improvement (CPI)

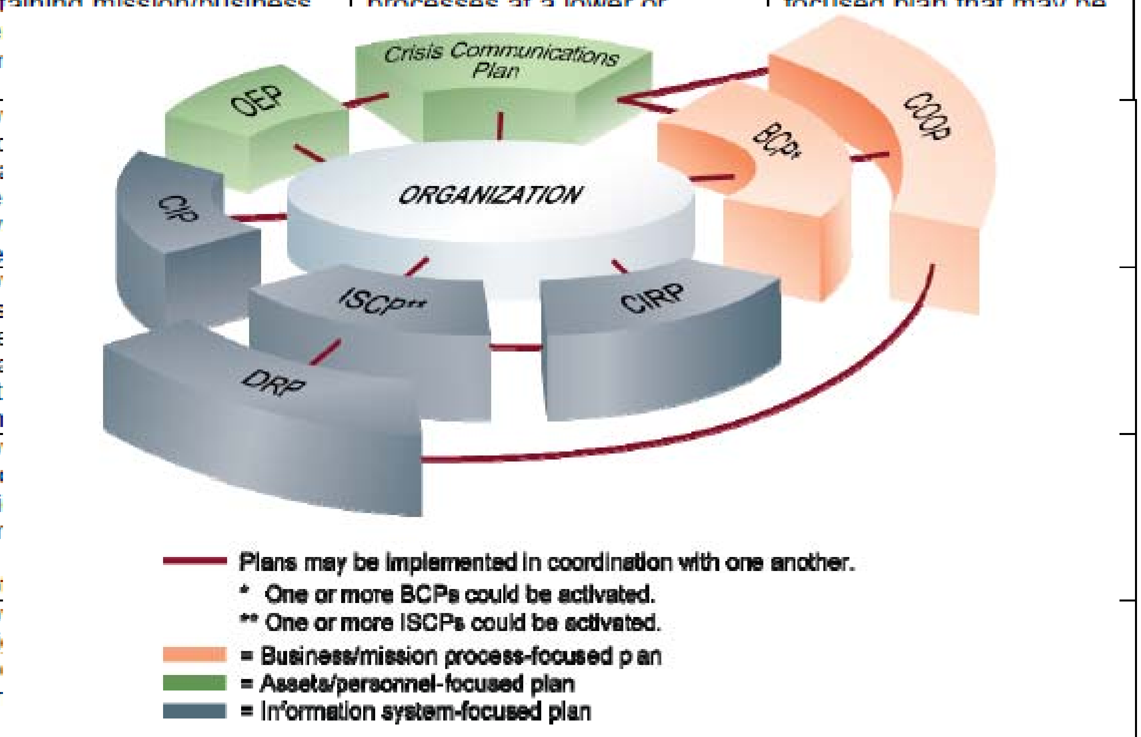
A formal implementation of this methodology is a process

NIST SP800-34

- MEF: Mission Essential Functions

Table 2-2: Type of Plans

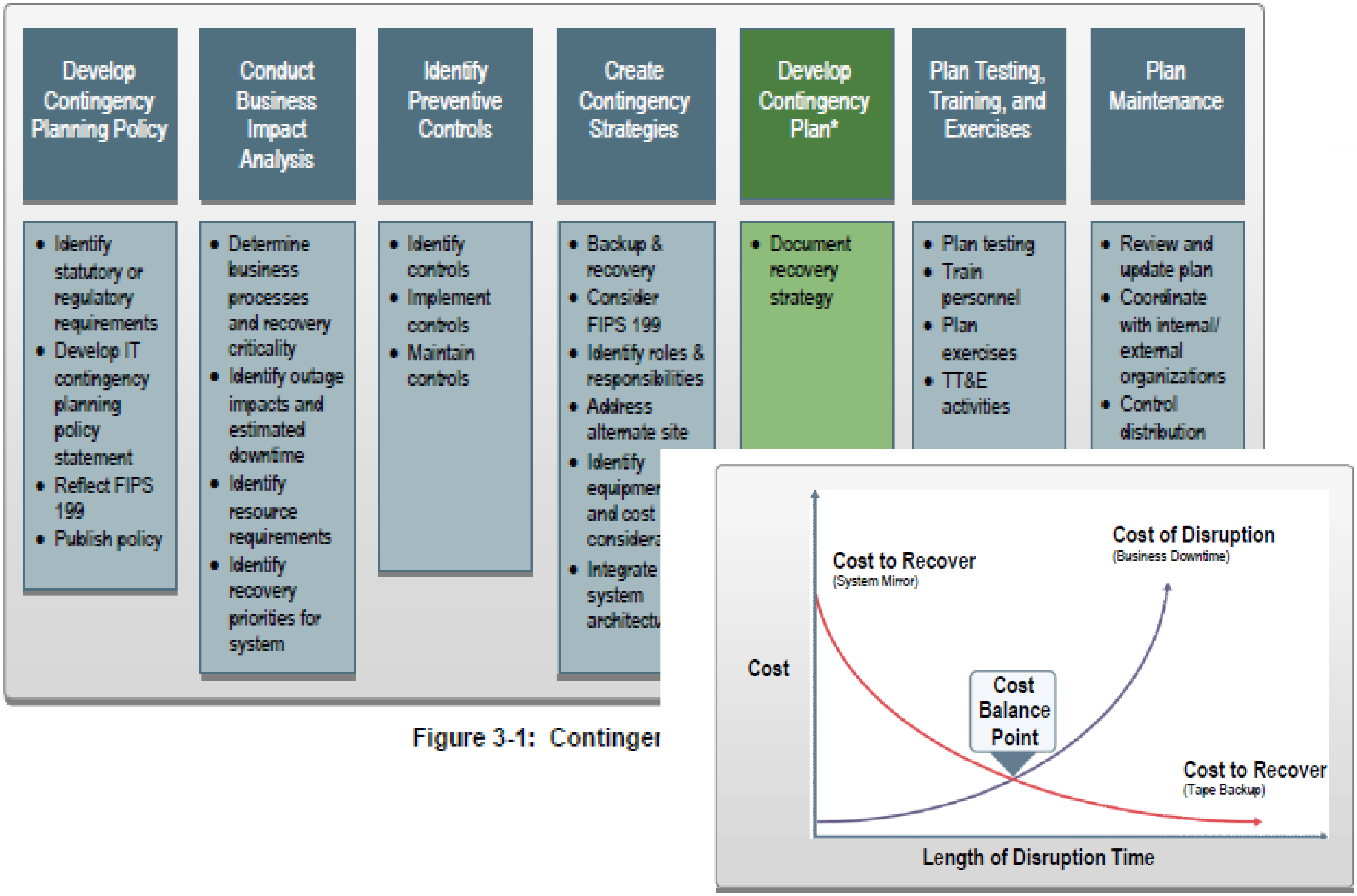
Plan	Purpose	Scope	Plan Relationship
Business Continuity Plan (BCP)	Provides procedures for sustaining mission/business ope from	Addresses mission/business processes at a lower or	Mission/business process focused plan that may be
Continuity of Operations (COOP) Plan	Pro guic orga alte day dire		
Crisis Communica-tions Plan	Pro diss exte mea stat rum		
Critical Infrastructure Protection (CIP) Plan	Pro proc nati com the Pro		
Cyber Incident Response Plan	Pro miti cyb wor		
Disaster Recovery Plan (DRP)	Pro relo systems operations to an alternate location.	effects.	activates one or more ISCPs for recovery of individual systems.
Information System Contingency Plan (ISCP)	Provides procedures and capabilities for recovering an information system.	Addresses single information system recovery at the current or, if appropriate alternate location.	Information system-focused plan that may be activated independent from other plans or as part of a larger recovery effort coordinated with a DRP, COOP, and/or BCP.
Occupant Emergency Plan (OEP)	Provides coordinated procedures for minimizing loss of life or injury and protecting property damage in response to a physical threat.	Focuses on personnel and property particular to the specific facility; not mission/business process or information system-based.	Incident-based plan that is initiated immediately after an event, preceding a COOP or DRP activation.



Crisis Communications Plan
OEP
COOP
BCP*
CIP
ORGANIZATION
ISCP**
CIRP
DRP
Plans may be implemented in coordination with one another.
* One or more BCPs could be activated.
** One or more ISCPs could be activated.
= Business/mission process-focused plan
= Assets/personnel-focused plan
= Information system-focused plan

Figure 2-1: Contingency-Related Plan Relationships

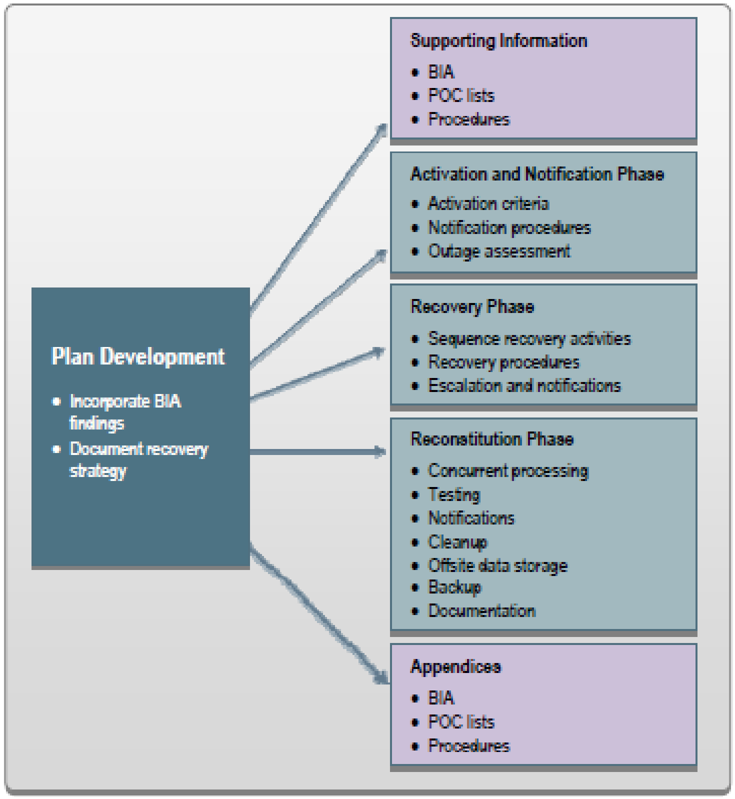
NIST SP 800-34 CP



Develop Contingency Planning Policy	Conduct Business Impact Analysis	Identify Preventive Controls	Create Contingency Strategies	Develop Contingency Plan*	Plan Testing, Training, and Exercises	Plan Maintenance
• Identify statutory or regulatory requirements • Develop IT contingency planning policy statement • Reflect FIPS 199 • Publish policy	• Determine business processes and recovery criticality • Identify outage impacts and estimated downtime • Identify resource requirements • Identify recovery priorities for system	• Identify controls • Implement controls • Maintain controls	• Backup & recovery • Consider FIPS 199 • Identify roles & responsibilities • Address alternate site • Identify equipmer and cost considera • Integrate system architectu	• Document recovery strategy	• Plan testing • Train personnel • Plan exercises • TT&E activities	• Review and update plan • Coordinate with internal/ external organizations • Control distribution

Figure 3-1: Continger

NIST SP 800-34 CP



Plan Development

- Incorporate BIA findings
- Document recovery strategy

Supporting Information

- BIA
- POC lists
- Procedures

Activation and Notification Phase

- Activation criteria
- Notification procedures
- Outage assessment

Recovery Phase

- Sequence recovery activities
- Recovery procedures
- Escalation and notifications

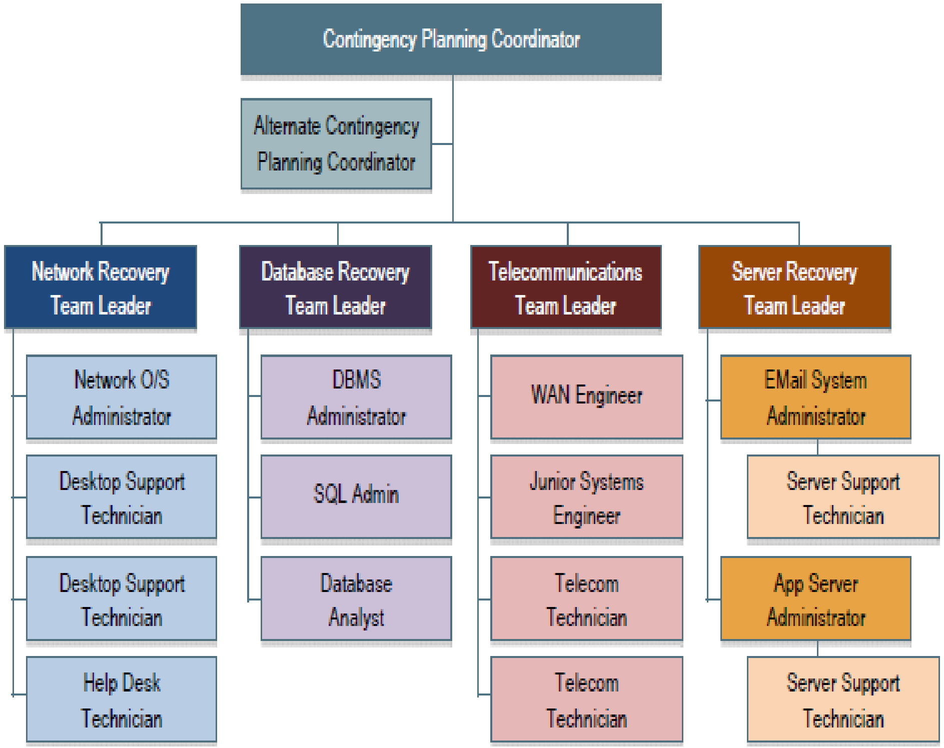
Reconstitution Phase

- Concurrent processing
- Testing
- Notifications
- Cleanup
- Offsite data storage
- Backup
- Documentation

Appendices

- BIA
- POC lists
- Procedures

Figure 4-1: Contingency Plan Structure



Contingency Planning Coordinator

Alternate Contingency Planning Coordinator

Network Recovery Team Leader

- Network O/S Administrator
- Desktop Support Technician
- Desktop Support Technician
- Help Desk Technician

Database Recovery Team Leader

- DBMS Administrator
- SQL Admin
- Database Analyst

Telecommunications Team Leader

- WAN Engineer
- Junior Systems Engineer
- Telecom Technician
- Telecom Technician

Server Recovery Team Leader

- EMail System Administrator
  - Server Support Technician
- App Server Administrator
  - Server Support Technician

Figure 4-2: Sample Call Tree

Read Sample Information Security Contingency Plan

Information Security Policy

Introduction

- Information security policy:
  - What it is
  - How to write it
  - How to implement it
  - How to maintain it
- Policy
  - Essential foundation of effective information security program

Why Policy?

- A quality information se
  - begins and ends with p
  - least expensive means implement
- Some basic rules must
  - Never conflict with law
  - Stand up in court
  - Properly supported and administered
- Some Guidelines
  - It should contribute to the success of the organization
  - Management must ensure the adequate sharing of responsibility for proper use of information systems
  - Involve end users of information systems

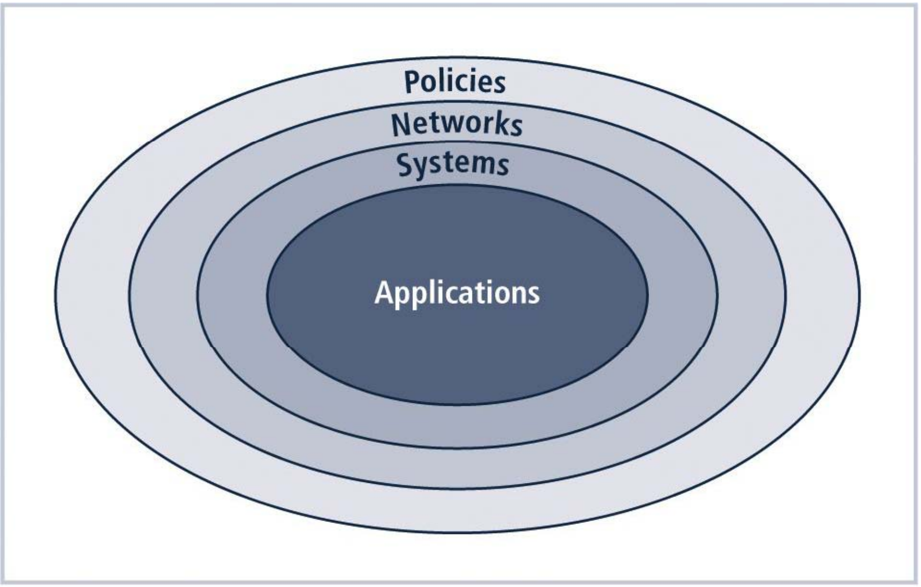


FIGURE 4-1 The Bull's-Eye Model

Policies, Standards, & Practices

Policy: A set of rules that dictates acceptable and unacceptable behavior

Standards: more detailed statement of what must be done to comply with policy

Practices, procedures and guidelines: explain how employees will comply with policy

- Policies must be:
  - Properly disseminated
  - Read
  - Understood
  - Agreed-to
  - constantly updated

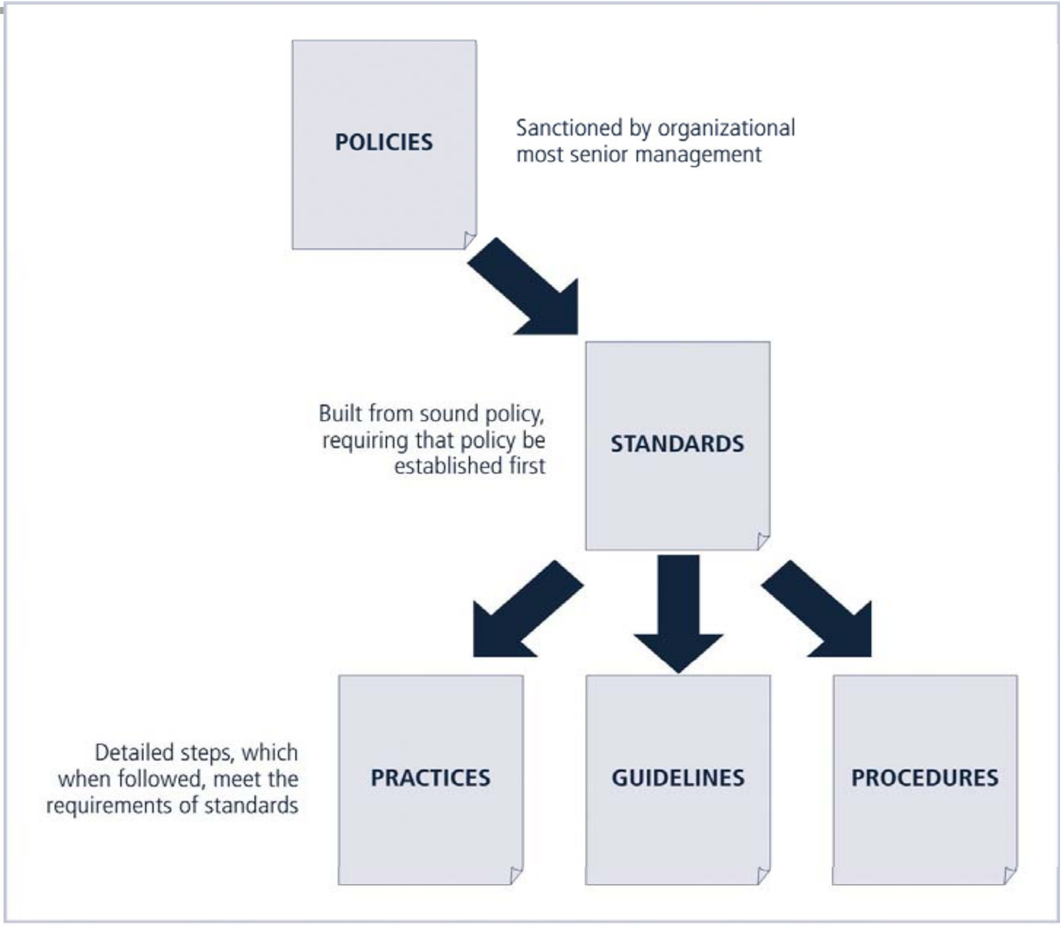

POLICIES
Sanctioned by organizational most senior management
Built from sound policy, requiring that policy be established first
STANDARDS
Detailed steps, which when followed, meet the requirements of standards
PRACTICES
GUIDELINES
PROCEDURES

FIGURE 4-2 Policies, Standards, and Practices

Policy, Standards, and Practices (Continued)

- Define three types of information security policy (NIST 800-14):
  - Enterprise information security program policy
  - Issue-specific information security policies
  - Systems-specific information security policies

Enterprise Information Security Policy (EISP)

- Sets strategic direction, scope, and tone for organization's security efforts
  - Executive-level document; 2-10 pages
  - CISO in consultation with CIO
- Assigns responsibilities for various areas of information security, including
  - Maintenance of information security policies
  - Practices and responsibilities of end users
- EISP guides
  - The development, implementation, and management requirements of information security program

EISP Elements

- EISP documents should provide :
  - An overview of corporate philosophy on security
  - Information about information security organization and information security roles
  - Responsibilities for security shared by all members of the organization
  - Responsibilities for security unique to each role within the organization

Components of the EISP

- Statement of Purpose:
  - What the policy is for
- Information Technology Security Elements:
  - Defines information security / clarify philosophies
- Need for Information Technology Security:
  - justifies importance of information security in the organization
- Information Security Responsibilities and Roles:
  - Defines organizational structure
- References Information Technology standards and guidelines

Example EISP

- Protection Of Information:
  - Information must be protected in a manner commensurate with its sensitivity, value, and criticality
- Use Of Information:
  - Company X information must be used only for business purposes expressly authorized by management
- Information Handling, Access, And Usage:
  - Information is a vital asset and all accesses to, uses of, and processing of Company X information must be consistent with policies and standards

Example EISP – CCW (Continued)

- Data And Program Damage Disclaimers:
    - Company X disclaims any responsibility for loss or damage to data or software that results from its efforts to protect the confidentiality, integrity, and availability of the information handled by computers and communications systems
- Legal Conflicts
- Exceptions To Policies
- Policy Non-Enforcement
- Violation Of Law
- Revocation Of Access Privileges
- Industry-Specific Information Security Standards
- Use Of Information Security Policies And Procedures
- Security Controls Enforceability

Issue-Specific Security Policy (ISSP)

- Every organization’s ISSP has three characteristics:
  - Addresses specific technology-based systems
  - Requires frequent updates
  - Contains an issue statement on the organization’s position on an issue
- ISSP topics could include:
  - E-mail use,
  - Internet and World Wide Web use,
  - Specific minimum configurations of computers to defend against worms and viruses,
  - Prohibitions against hacking or testing organization security controls,
  - ..

Typical ISSP Components

- Statement of Purpose
  - Scope and Applicability
  - Definition of Technology Addressed
  - Responsibilities
- Authorized Access and Usage of Equipment
  - User Access
  - Fair and Responsible Use
  - Protection of Privacy
- Prohibited Usage of Equipment
  - Disruptive Use or Misuse
  - Criminal Use
  - Offensive or Harassing Materials
  - Copyrighted, Licensed or other Intellectual Property
  - Other Restrictions

Components of the ISSP (Continued)

- Systems Management
  - Management of Stored Materials
  - Employer Monitoring
  - Virus Protection
  - Physical Security
  - Encryption
- Violations of Policy
  - Procedures for Reporting Violations
  - Penalties for Violations
- Policy Review and Modification
  - Scheduled Review of Policy and Procedures for Modification
- Limitations of Liability
  - Statements of Liability or Disclaimers

Implementing ISSP

- Common approaches include creating:
  - a number of independent ISSP documents
  - a single comprehensive ISSP document
  - A modular ISSP document that unifies policy creation and administration
    - Recommended approach
    - It provides a balance between issue orientation and policy management

TABLE 4-4 ISSP Approaches

Approach	Advantages	Disadvantages
Individual Policy	Clear assignment to a responsible department Written by those with superior subject matter expertise for technology-specific systems	Typically yields a scattershot result that fails to cover all of the necessary issues Can suffer from poor policy dissemination, enforcement, and review
Comprehensive Policy	Well controlled by centrally managed procedures assuring complete topic coverage Often provides better formal procedures than when policies are individually formulated Usually identifies processes for dissemination, enforcement, and review	May over-generalize the issues and skip over vulnerabilities May be written by those with less complete subject matter expertise
Modular Policy	Often considered an optimal balance between the individual ISSP and the comprehensive ISSP approaches Well controlled by centrally managed procedures, assuring complete topic coverage Clear assignment to a responsible department Written by those with superior subject matter expertise for technology-specific systems	May be more expensive than other alternatives Implementation can be difficult to manage

Systems-Specific Policy (SysSP)

- Systems-Specific Policies (SysSPs)
  - May not look like other types of policy
- They may often be created to function as
  - standards or procedures to be used when configuring or maintaining systems
- SysSPs can be separated into:
  - Management guidance
  - Technical specifications
    - Maybe combined in a single policy document

Systems-Specific Policy (SysSP)

- Management Guidance SysSPs
  - Created by management
    - guides the implementation and configuration of technology
  - Applies to any technology that affects the confidentiality, integrity or availability of information
  - Informs technologists of management intent
- Technical Specifications SysSPs
  - System administrators' directions on implementing managerial policy
  - Each type of equipment has its own type of policies
  - Two general methods of implementing such technical controls:
    - Access control lists
    - Configuration rules

Combined Document

- Often combine these two in one
  - Practical but can be confusing
  - Care should be taken

Access Control Lists

- Include user access lists, matrices, and capability tables that govern rights and privileges
- Can control access to file storage systems, object brokers or other network communications devices
- ACLs enable administrations to restrict access according to user, computer, time, duration, etc.
- Capability Table:
  - similar method that specifies which subjects and objects users or groups can access
- Specifications are frequently complex matrices, rather than simple lists or tables

Configuration Rules

- Configuration rules
  - specific configuration codes entered into security systems to guide execution of system when information passes through it
- Rule-based policies
  - more specific to system operation than ACLs and may or may not deal with users directly
- Many security systems require
  - specific configuration scripts telling systems what actions to perform on each set of information processed

Guidelines for Policy Development

- View PD as a two-part project
  1. Design and develop policy (or redesign and rewrite outdated policy)
  2. Establish management processes to perpetuate policy within organization

The Policy Project

- Policy (re)development projects should be
  - well planned,
  - properly funded, and
  - aggressively managed to ensure completion on time and within budget
- Policy development project can be guided by the SecSDLC process
  - Investigation
  - Analysis
  - Design
  - Implementation
  - Maintenance

Investigation Phase

- The policy development team should:
  - Obtain support from senior management (CIO)
  - Clearly articulate goals of policy project
  - Gain participation of correct individuals affected by recommended policies
  - Be composed from Legal, Human Resources and end-users
  - Assign project champion with sufficient stature and prestige
  - Acquire a capable project manager
  - Develop detailed outline of and sound estimates for the cost and scheduling of the project

Analysis Phase

- Analysis phase should include the following activities:
  - New or recent risk assessment or IT audit
    - document the current information security needs of the organization
  - Key reference materials—including any existing policies

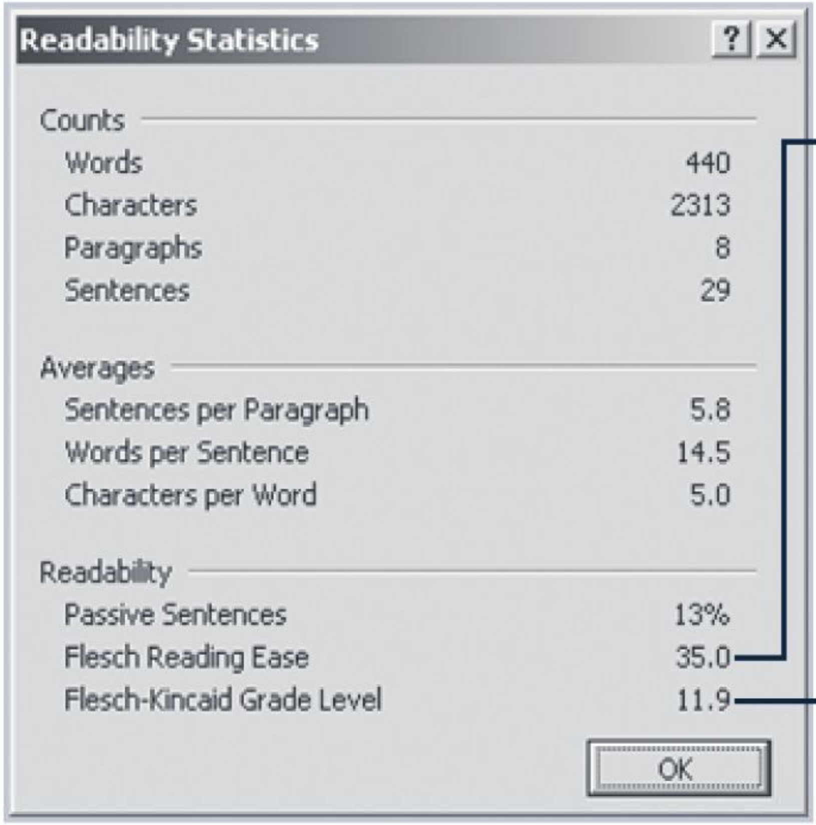
Design Phase

- Design phase should include:
  - How policies will be distributed
  - How verification of distribution will be accomplished
  - Specifications for any automated tools
  - Revisions to feasibility analysis reports based on improved costs and benefits as design is clarified

Implementation Phase

- Implementation Phase:
  - Writing the policies
- Make certain policies are enforceable as written
- Policy distribution is not always as straightforward
- Effective policy
  - Is written at a reasonable reading level
    - Readability statistics
  - Attempts to minimize technical jargon and management terminology

Readability Statistics Example



Readability Statistics

Counts	
Words	440
Characters	2313
Paragraphs	8
Sentences	29
Averages	
Sentences per Paragraph	5.8
Words per Sentence	14.5
Characters per Word	5.0
Readability	
Passive Sentences	13%
Flesch Reading Ease	35.0
Flesch-Kincaid Grade Level	11.9

The Flesch Reading Ease scale evaluates the writing on a scale of 1 to 100. The higher the score, the easier it is to understand the writing.
This score is too complex for most policies, but appropriate for a college text.
For most corporate documents, a score of 60 to 70 is preferred.

The Flesch-Kincaid Grade Level score evaluates writing on a U.S. grade-school level.
While an eleventh to twelfth grade level may be appropriate for this book, it is too high for an organization's policy.
For most corporate documents, a score of 7.0 to 8.0 is preferred.

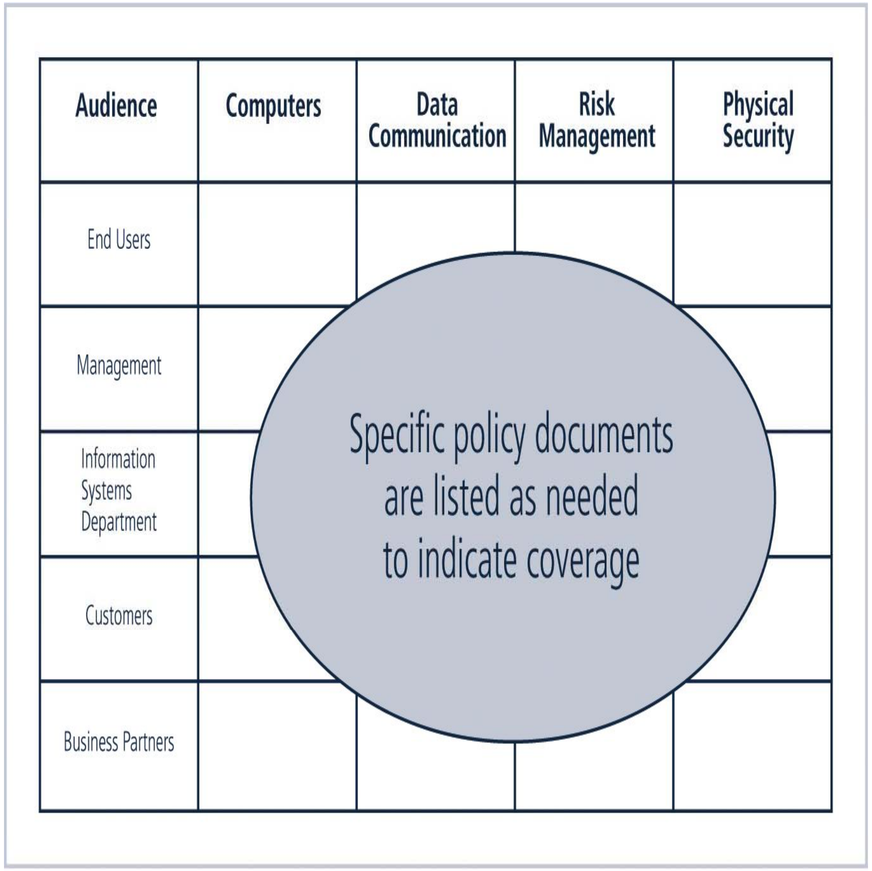
FIGURE 4-9 Readability Statistics for Policy

Maintenance Phase

- Maintain and modify policy as needed
  - to ensure that it remains effective as a tool to meet changing threats
- Policy should have a built-in mechanism
  - To support users to report problems with the policy, preferably anonymously
- Periodic review should be built in to the process

The Information Security Policy Made Easy Approach (ISPME)

- Gathering Key Reference Materials
- Defining A Framework For Policies
- Preparing A Coverage Matrix
- Making Critical Systems Design Decisions
- Structuring Review, Approval, And Enforcement Processes



Audience	Computers	Data Communication	Risk Management	Physical Security
End Users				
Management				
Information Systems Department				
Customers				
Business Partners				

Specific policy documents are listed as needed to indicate coverage

FIGURE 4-11 A Sample Coverage Matrix

ISPME Checklist

- Perform risk assessment or information technology audit to determine your organization's unique information security needs
- Clarify what “policy” means within your organization so that you are not preparing a “standard,” “procedure,” or some other related material
- Ensure that roles and responsibilities related to information security are clarified, including responsibility for issuing and maintaining policies
- Convince management that it is advisable to have documented information security policies
  - And so on ..
- (Refer to the huge checklist!!)

ISPME Next Steps

- Post Policies To Intranet Or Equivalent
- Develop A Self-Assessment Questionnaire
- Develop Revised user ID Issuance Form
- Develop Agreement To Comply With Information Security Policies Form
- Develop Tests To Determine If Workers Understand Policies
- Assign Information Security Coordinators
- Train Information Security Coordinators

ISPME Next Steps (Continued)

- Prepare And Deliver A Basic Information Security Training Course
- Develop Application Specific Information Security Policies
- Develop A Conceptual Hierarchy Of Information Security Requirements
- Assign Information Ownership And Custodianship
- Establish An Information Security Management Committee
- Develop An Information Security Architecture Document

SP 800-18: Guide for Developing Security Plans

- NIST Special Publication 800-18 offers another approach to policy management
- Policies:
  - Documents that constantly change/grow
  - Must be properly disseminated (distributed, read, understood and agreed to) and managed

SP 800-18: Guide for Developing Security Plans (Continued)

- Good management practices for policy development and maintenance make for a more resilient organization
- In order to remain current and viable, policies must have:
  - Individual responsible for reviews
  - Schedule of reviews
  - Method for making recommendations for reviews
  - Indication of policy and revision date

Summary

- It is important to emphasize the preventative nature of policy
- Policies exist first, and foremost,
  - to inform employees of what is and is not acceptable behavior in the organization
- Policy seeks to improve
  - employee productivity, and prevent potentially embarrassing situations

Developing the Security Program

Introduction

- Security programs
  - describe the entire set of personnel, plans, policies, and initiatives related to information security
- Information security program
  - describe the structure and organization of the effort that contains risks to the information assets of organization

Organizing for Security

- Some variables that determine how to structure an information security program are:
  - Organizational culture
  - Size
  - Security personnel budget
  - Security capital budget

Security in Large Organizations

- InfoSec departments in large organizations
  - tend to form and re-form internal groups to meet long-term challenges
  - Functions are likely to be split into groups
- InfoSec departments in small organizations
  - typically create fewer groups, perhaps only having one general group of specialists

Large Organizations
With 1,000 to 10,000 computers

- At this size,
  - approach to security is often matured,
  - Integration of planning and policy into organization’s culture
- Unfortunately, large organization does not always put
  - large amounts of resources into security considering vast numbers of computers and users
  - Tend to spend proportionally less on security

Very Large Organizations More than 10,000 Computers

- Security budgets often grow faster than IT budgets
- Even with large budgets, average amount spent on security per user is still smaller than any other type of organization

  Where small orgs spend more than $5,000 per user on security, very large organizations spend about 1/18th of that, roughly $300 per user
- Does a better job in the policy and resource mgmt areas, although only 1/3 of organizations handled incidents according to an IR plan

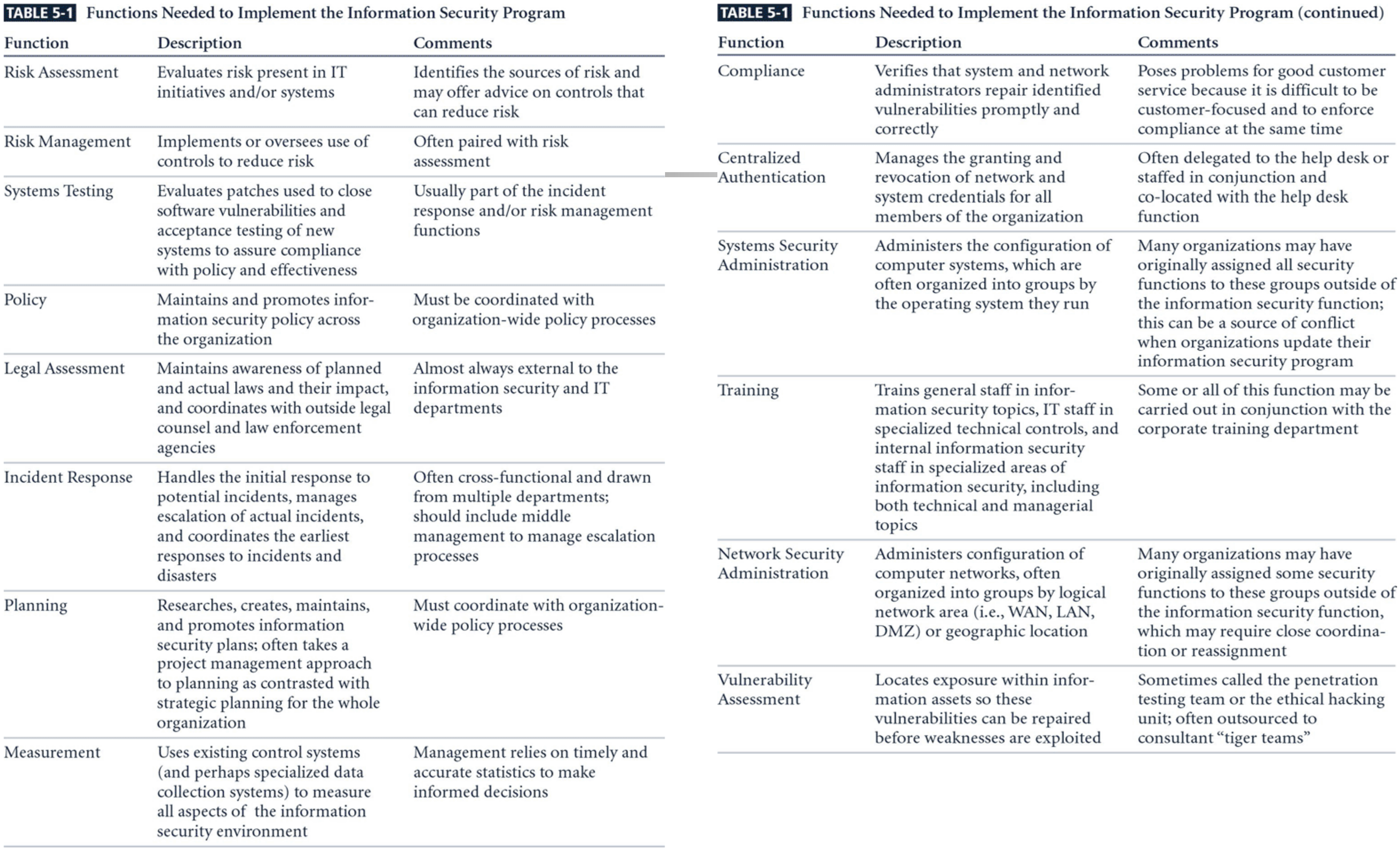


TABLE 5-1 Functions Needed to Implement the Information Security Program

Function	Description	Comments
Risk Assessment	Evaluates risk present in IT initiatives and/or systems	Identifies the sources of risk and may offer advice on controls that can reduce risk
Risk Management	Implements or oversees use of controls to reduce risk	Often paired with risk assessment
Systems Testing	Evaluates patches used to close software vulnerabilities and acceptance testing of new systems to assure compliance with policy and effectiveness	Usually part of the incident response and/or risk management functions
Policy	Maintains and promotes information security policy across the organization	Must be coordinated with organization-wide policy processes
Legal Assessment	Maintains awareness of planned and actual laws and their impact, and coordinates with outside legal counsel and law enforcement agencies	Almost always external to the information security and IT departments
Incident Response	Handles the initial response to potential incidents, manages escalation of actual incidents, and coordinates the earliest responses to incidents and disasters	Often cross-functional and drawn from multiple departments; should include middle management to manage escalation processes
Planning	Researches, creates, maintains, and promotes information security plans; often takes a project management approach to planning as contrasted with strategic planning for the whole organization	Must coordinate with organization-wide policy processes
Measurement	Uses existing control systems (and perhaps specialized data collection systems) to measure all aspects of the information security environment	Management relies on timely and accurate statistics to make informed decisions
Compliance	Verifies that system and network administrators repair identified vulnerabilities promptly and correctly	Poses problems for good customer service because it is difficult to be customer-focused and to enforce compliance at the same time
Centralized Authentication	Manages the granting and revocation of network and system credentials for all members of the organization	Often delegated to the help desk or staffed in conjunction and co-located with the help desk function
Systems Security Administration	Administers the configuration of computer systems, which are often organized into groups by the operating system they run	Many organizations may have originally assigned all security functions to these groups outside of the information security function; this can be a source of conflict when organizations update their information security program
Training	Trains general staff in information security topics, IT staff in specialized technical controls, and internal information security staff in specialized areas of information security, including both technical and managerial topics	Some or all of this function may be carried out in conjunction with the corporate training department
Network Security Administration	Administers configuration of computer networks, often organized into groups by logical network area (i.e., WAN, LAN, DMZ) or geographic location	Many organizations may have originally assigned some security functions to these groups outside of the information security function, which may require close coordination or reassignment
Vulnerability Assessment	Locates exposure within information assets so these vulnerabilities can be repaired before weaknesses are exploited	Sometimes called the penetration testing team or the ethical hacking unit; often outsourced to consultant "tiger teams"

Suggested Functions Needed to Implement InfoSec Program

Security in Large Organizations

- Recommended approach: separate into 4 areas:
  - Functions performed by non-technology business units outside of IT
    - Legal; Training
  - Functions performed by IT groups outside of information security area of management control
    - Network/systems security administrator
    - Centralized authentication
  - Functions performed within information security department as customer service
    - Risk assessment; systems testing; incident response; planning; measurement; vulnerability assessment
  - Functions performed within the information security department as compliance enforcement obligation
    - Policy; compliance; risk management

Responsibilities in Large Organizations

- CISO's responsibility - see that
  - information security functions are adequately performed somewhere within the organization
- Deployment of full-time security personnel depends on a number of factors,
  - sensitivity of information to be protected,
  - industry regulations and
  - general profitability

Typical Information Security Staffing in a Large Organization

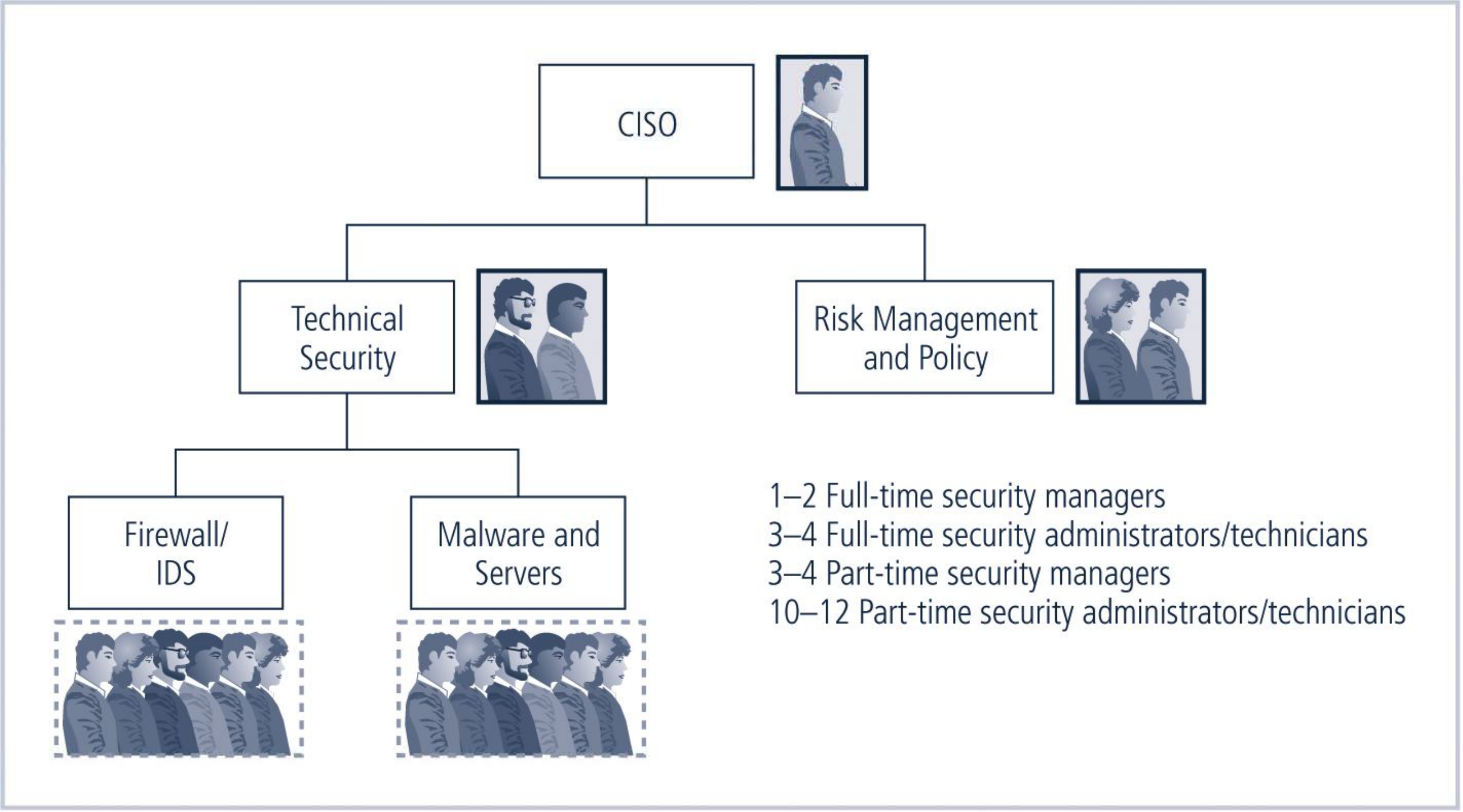
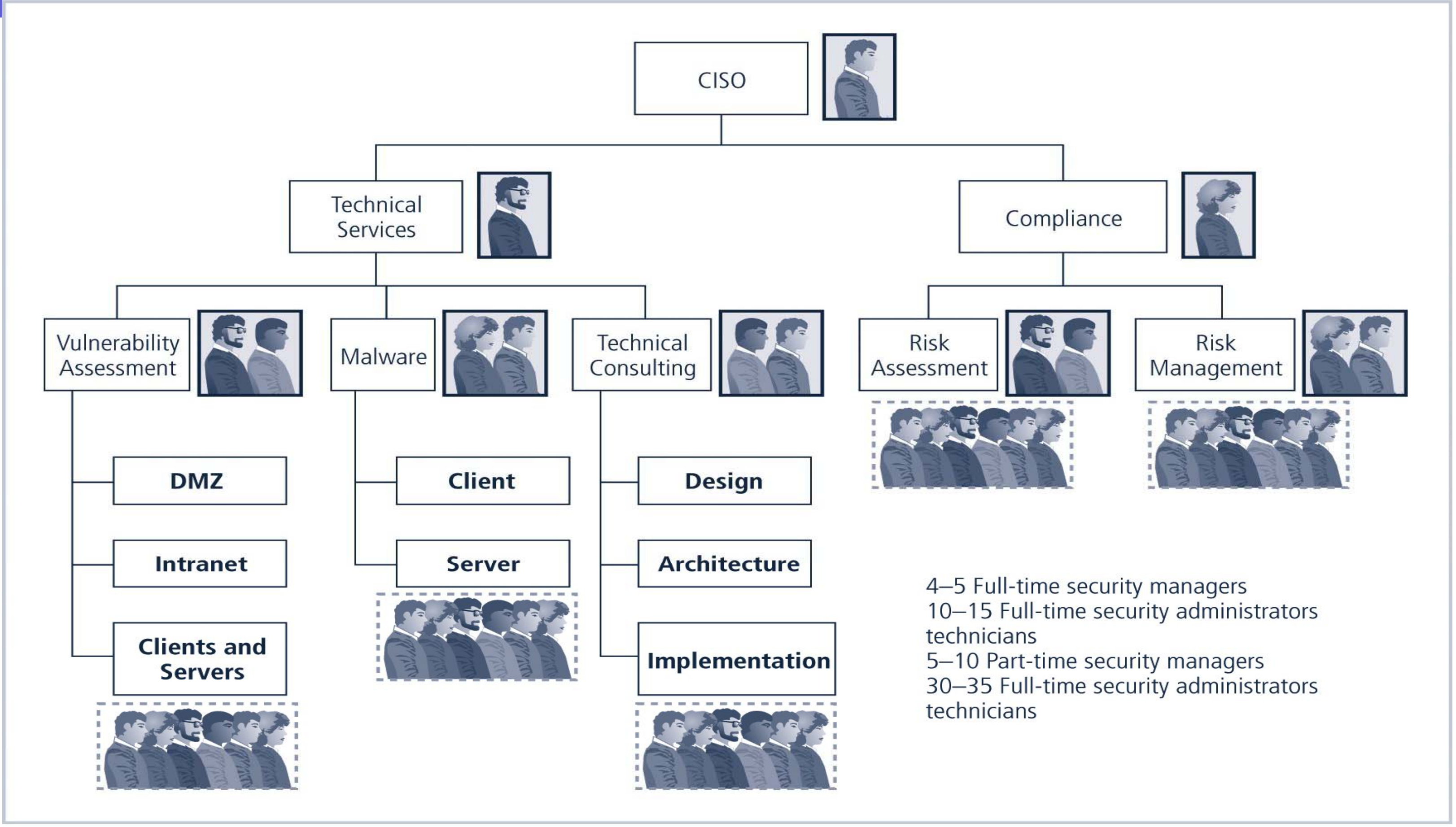

CISO
Technical Security
Risk Management and Policy
Firewall/ IDS
Malware and Servers
1–2 Full-time security managers
3–4 Full-time security administrators/technicians
3–4 Part-time security managers
10–12 Part-time security administrators/technicians

FIGURE 5-1 Information Security Staffing in a Large Organization

Typical InfoSec Staffing in a Very Large Organization



4–5 Full-time security managers
10–15 Full-time security administrators technicians
5–10 Part-time security managers
30–35 Full-time security administrators technicians

FIGURE 5-2 Information Security Staffing in a Very Large Organization

Security in Medium-Sized Organizations (100-1,000 PCs)

- Have smaller total budget
- May have same sized security staff as small org, but larger need
- Typically relies on help from IT staff for plans and practices
- May be large enough
  - to implement multi-tiered approach to security
  - with fewer dedicated groups and more functions assigned to each group
- Medium-sized organizations tend to ignore some security functions.

Typical InfoSec Staffing in a Medium Organization

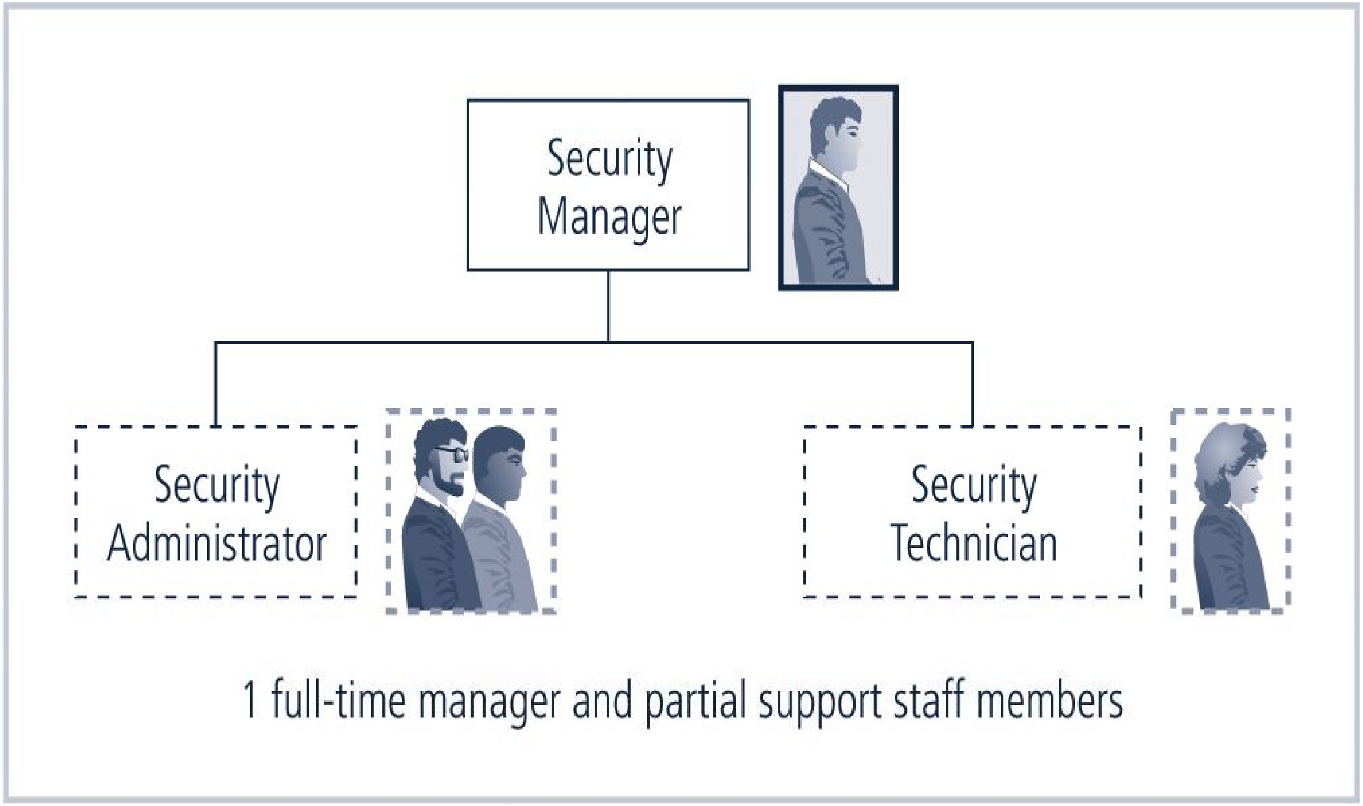


FIGURE 5-3 Information Security Staffing in a Medium-Sized Organization

Security in Small Organizations 10-100 Computers

- Have simple, centralized IT organizational model
- Spend disproportionately more on security
- Information security in small org is often responsibility of a single security administrator
- Such organizations frequently have little in the way of formal policy, planning, or security measures
  - Commonly outsource their Web presence or electronic commerce operations
  - Security training and awareness is commonly conducted on a 1-on-1 basis
  - Policies are often issue-specific
  - Formal planning is often part of IT planning
- Threats from insiders are less likely in such an environment

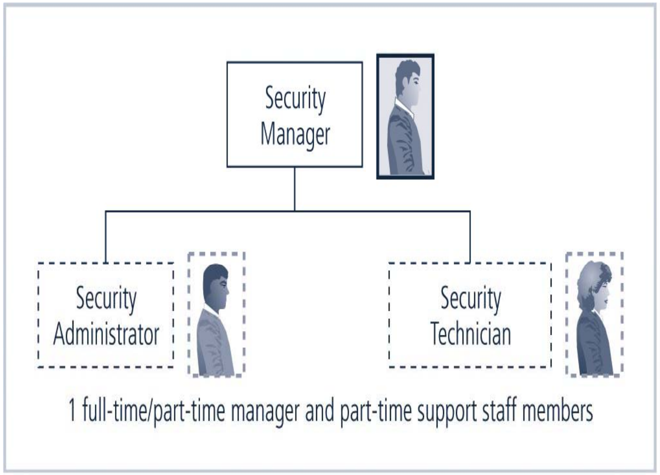

Security Manager
Security Administrator
Security Technician
1 full-time/part-time manager and part-time support staff members

FIGURE 5-4 Information Security Staffing in a Smaller Organization

Placing Information Security Within An Organization

- In large organizations,
  - InfoSec is often located within IT department,
  - headed by CISO who reports directly to top computing executive, or CIO
- By its very nature, an InfoSec program is sometimes at odds with the goals and objectives of the IT department as a whole

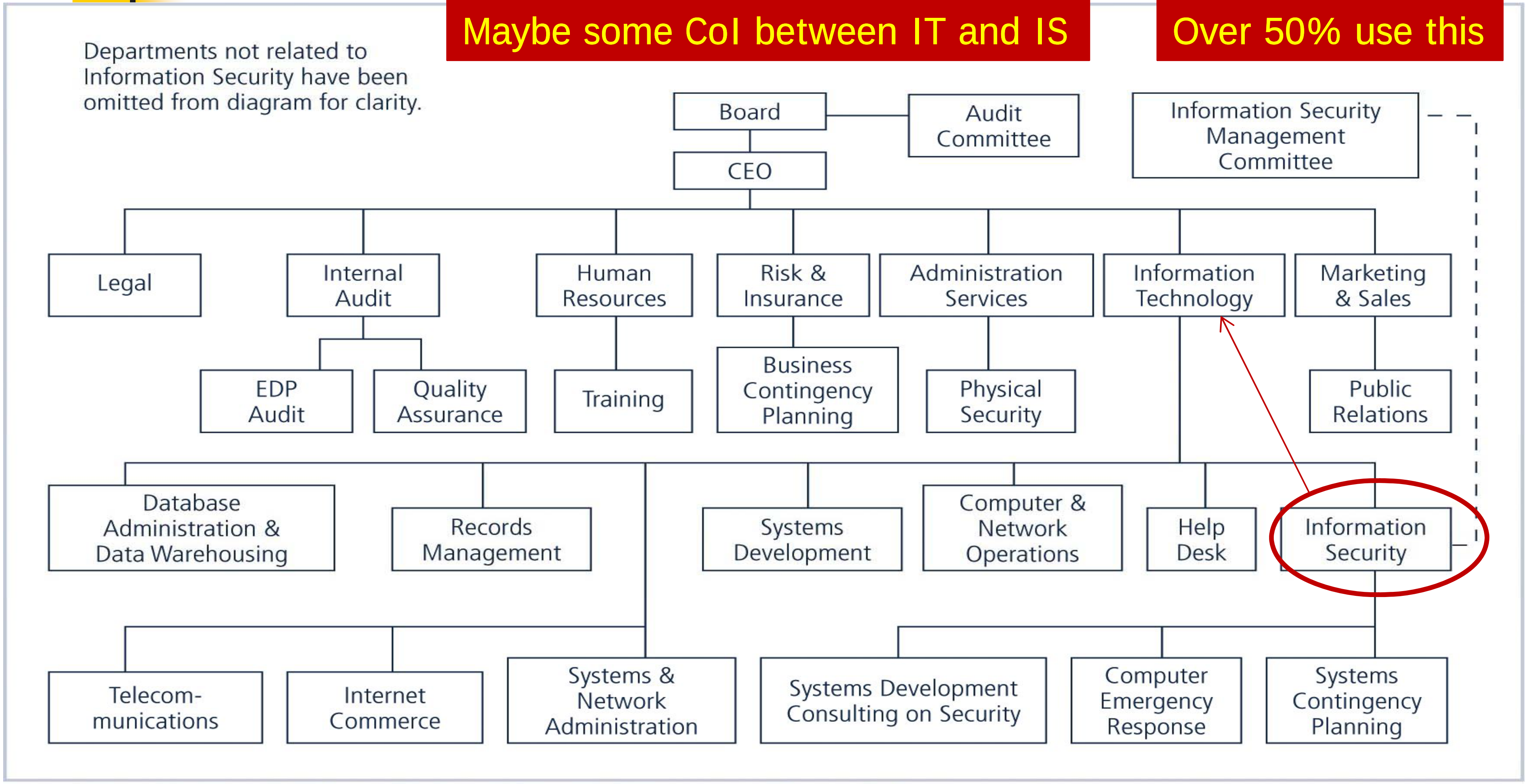
Placing Information Security Within An Organization (Continued)

- Possible conflicts between CIO/CISO goals
  - Current movement to separate information security from IT division
- The challenge is
  - to design a reporting structure for the InfoSec program that balances the needs of each of the communities of interest

IT Department

Maybe some CoI between IT and IS

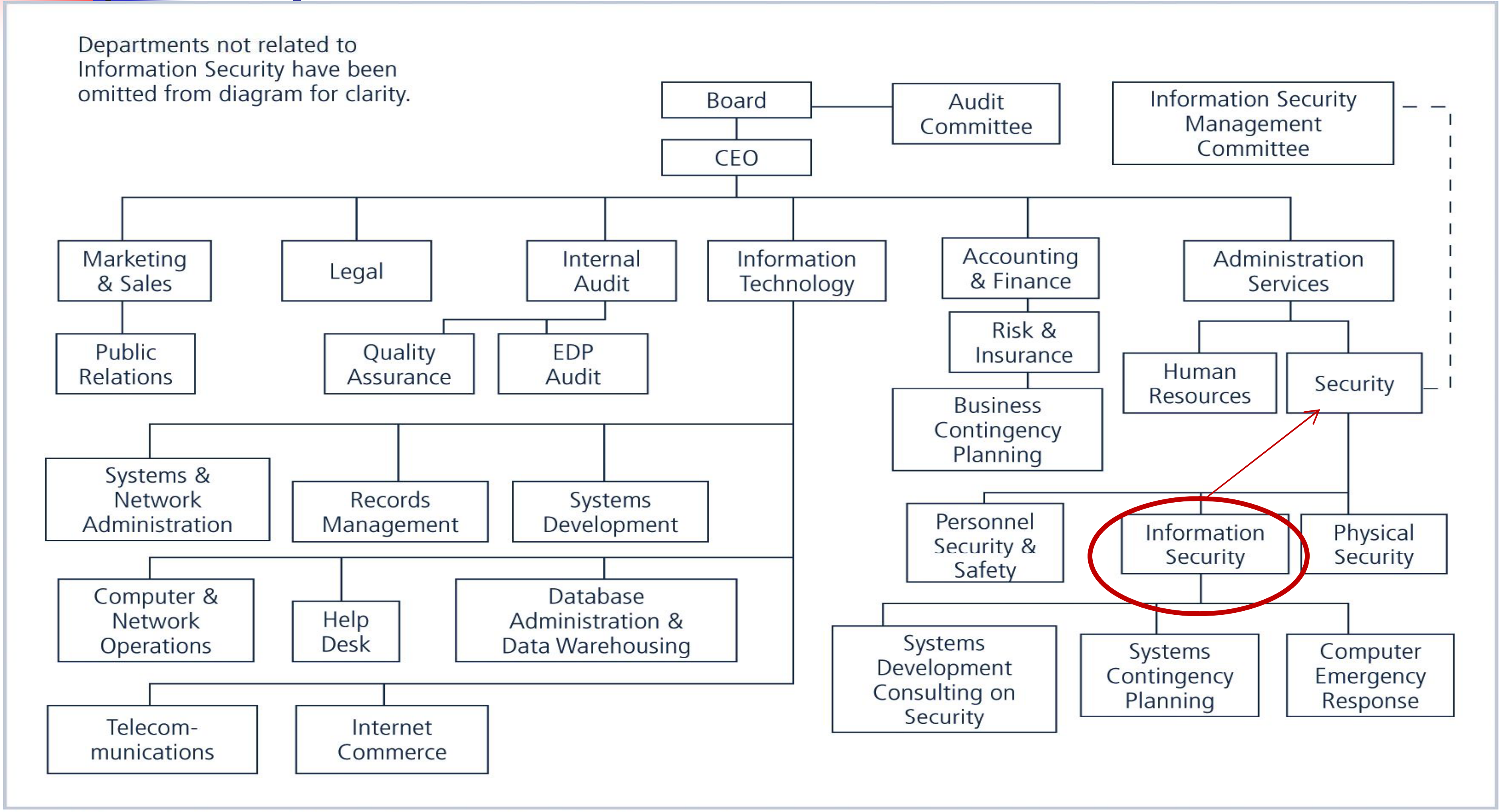
Over 50% use this


Departments not related to Information Security have been omitted from diagram for clarity.
Board
Audit Committee
CEO
Information Security Management Committee
Legal
Internal Audit
Human Resources
Risk & Insurance
Administration Services
Information Technology
Marketing & Sales
EDP Audit
Quality Assurance
Training
Business Contingency Planning
Physical Security
Public Relations
Database Administration & Data Warehousing
Records Management
Systems Development
Computer & Network Operations
Help Desk
Information Security
Telecom-munications
Internet Commerce
Systems & Network Administration
Systems Development Consulting on Security
Computer Emergency Response
Systems Contingency Planning

From *Information Security Roles and Responsibilities Made Easy*, used with permission.

FIGURE 5-5 **Wood's Option 1: Information Security Reports to Information Technology Department**

Broadly Defined Security Department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Audit Committee
Information Security Management Committee
CEO
Marketing & Sales
Legal
Internal Audit
Information Technology
Accounting & Finance
Administration Services
Public Relations
Quality Assurance
EDP Audit
Risk & Insurance
Human Resources
Security
Business Contingency Planning
Systems & Network Administration
Records Management
Systems Development
Personnel Security & Safety
Information Security
Physical Security
Computer & Network Operations
Help Desk
Database Administration & Data Warehousing
Systems Development Consulting on Security
Systems Contingency Planning
Computer Emergency Response
Telecom- munications
Internet Commerce

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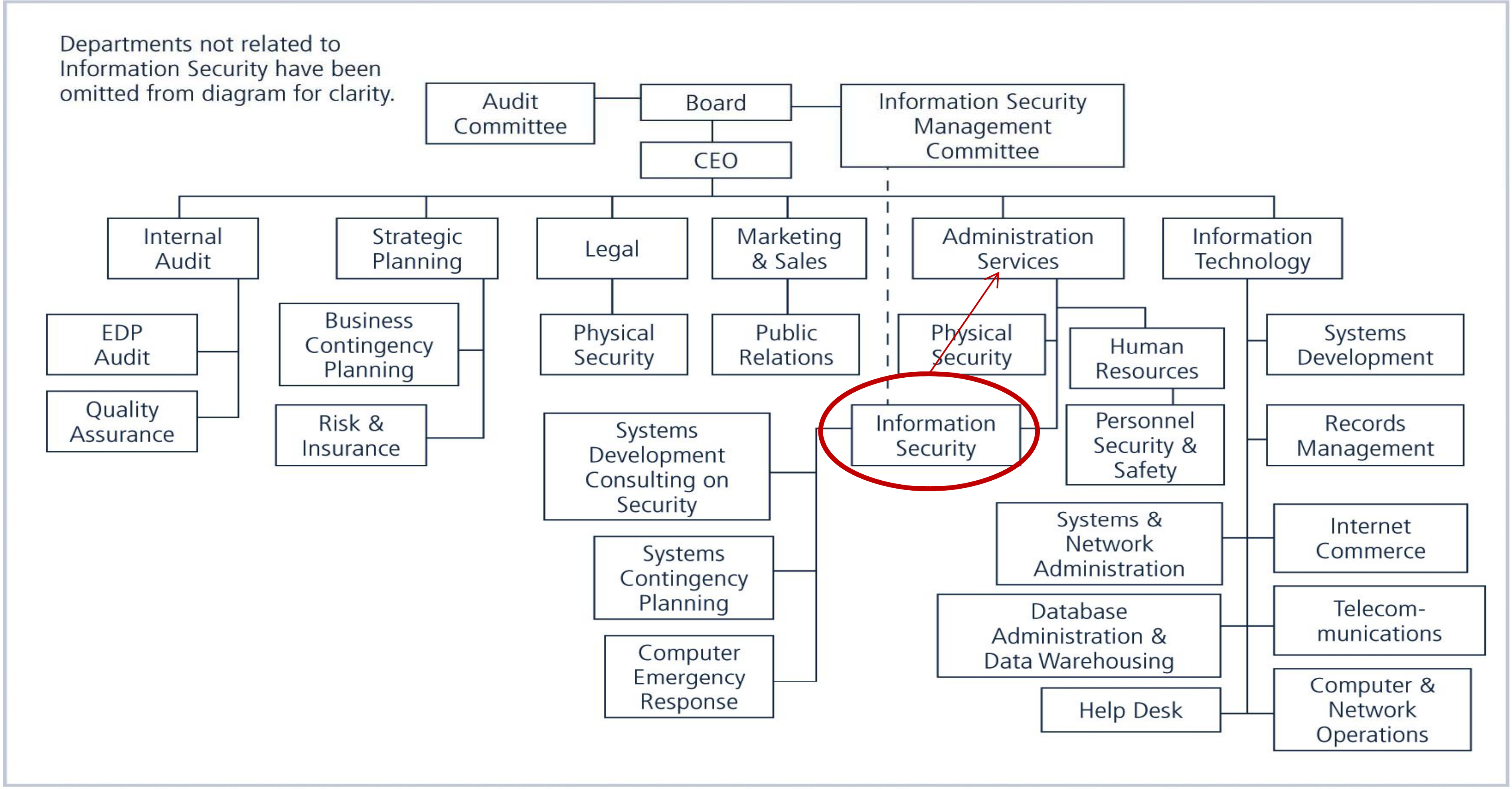
FIGURE 5-6 Wood's Option 2: Information Security Reports to Broadly Defined Security Department

Administrative Services Department



Departments not related to Information Security have been omitted from diagram for clarity.

Audit Committee

Board

Information Security Management Committee

CEO

Internal Audit

EDP Audit

Quality Assurance

Strategic Planning

Business Contingency Planning

Risk & Insurance

Legal

Physical Security

Systems Development Consulting on Security

Systems Contingency Planning

Computer Emergency Response

Marketing & Sales

Public Relations

Administration Services

Physical Security

Information Security

Human Resources

Personnel Security & Safety

Information Technology

Systems Development

Records Management

Systems & Network Administration

Internet Commerce

Database Administration & Data Warehousing

Telecom-munications

Help Desk

Computer & Network Operations

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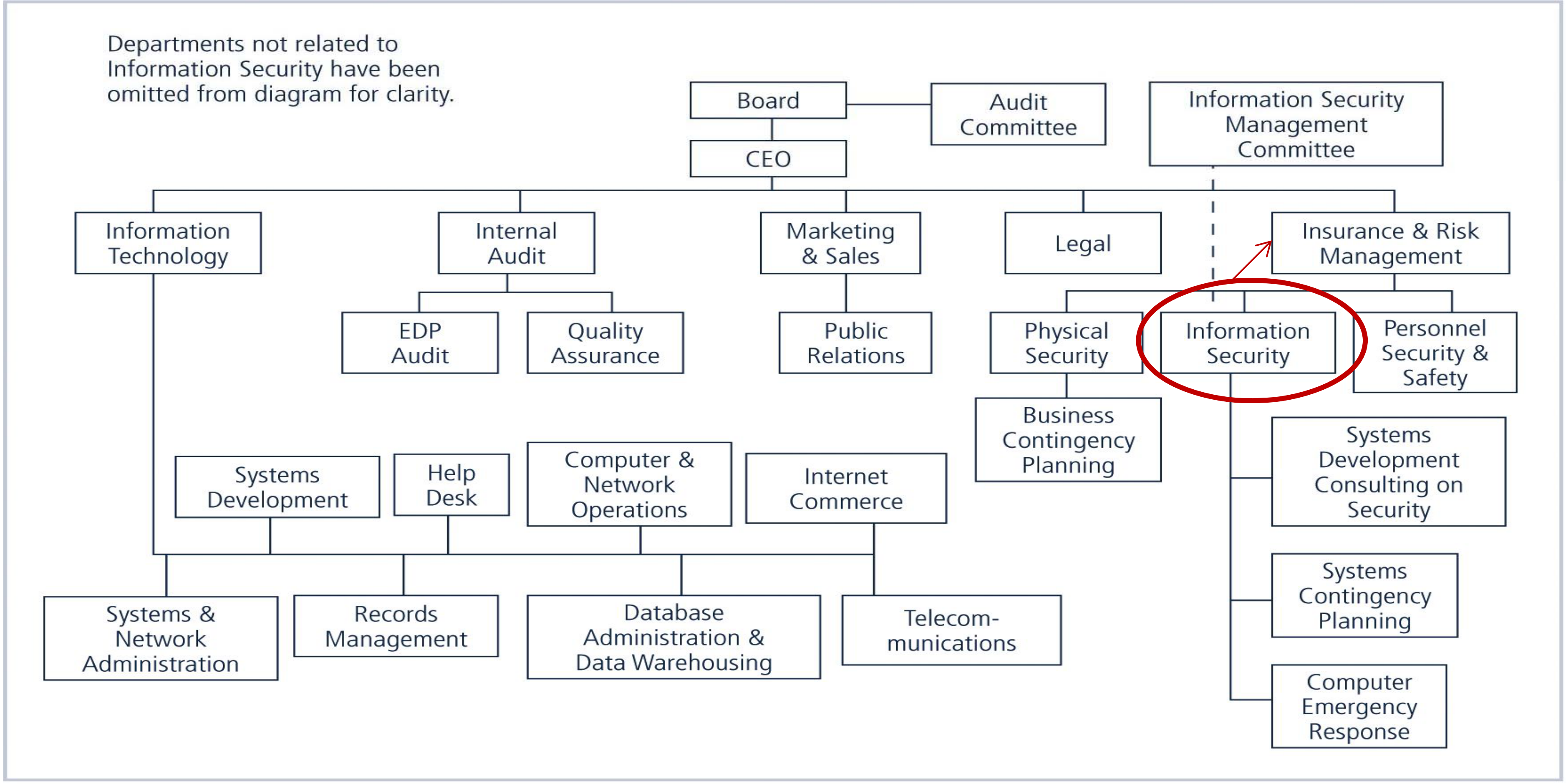
FIGURE 5-7 Wood's Option 3: Information Security Reports to Administrative Services Department

Insurance & Risk Mgmt Department



Departments not related to Information Security have been omitted from diagram for clarity.

Board

Audit Committee

Information Security Management Committee

CEO

Information Technology

Internal Audit

Marketing & Sales

Legal

Insurance & Risk Management

EDP Audit

Quality Assurance

Public Relations

Physical Security

Information Security

Personnel Security & Safety

Business Contingency Planning

Systems Development Consulting on Security

Systems Contingency Planning

Computer Emergency Response

Systems Development

Help Desk

Computer & Network Operations

Internet Commerce

Systems & Network Administration

Records Management

Database Administration & Data Warehousing

Telecom-munications

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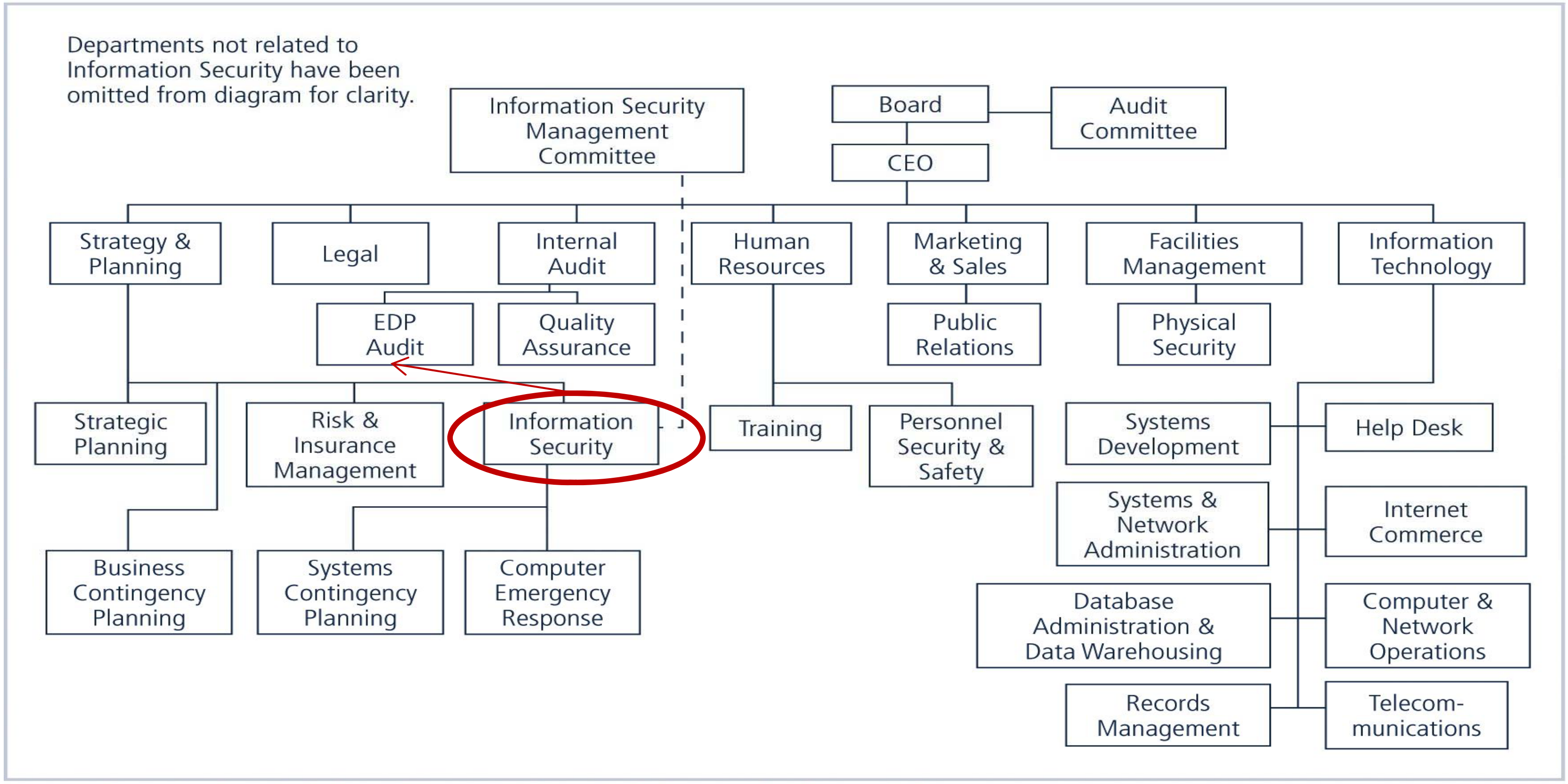
FIGURE 5-8 **Wood's Option 4: Information Security Reports to Insurance and Risk Management Department**

Strategy & Planning Department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Internal Audit
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Marketing & Sales
Facilities Management
Information Technology
EDP Audit
Quality Assurance
Public Relations
Physical Security
Strategic Planning
Risk & Insurance Management
Information Security
Training
Personnel Security & Safety
Systems Development
Help Desk
Systems & Network Administration
Internet Commerce
Business Contingency Planning
Systems Contingency Planning
Computer Emergency Response
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Computer & Network Operations
Records Management
Telecom-munications

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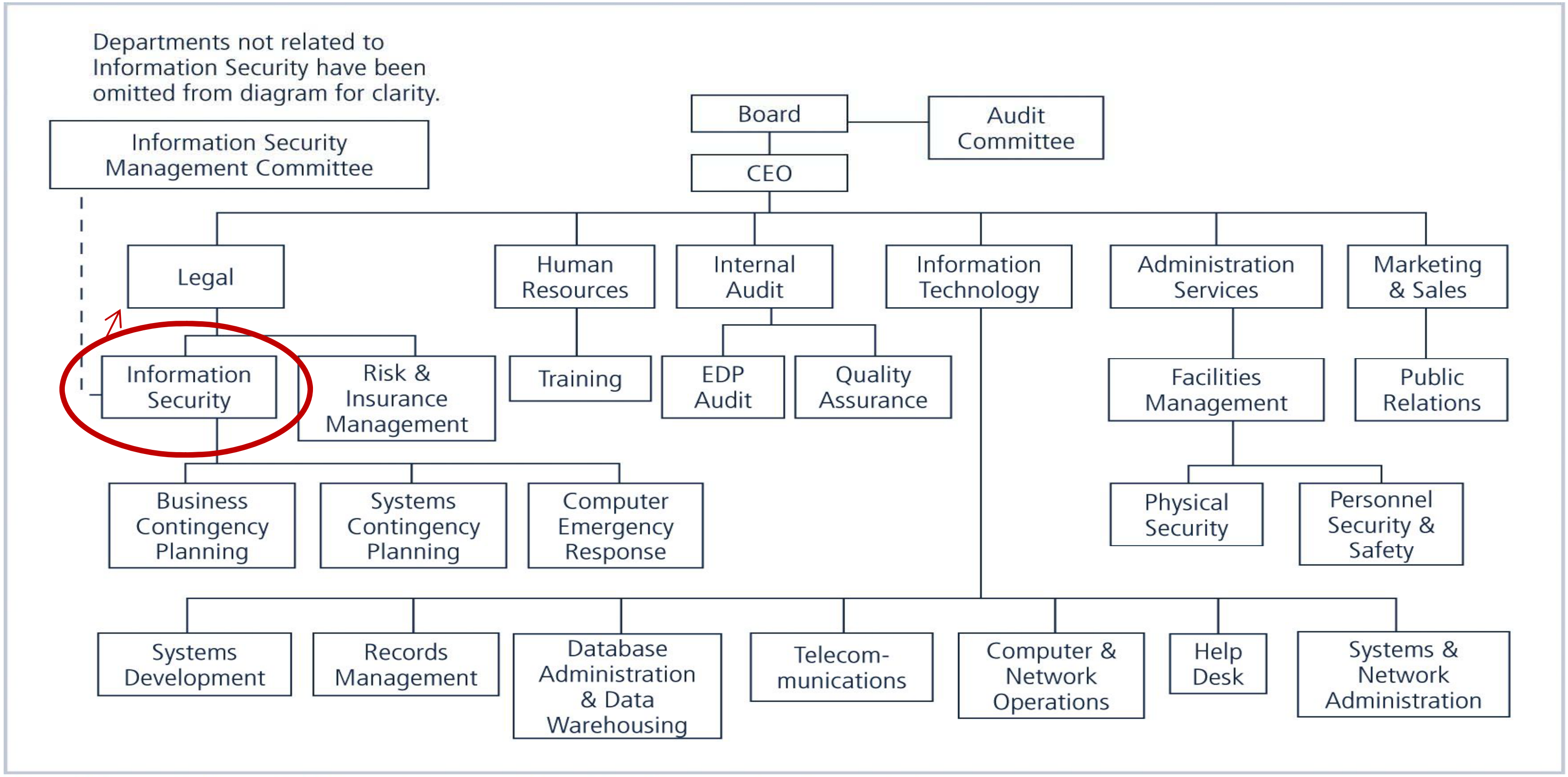
FIGURE 5-9 **Wood's Option 5: Information Security Reports to Strategy and Planning Department**

From *Information Security Roles and Responsibilities Made Easy*

Legal Department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Internal Audit
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Marketing & Sales
Information Security
Risk & Insurance Management
Training
EDP Audit
Quality Assurance
Facilities Management
Public Relations
Business Contingency Planning
Systems Contingency Planning
Computer Emergency Response
Physical Security
Personnel Security & Safety
Systems Development
Records Management
Database Administration & Data Warehousing
Telecom-munications
Computer & Network Operations
Help Desk
Systems & Network Administration

From *Information Security Roles and Responsibilities Made Easy*, used with permission.

FIGURE 5-10 **Wood's Option 6: Information Security Reports to Legal Department**

From *Information Security Roles and Responsibilities Made Easy*, used with permission.

Other Options

- Option 7: Internal Audit
- Option 8: Help Desk
- Option 9: Accounting and Finance Through IT
- Option 10: Human Resources
- Option 11: Facilities Management
- Option 12: Operations

Components of the Security Program

- Determining what level the information security program operates on depends on the organization’s strategic plan
  - In particular, on the plan’s vision and mission statements
- The CIO and CISO should use these two documents to formulate the mission statement for the information security program
  - NIST SP 800-14 Generally Accepted Principles for Securing Information Technology Systems
  - SP 800-12 An Introduction to Computer Security: The NIST Handbook

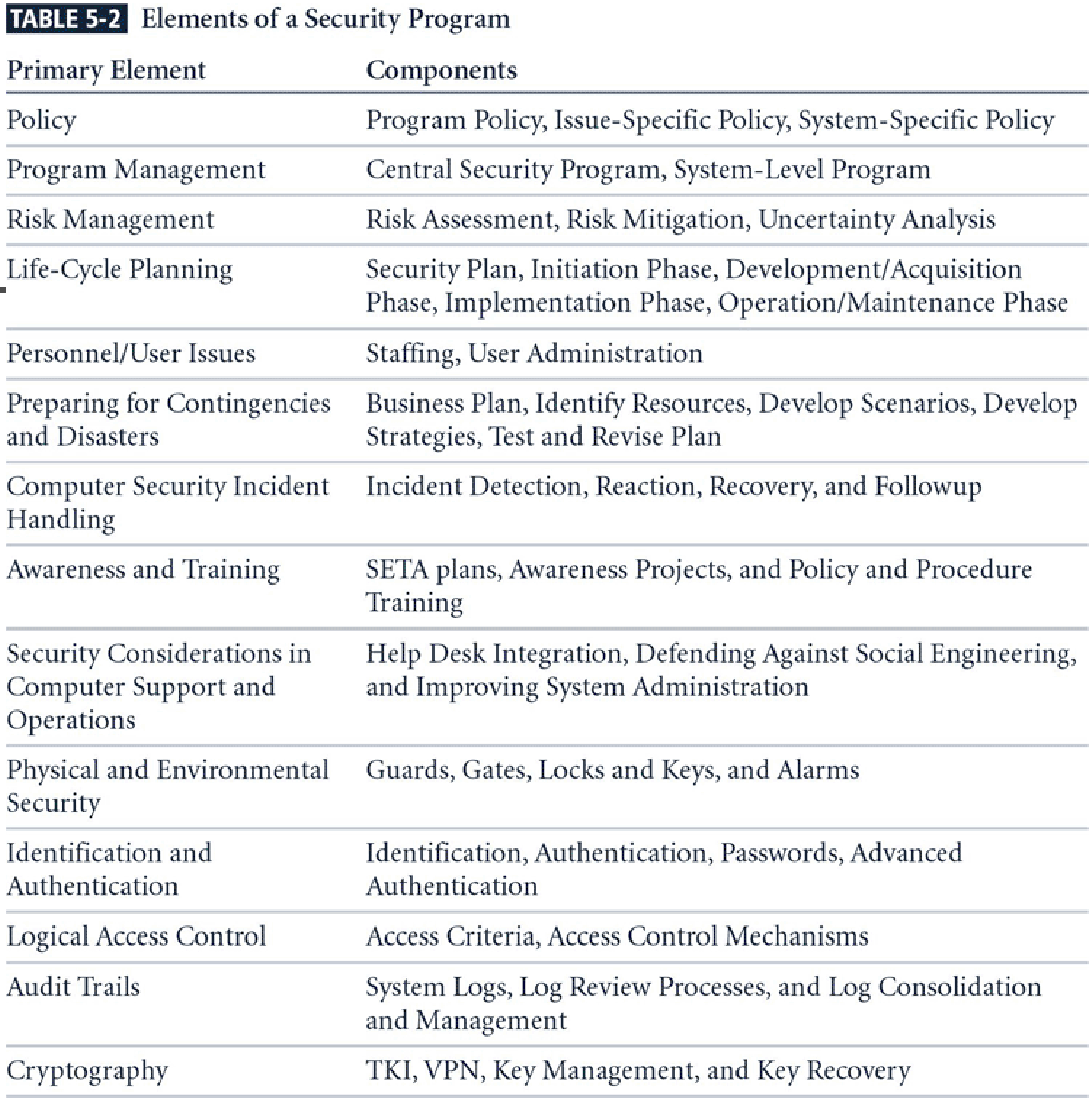


TABLE 5-2 Elements of a Security Program

Primary Element	Components
Policy	Program Policy, Issue-Specific Policy, System-Specific Policy
Program Management	Central Security Program, System-Level Program
Risk Management	Risk Assessment, Risk Mitigation, Uncertainty Analysis
Life-Cycle Planning	Security Plan, Initiation Phase, Development/Acquisition Phase, Implementation Phase, Operation/Maintenance Phase
Personnel/User Issues	Staffing, User Administration
Preparing for Contingencies and Disasters	Business Plan, Identify Resources, Develop Scenarios, Develop Strategies, Test and Revise Plan
Computer Security Incident Handling	Incident Detection, Reaction, Recovery, and Followup
Awareness and Training	SETA plans, Awareness Projects, and Policy and Procedure Training
Security Considerations in Computer Support and Operations	Help Desk Integration, Defending Against Social Engineering, and Improving System Administration
Physical and Environmental Security	Guards, Gates, Locks and Keys, and Alarms
Identification and Authentication	Identification, Authentication, Passwords, Advanced Authentication
Logical Access Control	Access Criteria, Access Control Mechanisms
Audit Trails	System Logs, Log Review Processes, and Log Consolidation and Management
Cryptography	TKI, VPN, Key Management, and Key Recovery

NIST 800-14

Information Security Roles

- Information security positions can be classified into one of three types:
  - Those that define,
    - *provide the policies, guidelines, and standards. They're the people who do the consulting and the risk assessment, who develop the product and technical architectures. These are senior people with a lot of broad knowledge, but often not a lot of depth.*
  - Those that build
    - *They're the real techies, who create and install security solutions.*
  - Those that administer
    - *who operate and administrate the security tools, the security monitoring function, and the people who continuously improve the processes.*

Information Security Titles

- Typical organization has a number of individuals with information security responsibilities
- While the titles used may be different, most of the job functions fit into one of the following:
  - Chief Information Security Officer (CISO)
  - Security managers
  - Security administrators and analysts
  - Security technicians
  - Security staff

Information Security Roles

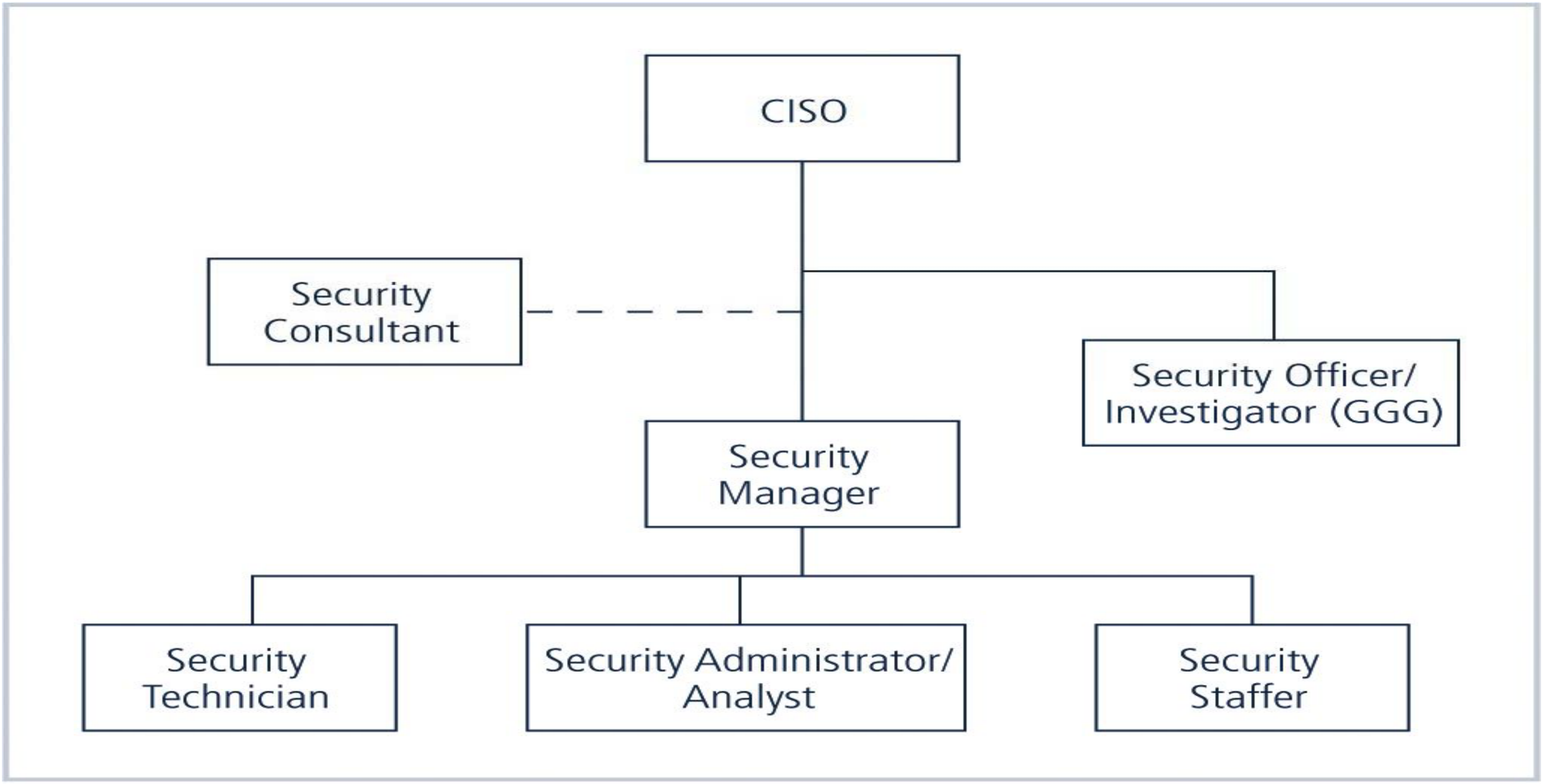


FIGURE 5-11 Information Security Roles

Integrating Security and the Help Desk

- Help desk
  - an important part of the information security team,
  - enhances the ability to identify potential problems
- User’s complaint about his or her computer,
  - may turn out to be related to a bigger problem, such as a hacker, denial-of-service attack, or a virus
- Because help desk technicians perform a specialized role in information security,
  - they have a need for specialized training

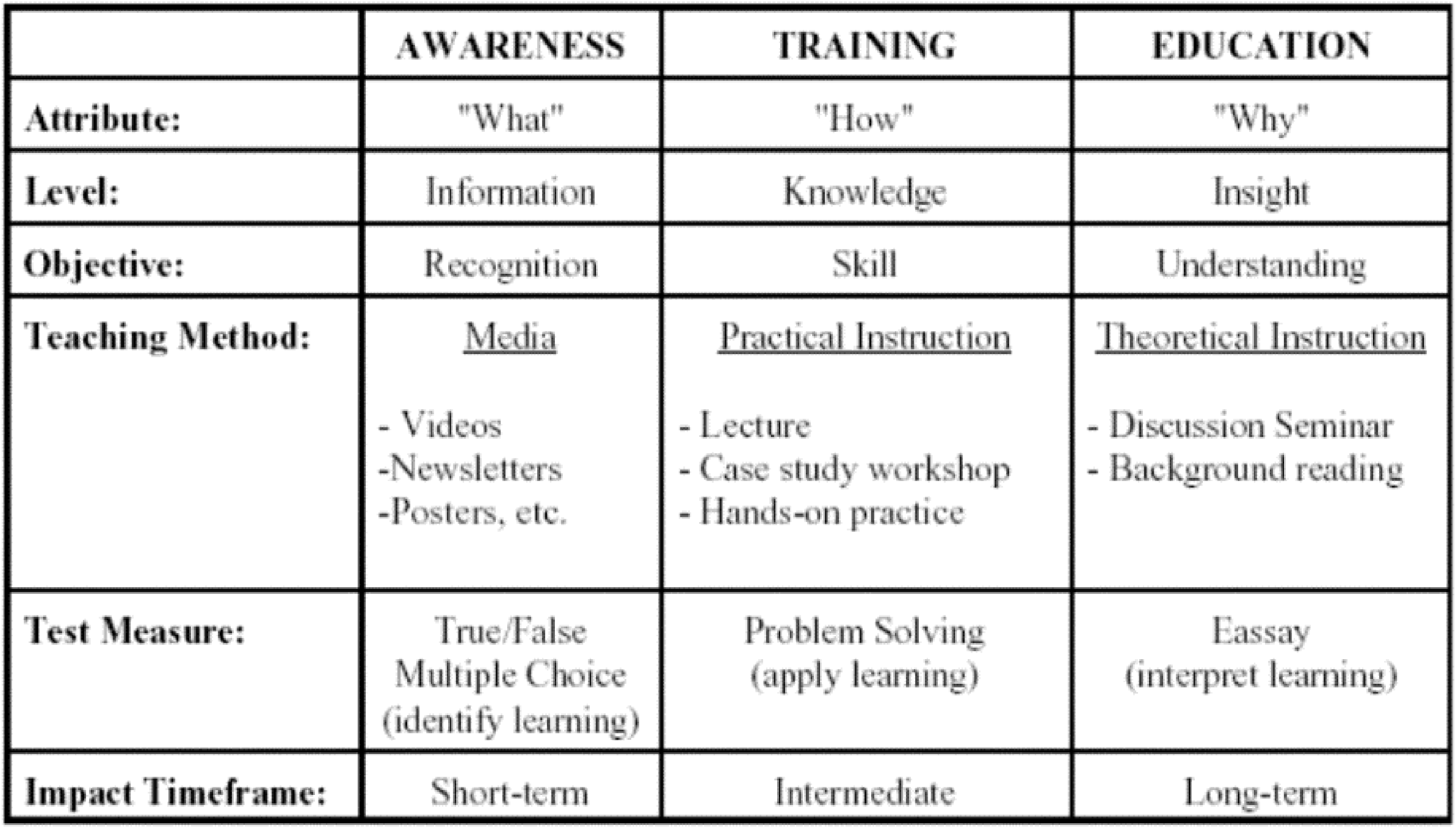
Implementing Security Education, Training, and Awareness Programs

- SETA program:
  - designed to reduce accidental security breaches
  - consists of three elements:
    - security education,
    - security training, and
    - security awareness
- Awareness, training, and education programs offer two major benefits:
  - Improve employee behavior
  - Enable organization to hold employees accountable for their actions

Implementing SETA (Continued)

- The purpose of SETA is to enhance security:
  - By building in-depth knowledge, as needed, to design, implement, or operate security programs for organizations and systems
  - By developing skills and knowledge so that computer users can perform their jobs while using IT systems more securely
  - By improving awareness of the need to protect system resources

Comparative SETA Framework



	AWARENESS	TRAINING	EDUCATION
Attribute:	"What"	"How"	"Why"
Level:	Information	Knowledge	Insight
Objective:	Recognition	Skill	Understanding
Teaching Method:	Media - Videos -Newsletters -Posters, etc.	Practical Instruction - Lecture - Case study workshop - Hands-on practice	Theoretical Instruction - Discussion Seminar - Background reading
Test Measure:	True/False Multiple Choice (identify learning)	Problem Solving (apply learning)	Eassay (interpret learning)
Impact Timeframe:	Short-term	Intermediate	Long-term

NIST 800-12

Security Training

- Security training involves
  - providing detailed information and
  - hands-on instruction to give skills to users to perform their duties securely
- Two methods for customizing training
  - Functional background:
    - General user
    - Managerial user
    - Technical user
  - Skill level:
    - Novice
    - Intermediate
    - Advanced

Training Techniques

- Using wrong method can:
  - Hinder transfer of knowledge
  - Lead to unnecessary expense and frustrated, poorly trained employees
- Good training programs:
  - Use latest learning technologies and best practices
  - Recently, less use of centralized public courses and more on-site training
  - Often for one or a few individuals, not necessarily for large group → waiting for large-enough group can cost companies productivity
  - Increased use of short, task-oriented modules and training sessions that are immediate and consistent, available during normal work week

Delivery Methods

- Selection of training delivery method:
  - Not always based on best outcome for the trainee
  - Other factors: budget, scheduling, and needs of the organization often come first
    - One-on-One
    - Formal Class
    - Computer-Based Training (CBT)
    - Distance Learning/Web Seminars
    - User Support Group
    - On-the-Job Training
    - Self-Study (Noncomputerized)

Selecting the Training Staff

- Employee training:
  - Local training program
  - Continuing education department
  - External training agency
  - Professional trainer, consultant, or someone from accredited institution to conduct on-site training
  - In-house training using organization’s own employees

Implementing Training

- The following seven-step methodology generally applies:
  - Step 1: Identify program scope, goals, and objectives
  - Step 2: Identify training staff
  - Step 3: Identify target audiences
  - Step 4: Motivate management and employees
  - Step 5: Administer the program
  - Step 6: Maintain the program
  - Step 7: Evaluate the program

Security Awareness

- Security awareness program:
  - one of least frequently implemented, but most effective security methods
- Security awareness programs:
  - Set the stage for training by changing organizational attitudes to realize the importance of security and the adverse consequences of its failure
  - Remind users of the procedures to be followed

SETA Best Practices

- When developing an awareness program:
  - Focus on people
  - Refrain from using technical jargon
  - Use every available venue
  - Define learning objectives, state them clearly, and provide sufficient detail and coverage
  - Keep things light
  - Don’t overload the users
  - Help users understand their roles in InfoSec
  - Take advantage of in-house communications media
  - Make the awareness program formal; plan and document all actions
  - Provide good information early, rather than perfect information late

The Ten Commandments of InfoSec Awareness Training

- Information security is a people, rather than a technical, issue
- If you want them to understand, speak their language
- If they cannot see it, they will not learn it
- Make your point so that you can identify it and so can they
- Never lose your sense of humor
- Make your point, support it, and conclude it
- Always let the recipients know how the behavior that you request will affect them
- Ride the tame horses
- Formalize your training methodology
- Always be timely, even if it means slipping schedules to include urgent information

Employee Behavior and Awareness

- Security awareness and security training are designed to
  - modify any employee behavior that endangers the security of the organization’s information
- Security training and awareness activities can be undermined
  - if management does not set a good example

Awareness Techniques

- Awareness can take on different forms for particular audiences

- A security awareness program can use many methods to deliver its message

- Effective security awareness programs need to be designed with the recognition that people tend to practice a tuning out process (acclimation)
  - Awareness techniques should be creative and frequently changed

Developing Security Awareness Components

- Many security awareness components are available at little or no cost - others can be very expensive if purchased externally
- Security awareness components include the following:
  - Videos
  - Posters and banners
  - Lectures and conferences
  - Computer-based training
  - Newsletters
  - Brochures and flyers
  - Trinkets (coffee cups, pens, pencils, T-shirts)
  - Bulletin boards

The Security Newsletter

- Security newsletter: cost-effective way to disseminate security information
  - In the form of hard copy, e-mail, or intranet
  - Topics can include threats to the organization’s information assets, schedules for upcoming security classes, and the addition of new security personnel
- Goal:
  - keep information security uppermost in users’ minds and stimulate them to care about security

The Security Newsletter (Continued)

- Newsletters might include:
  - Summaries of key policies
  - Summaries of key news articles
  - A calendar of security events, including training sessions, presentations, and other activities
  - Announcements relevant to information security
  - How-to’s

The Security Poster

- Security poster series can be a simple and inexpensive way to keep security on people's minds
- Professional posters can be quite expensive, so in-house development may be best solution
- Keys to a good poster series:
  - Varying the content and keeping posters updated
  - Keeping them simple, but visually interesting
  - Making the message clear
  - Providing information on reporting violations

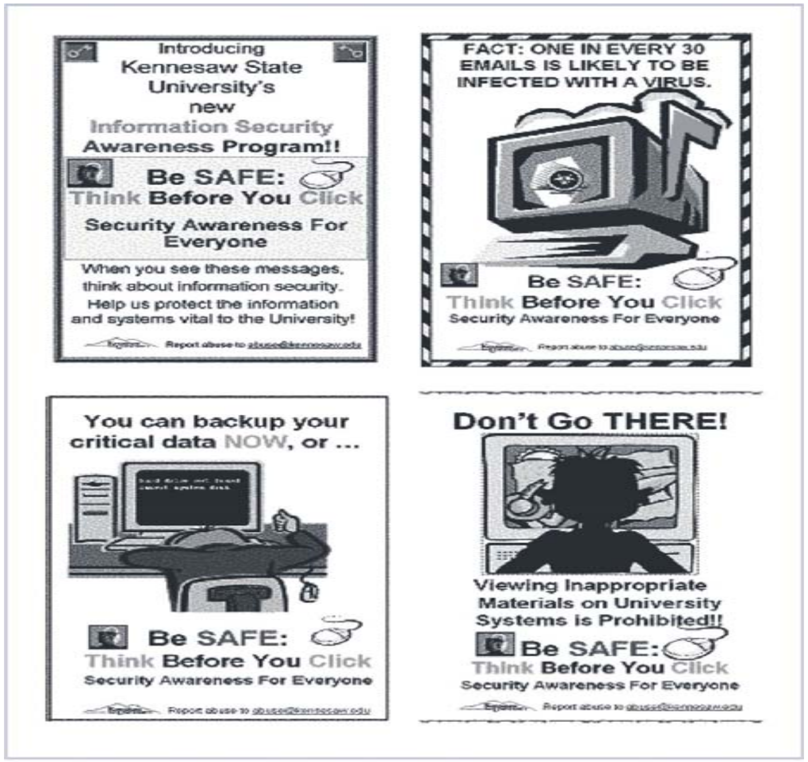

Introducing Kennesaw State University's new Information Security Awareness Program!!
Be SAFE: Think Before You Click
Security Awareness For Everyone
When you see these messages, think about information security. Help us protect the information and systems vital to the University!
Report abuse to abuse@kennesaw.edu
FACT: ONE IN EVERY 30 EMAILS IS LIKELY TO BE INFECTED WITH A VIRUS.
Be SAFE: Think Before You Click
Security Awareness For Everyone
Report abuse to abuse@kennesaw.edu
You can backup your critical data NOW, or ...
Be SAFE: Think Before You Click
Security Awareness For Everyone
Report abuse to abuse@kennesaw.edu
Don't Go THERE!
Viewing Inappropriate Materials on University Systems is Prohibited!!
Be SAFE: Think Before You Click
Security Awareness For Everyone
Report abuse to abuse@kennesaw.edu

FIGURE 5-15 SETA Awareness Components: Posters

The Trinket Program

- Trinkets may not cost much on a per-unit basis, but they can be expensive to distribute throughout an organization
- Several types of trinkets are commonly used:
  - Pens and pencils
  - Mouse pads
  - Coffee mugs
  - Plastic cups
  - Hats
  - T-shirts

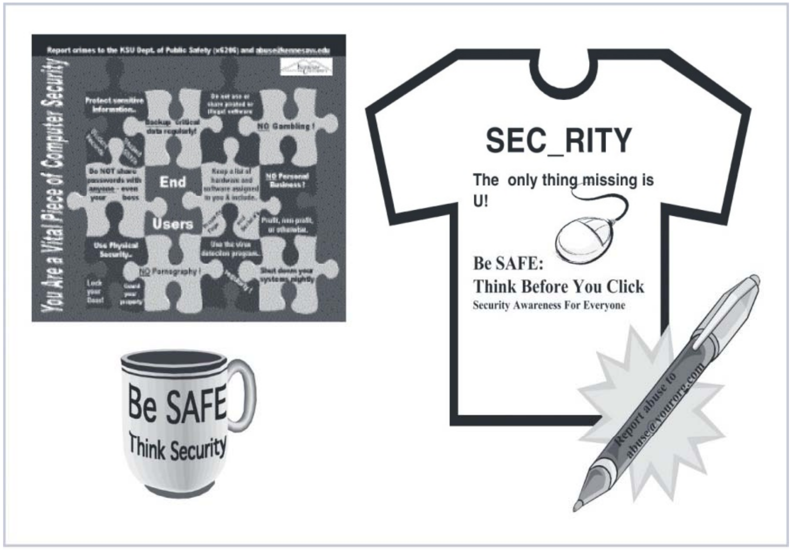

Report crimes to the KSU Dept. of Public Safety (x6206) and abuse@kennesaw.edu
You Are a Vital Piece of Computer Security
Protect sensitive information..
Backup critical data regularly!
Do not use or share pirated or illegal software
NO Gambling !
Do NOT share passwords with anyone - even your boss
End
Users
Keep a list of hardware and software assigned to you & include..
NO Personal Business !
Profit, non-profit, or otherwise.
Use Physical Security..
NO Pornography !
Use the virus detection program..
Shut down your systems nightly
Lock your Door!
Guard your property
SEC_RITY
The only thing missing is U!
Be SAFE:
Think Before You Click
Security Awareness For Everyone
Be SAFE
Think Security
Report abuse to abuse@yourorg.com

FIGURE 5-16 SETA Awareness Components: Trinkets

Information Security Awareness Web Site

- Organizations can establish
  - Web pages or sites dedicated to promoting information security awareness
- As with other SETA awareness methods,
  - the challenge lies in updating the messages frequently enough to keep them fresh

Information Security Awareness Web Site (Continued)

- Some tips on creating and maintaining an educational Web site are provided here:
  - See what’s already out there
  - Plan ahead
  - Keep page loading time to a minimum
  - Seek feedback
  - Assume nothing and check everything
  - Spend time promoting your site

Security Awareness Conference/Presentations

- Another means of renewing the information security message is to have a guest speaker or even a mini-conference dedicated to the topic
  - Perhaps in association with National Computer Security Day - November 30

Security Management Models And Practices

Objectives

- Overview basic standards and best practices
  - Overview of ISO 17799
  - Overview of NIST SP documents related to security management practices and guidelines, certification and accreditation

Introduction

- To create or maintain a secure environment
  1. Design working security plan
  2. Implement management model to execute and maintain the plan
  - Basic steps:
    - begin with creation or validation of security framework,
    - followed by an information security blueprint describing existing controls and identifying other necessary security controls

Introduction (Continued)

- Framework:
  - outline of the more thorough blueprint,
  - Blueprint
    - basis for the design, selection, and implementation of all subsequent security controls
- To develop a blueprint or methodology
  - Use established security management models and practices

BS 7799

- One of the most widely referenced and often discussed security models
  - BS 7799:1 Information Technology – Code of Practice for Information Security Management,
    - Originally as British Standard BS 7799
    - Now ISO/IEC 17799 (since 2000)
  - BS 7799:2 Information Security Management: Specification with Guidance for Use
- The purpose of ISO/IEC 17799 (BS 7799:1)
  - give recommendations for information security management for use by those who are responsible for initiating, implementing or maintaining security in their organization

BS 7799 (Continued)

- Volume 2
  - provides information on how to implement Volume 1 (17799) and
  - how to set up an Information Security Management Structure (ISMS)
    - ISMS Certification and accreditation done by BS 7799 certified evaluator
- Standard has not been adopted by US, Germany, Japan etc.

ISO/IEC 17799 Drawbacks

- The global information security community has not defined any justification for a code of practice as identified in the ISO/IEC 17799
- Lacks “the necessary measurement precision of a technical standard”
- No reason to believe that ISO/IEC 17799 is more useful than any other approach
- Not as complete as other frameworks
- Perceived to have been hurriedly prepared, given tremendous impact its adoption could have on industry information security controls

The Ten Sections Of ISO/IEC 17799

1. Organizational Security Policy
2. Organizational Security Infrastructure objectives
3. Asset Classification and Control
4. Personnel Security objectives
5. Physical and Environmental Security objectives
6. Communications and Operations Management objectives
7. System Access Control objectives
8. System Development and Maintenance objectives
9. Business Continuity Planning
10. Compliance objectives

Plan-Do-Check-Act of BS7799:2

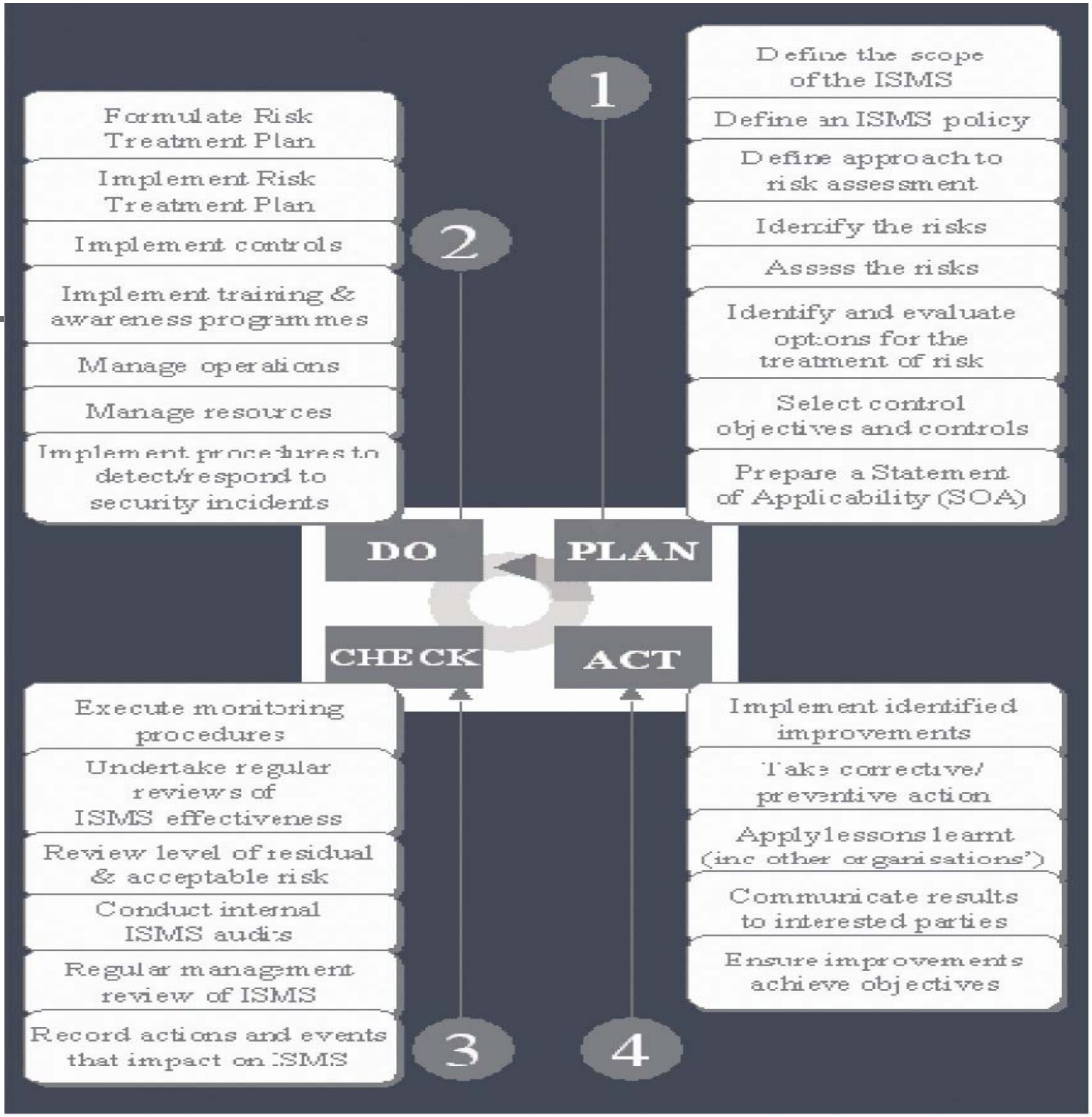

Define the scope of the ISMS
Define an ISMS policy
Define approach to risk assessment
Identify the risks
Assess the risks
Identify and evaluate options for the treatment of risk
Select control objectives and controls
Prepare a Statement of Applicability (SOA)
1
PLAN
Formulate Risk Treatment Plan
Implement Risk Treatment Plan
Implement controls
Implement training & awareness programmes
Manage operations
Manage resources
Implement procedures to detect/respond to security incidents
2
DO
CHECK
Execute monitoring procedures
Undertake regular reviews of ISMS effectiveness
Review level of residual & acceptable risk
Conduct internal ISMS audits
Regular management review of ISMS
Record actions and events that impact on ISMS
3
ACT
Implement identified improvements
Take corrective/ preventive action
Apply lessons learnt (inc other organisations')
Communicate results to interested parties
Ensure improvements achieve objectives
4

FIGURE 6-2 Plan-Do-Check-Act Cycle from BS 7799:2

The Security Management Index and ISO 17799

- To determine how closely an organization is complying with ISO 17799, take Human Firewall Council's survey, the Security Management Index (SMI)
  - Asks 35 questions over 10 domains of ISO standard
  - Gathers metrics on how organizations manage security
  - Survey has been developed according to ISO 17799 international security standards to reflect best practices from a global perspective
  - Enables information security officers to benchmark their practices against those of other organizations

The Human Firewall Council SMI

- Familiarize yourself with the 10 categories of security management
- Benchmark your organization’s security management practices by taking the survey
- Evaluate your results in each category to identify strengths and weaknesses
- Examine the suggestions for improvement in each category in this report
- Use your SMI results to gain support for improving security

RFC 2196 Site Security Handbook

- RFC 2196
  - Created by the Security Area Working Group within the IETF
  - provides a good functional discussion of important security issues along with development and implementation details
  - Covers
    - security policies, security technical architecture, security services, and security incident handling
  - Also includes discussion of the importance of security policies, examination of services, access controls, etc.

NIST Security Models

- NIST documents have two notable advantages:
  - Publicly available at no charge
  - Have been broadly reviewed by government and industry professionals
    - SP 800-12, Computer Security Handbook
    - SP 800-14, Generally Accepted Security Principles & Practices
    - SP 800-18, Guide for Developing Security Plans
    - SP 800-26, Security Self-Assessment Guide-IT Systems
    - SP 800-30, Risk Management for Information Technology Systems

NIST SP 800-12
The Computer Security Handbook

- Excellent reference and guide for routine management of information security
  - Little on design and implementation
- Lays out NIST philosophy on security management by identifying 17 controls organized into three categories:
  - Management Controls section
    - addresses security topics characterized as managerial
  - Operational Controls section
    - addresses security controls focused on controls that are, broadly speaking, implemented and executed by people (as opposed to systems)
  - Technical Controls section
    - focuses on security controls that the computer system executes

NIST Special Publication 800-14

Generally Accepted Principles and Practices for Securing Information Technology Systems

- Describes best practices useful in the development of a security blueprint
- Describes principles that should be integrated into information security processes
- Documents 8 points and 33 Principles

NIST Special Publication 800-14 Key Points

- Key points made in NIST SP 800-14 are:
  - Security Supports the Mission of the Organization
  - Security is an Integral Element of Sound Management
  - Security Should Be Cost-Effective
  - Systems Owners Have Security Responsibilities Outside Their Own Organizations
  - Security Responsibilities and Accountability Should Be Made Explicit
  - Security Requires a Comprehensive and Integrated Approach
  - Security Should Be Periodically Reassessed
  - Security is Constrained by Societal Factors

NIST Special Publication 800-14 Principles

1. Establish sound security policy as “foundation” for design
2. Treat security as integral part of overall system design
3. Clearly delineate physical and logical security boundaries governed by associated security policies
4. Reduce risk to acceptable level
5. Assume that external systems are insecure
6. Identify potential trade-offs between reducing risk and increased costs and decrease in other aspects of operational effectiveness
7. Implement layered security (Ensure no single point of vulnerability)

Checklist for the security blueprint

NIST Special Publication 800-14 Principles (Continued)

8. Implement tailored system security measures to meet organizational security goals
9. Strive for simplicity
10. Design and operate an IT system to limit vulnerability and to be resilient in response
11. Minimize system elements to be trusted
12. Implement security through a combination of measures distributed physically and logically
13. Provide assurance that the system is, and continues to be, resilient in the face of expected threats
14. Limit or contain vulnerabilities
15. Formulate security measures to address multiple overlapping information domains
16. Isolate public access systems from mission critical resources
17. Use boundary mechanisms to separate computing systems and network infrastructures
18. Where possible, base security on open standards for portability and interoperability
19. Use common language in developing security requirements.
20. Design and implement audit mechanisms to detect unauthorized use and to support incident investigations

NIST Special Publication 800-14 Principles (Continued)

21. Design security to allow for regular adoption of new technology, including a secure and logical technology upgrade process
22. Authenticate users and processes to ensure appropriate access control decisions both within and across domains
23. Use unique identities to ensure accountability
24. Implement least privilege
25. Do not implement unnecessary security mechanisms
26. Protect information while being processed, in transit, and in storage
27. Strive for operational ease of use
28. Develop and exercise contingency or disaster recovery procedures to ensure appropriate availability
29. Consider custom products to achieve adequate security
30. Ensure proper security in the shutdown or disposal of a system
31. Protect against all likely classes of “attacks”
32. Identify and prevent common errors and vulnerabilities
33. Ensure that developers are trained in how to develop secure software

NIST Special Publication 800-18

A Guide for Developing Security Plans for Information Technology Systems

- Provides
  - detailed methods for assessing, designing, and implementing controls and plans for various sized applications
- Serves as a guide for the activities
  - for the overall information security planning process
- Includes templates for major application security plans

NIST Special Publication 800-26
17 areas Defining the core of the NIST Security Management Structure

- Management Controls
  1. Risk Management
  2. Review of Security Controls
  3. Life Cycle Maintenance
  4. Authorization of Processing (Certification and Accreditation)
  5. System Security Plan

- Operational Controls
  6. Personnel Security
  7. Physical Security
  8. Production, Input/Output Controls
  9. Contingency Planning
  10. Hardware and Systems Software
  11. Data Integrity
  12. Documentation
  13. Security Awareness, Training, and Education
  14. Incident Response Capability

- Technical Controls
  15. Identification and Authentication
  16. Logical Access Controls
  17. Audit Trails

Hybrid Security Management Model

- Management controls
  - Program management
  - System security plan
  - Life cycle management
  - Risk management
  - Review of security controls
  - Legal compliance

- Operational controls
  - Contingency planning
  - Security education, training and awareness
  - Personnel security
  - Physical security
  - Production inputs and outputs
  - Hardware and software systems maintenance
  - Data integrity

- Technical controls
  - Logical access controls
  - Identification, authentication, authorization and accountability
  - Audit trails
  - Asset classification and control
  - cryptography

NIST Special Publication 800-30

Risk Management Guide for Information Technology Systems

- Provides a foundation for the development of an effective risk management program
- Contains both the definitions and the practical guidance necessary for assessing and mitigating risks identified within IT systems
- Strives to enable organizations to better manage IT-related risks

Risk Management Overview
Risk Assessment
Risk Mitigation
Evaluation and Assessment

Security Management Practices

- In information security, two categories of benchmarks are used
  - Standards of due care/due diligence
  - Best practices
- Gold standard – subcategory of Best practices
  - that are generally regarded as “the best of the best”

Standards of Due Care/ Diligence

- Standard of due care
  - organizations adopt minimum levels of security for a legal defense,
    - they may need to show that they have done what any prudent organization would do in similar circumstances
- Due diligence
  - Demonstrated by implementing controls at this minimum standard, and maintaining them
  - Requires that an organization ensure that the implemented standards continue to provide the required level of protection
  - Failure to support a standard of due care or due diligence
    - can expose an organization to legal liability,
    - provided it can be shown that the organization was negligent in its application or lack of application of information protection

Best Security Practices

- Best business practices or simply best practices
  - Security efforts that seek to provide a superior level of performance in the protection of information
  - Some organizations call them recommended practices
- Best security practices
  - Security efforts that are among the best in the industry
    - Balanced
    - Defense in depth
- Companies with best practices may not be the best in every area

- Federal Agency Best Security Practices (http://csrc.nist.gov/groups/SMA/fasp/areas.html)

VISA International Security Model (best practices example)

- VISA use two important documents that improve and regulate its information systems:
  - Security Assessment Process document
    - contains series of recommendations for detailed examination of organization’s systems with the eventual goal of integration into the VISA systems
  - Agreed Upon Procedures document
    - outlines the policies and technologies used to safeguard security systems that carry the sensitive cardholder information to and from VISA systems

The Gold Standard

- A model level of performance
  - Demonstrates industrial leadership, quality, and concern for the protection of information
- The implementation of gold standard security requires
  - a great deal of support, both in financial and personnel resources
- No published criteria!

Selecting Best Practices

- Choosing recommended practices could be a challenge
  - In industries that are regulated by governmental agencies,
    - government guidelines are often requirements
  - For other organizations,
    - government guidelines are excellent sources of information and can inform their selection of best practices

Selecting Best Practices (Continued)

- When considering best practices for your organization, consider the following:
  - Does your organization resemble the identified target organization of the best practice?
    - Are you in a similar industry as the target?
    - Do you face similar challenges as the target?
    - Is your organizational structure similar to the target?
  - Are the resources you can expend similar to those called for by the best practice?
  - Are you in a similar threat environment as the one assumed by the best practice?

Best Practices

- Microsoft best practices (at its Web site)
  - Use antivirus software
  - Use strong passwords
  - Verify your software security settings
  - Update product security
  - Build personal firewalls
  - Back up early and often
  - Protect against power surges and loss

Benchmarking and Best Practices Limitations

- Biggest problems with benchmarking in information security:
  - Organizations don’t talk to each other and are not identical
    - Successful attack is viewed as organizational failure and is kept secret, insofar as possible
      - Join professional associations and societies like ISSA and sharing their stories and lessons learned
    - Alternative to this direct dialogue is the publication of lessons learned
  - No two organizations are identical
  - Best practices are moving targets

Baselining

- Baseline:
  - “value or profile of a performance metric against which changes in the performance metric can be usefully compared”
- Baselining:
  - process of measuring against established standards

  - In InfoSec,
    - the comparison of security activities and events against the organization’s future performance
  - Can provide foundation for internal benchmarking, as information gathered for an organization’s first risk assessment becomes the baseline for future comparisons

Emerging Trends In Certification And Accreditation

- Accreditation
  - is authorization of an IT system to process, store, or transmit information
    - Issued by management official
    - Serves as means of assuring that systems are of adequate quality
    - Also challenges managers and technical staff to find best methods to assure security, given technical constraints, operational constraints, and mission requirements

Emerging Trends In Certification And Accreditation (Continued)

- Certification:
  - *“the comprehensive evaluation of the technical and non-technical security controls of an IT system to support the accreditation process that establishes the extent to which a particular design and implementation meets a set of specified security requirements”*
- Organizations pursue accreditation or certification to gain a competitive advantage, or to provide assurance or confidence to customers

SP 800-37

Guidelines for the Security Certification and Accreditation of Federal IT Systems

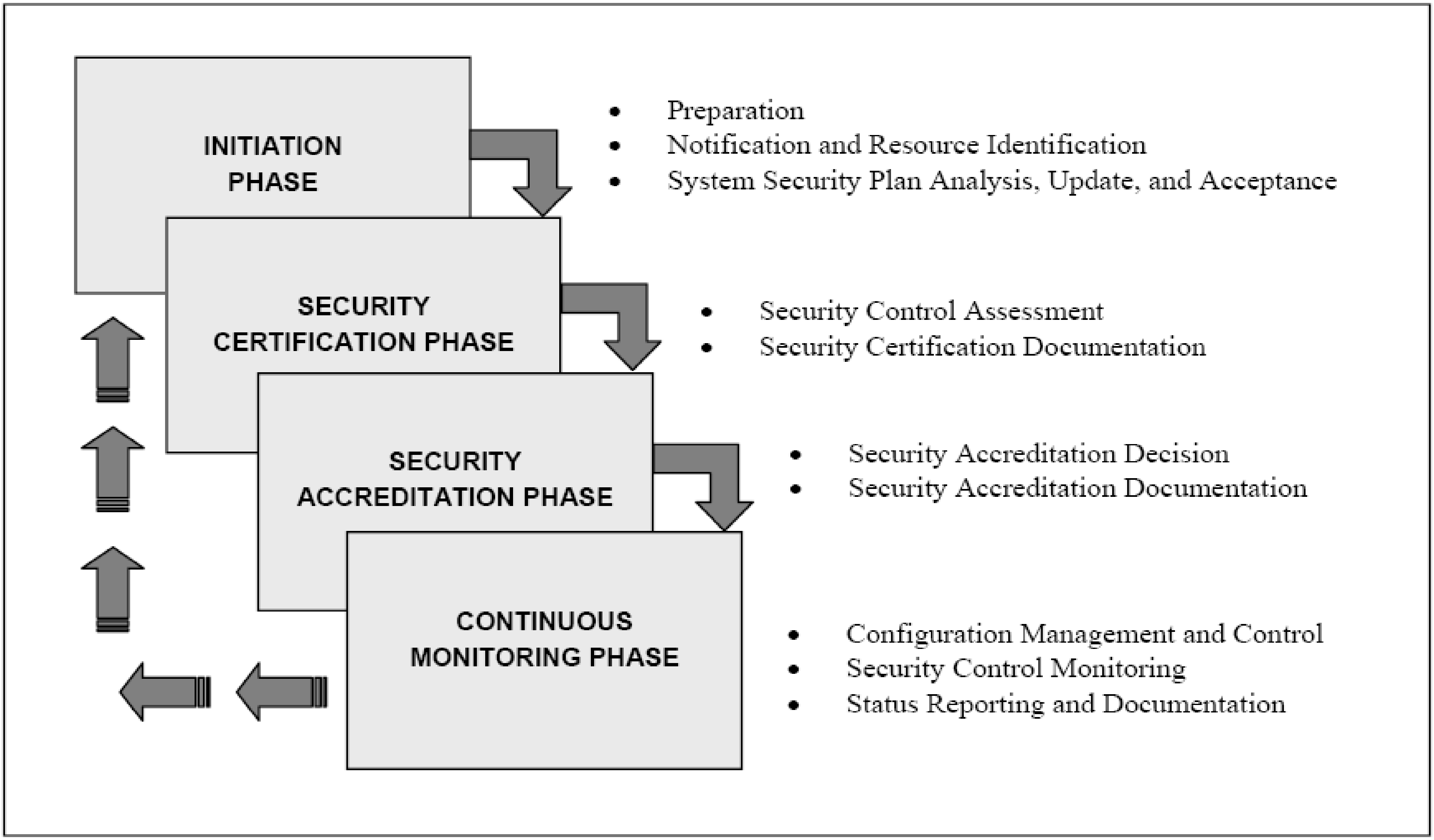
- Three project goals
  - Develop standard guidelines and procedures for certifying and accrediting federal IT systems including critical infrastructure of United States
  - Define essential minimum security controls for federal IT systems
  - Promote
    - development of public and private sector assessment organizations and
    - certification of individuals capable of providing cost effective, high quality, security certifications based on standard guidelines and procedures

SP 800-37 (Continued)

Guidelines for the Security Certification and Accreditation of Federal IT Systems

- Specific benefits of security certification and accreditation (C&A) initiative include:
  - More consistent, comparable, and repeatable certifications of IT systems
  - More complete, reliable, information for authorizing officials—leading to better understanding of complex IT systems and associated risks and vulnerabilities—and therefore, more informed decisions by management officials
  - Greater availability of competent security evaluation and assessment services
  - More secure IT systems within the federal government”

The Process



INITIATION PHASE

- Preparation
- Notification and Resource Identification
- System Security Plan Analysis, Update, and Acceptance

SECURITY CERTIFICATION PHASE

- Security Control Assessment
- Security Certification Documentation

SECURITY ACCREDITATION PHASE

- Security Accreditation Decision
- Security Accreditation Documentation

CONTINUOUS MONITORING PHASE

- Configuration Management and Control
- Security Control Monitoring
- Status Reporting and Documentation

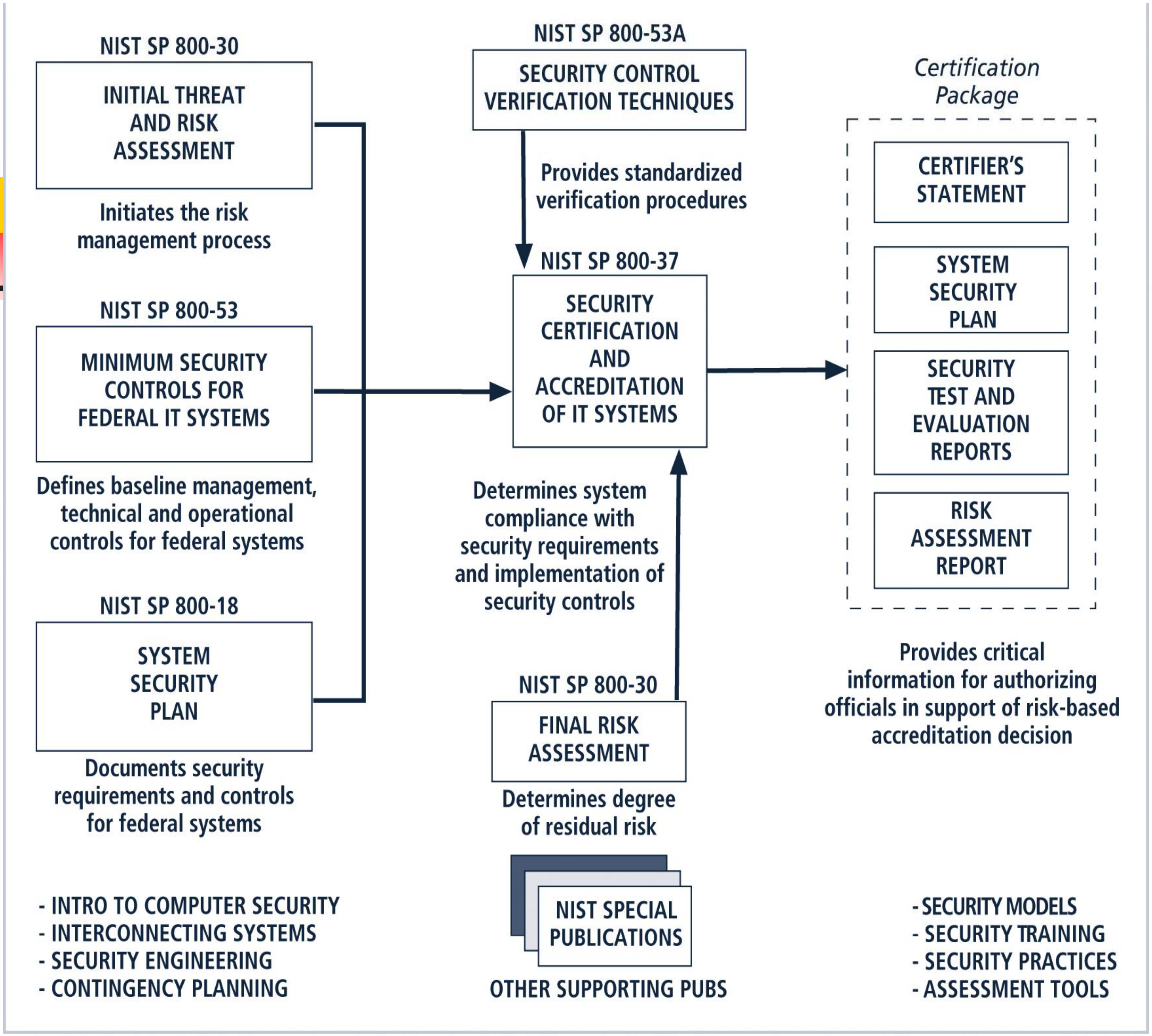
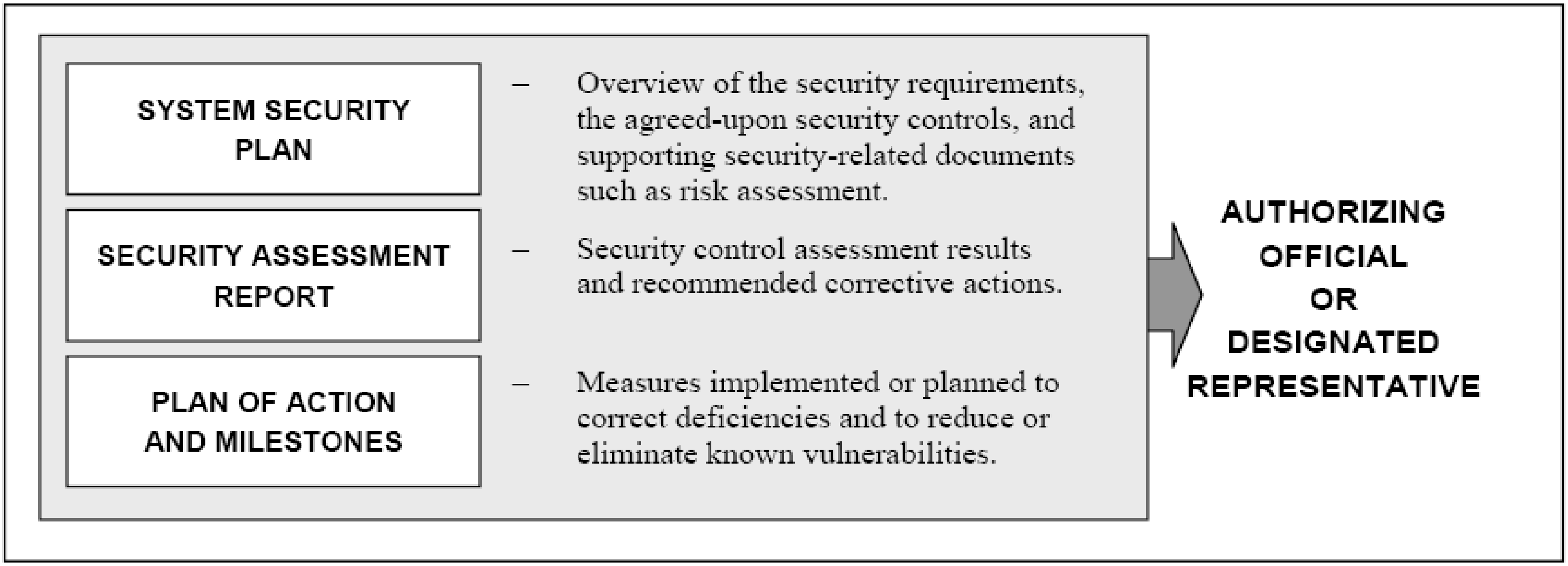

NIST SP 800-30
INITIAL THREAT AND RISK ASSESSMENT
Initiates the risk management process
NIST SP 800-53
MINIMUM SECURITY CONTROLS FOR FEDERAL IT SYSTEMS
Defines baseline management, technical and operational controls for federal systems
NIST SP 800-18
SYSTEM SECURITY PLAN
Documents security requirements and controls for federal systems
NIST SP 800-53A
SECURITY CONTROL VERIFICATION TECHNIQUES
Provides standardized verification procedures
NIST SP 800-37
SECURITY CERTIFICATION AND ACCREDITATION OF IT SYSTEMS
Determines system compliance with security requirements and implementation of security controls
NIST SP 800-30
FINAL RISK ASSESSMENT
Determines degree of residual risk
Certification Package
CERTIFIER'S STATEMENT
SYSTEM SECURITY PLAN
SECURITY TEST AND EVALUATION REPORTS
RISK ASSESSMENT REPORT
Provides critical information for authorizing officials in support of risk-based accreditation decision
- INTRO TO COMPUTER SECURITY
- INTERCONNECTING SYSTEMS
- SECURITY ENGINEERING
- CONTINGENCY PLANNING
NIST SPECIAL PUBLICATIONS
OTHER SUPPORTING PUBS
- SECURITY MODELS
- SECURITY TRAINING
- SECURITY PRACTICES
- ASSESSMENT TOOLS

FIGURE 6-3 Special Publications Supporting SP 800-37

Planned Federal System Certifications

- Systems are to be certified to one of three levels:
  - Security Certification Level 1: Entry-Level Certification Appropriate For Low Priority (Concern) Systems
  - Security Certification Level 2: Mid-Level Certification Appropriate For Moderate Priority (Concern) Systems
  - Security Certification Level 3: Top-Level Certification Appropriate For High Priority (Concern) Systems

Accreditation Package & Decision



SYSTEM SECURITY PLAN – Overview of the security requirements, the agreed-upon security controls, and supporting security-related documents such as risk assessment.

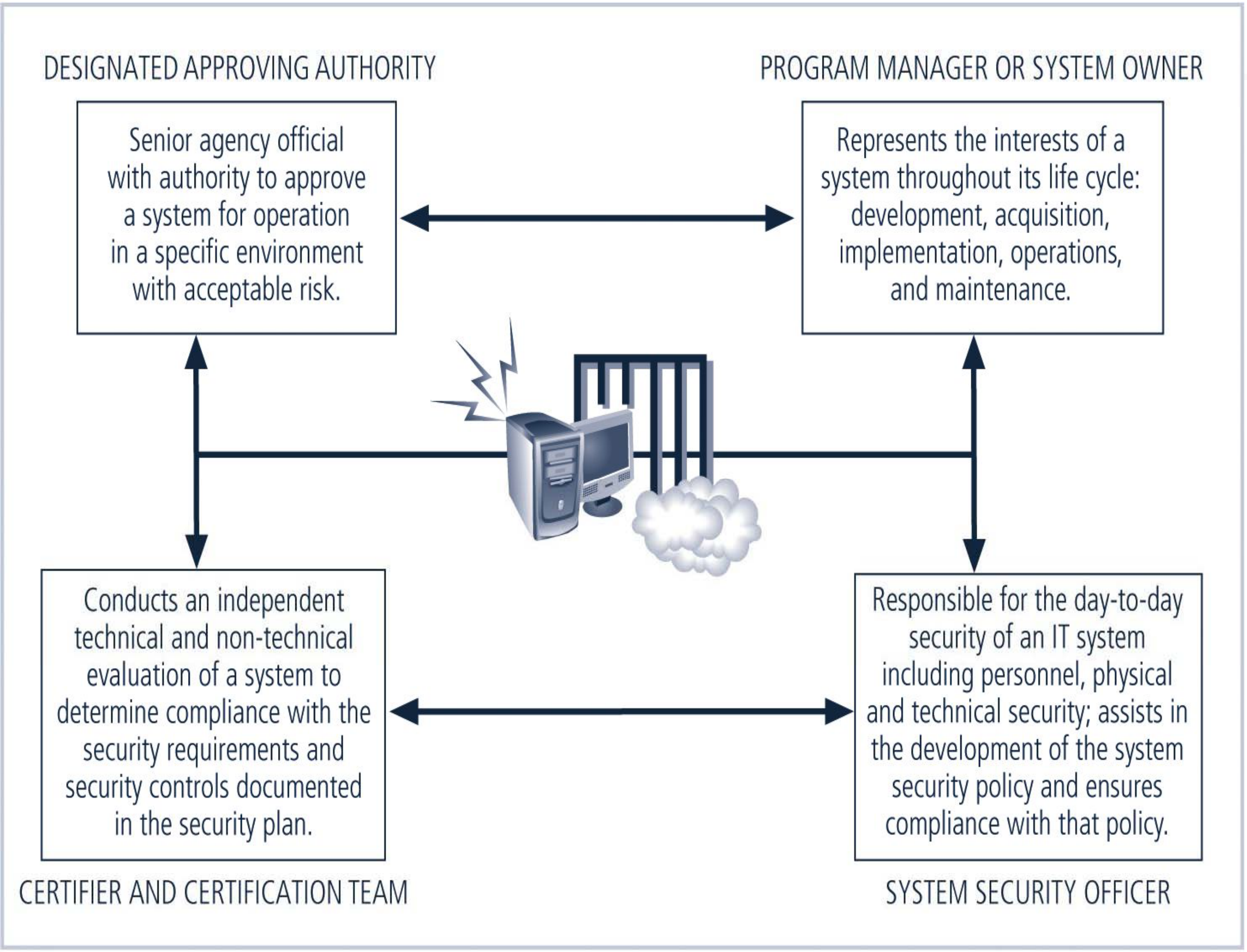
SECURITY ASSESSMENT REPORT – Security control assessment results and recommended corrective actions.

PLAN OF ACTION AND MILESTONES – Measures implemented or planned to correct deficiencies and to reduce or eliminate known vulnerabilities.

AUTHORIZING OFFICIAL OR DESIGNATED REPRESENTATIVE

- Decision letter
  - Security accreditation decision letter
    - Authorize to operate - Authorized to operate in interim basis – Not authorized to operate
  - Supporting rationale for the decision
  - Terms and condition for the decision

Participants in the Federal C&A Process



DESIGNATED APPROVING AUTHORITY

Senior agency official with authority to approve a system for operation in a specific environment with acceptable risk.

PROGRAM MANAGER OR SYSTEM OWNER

Represents the interests of a system throughout its life cycle: development, acquisition, implementation, operations, and maintenance.

Conducts an independent technical and non-technical evaluation of a system to determine compliance with the security requirements and security controls documented in the security plan.

CERTIFIER AND CERTIFICATION TEAM

Responsible for the day-to-day security of an IT system including personnel, physical and technical security; assists in the development of the system security policy and ensures compliance with that policy.

SYSTEM SECURITY OFFICER

FIGURE 6-4 Participants in the Certification and Accreditation Process

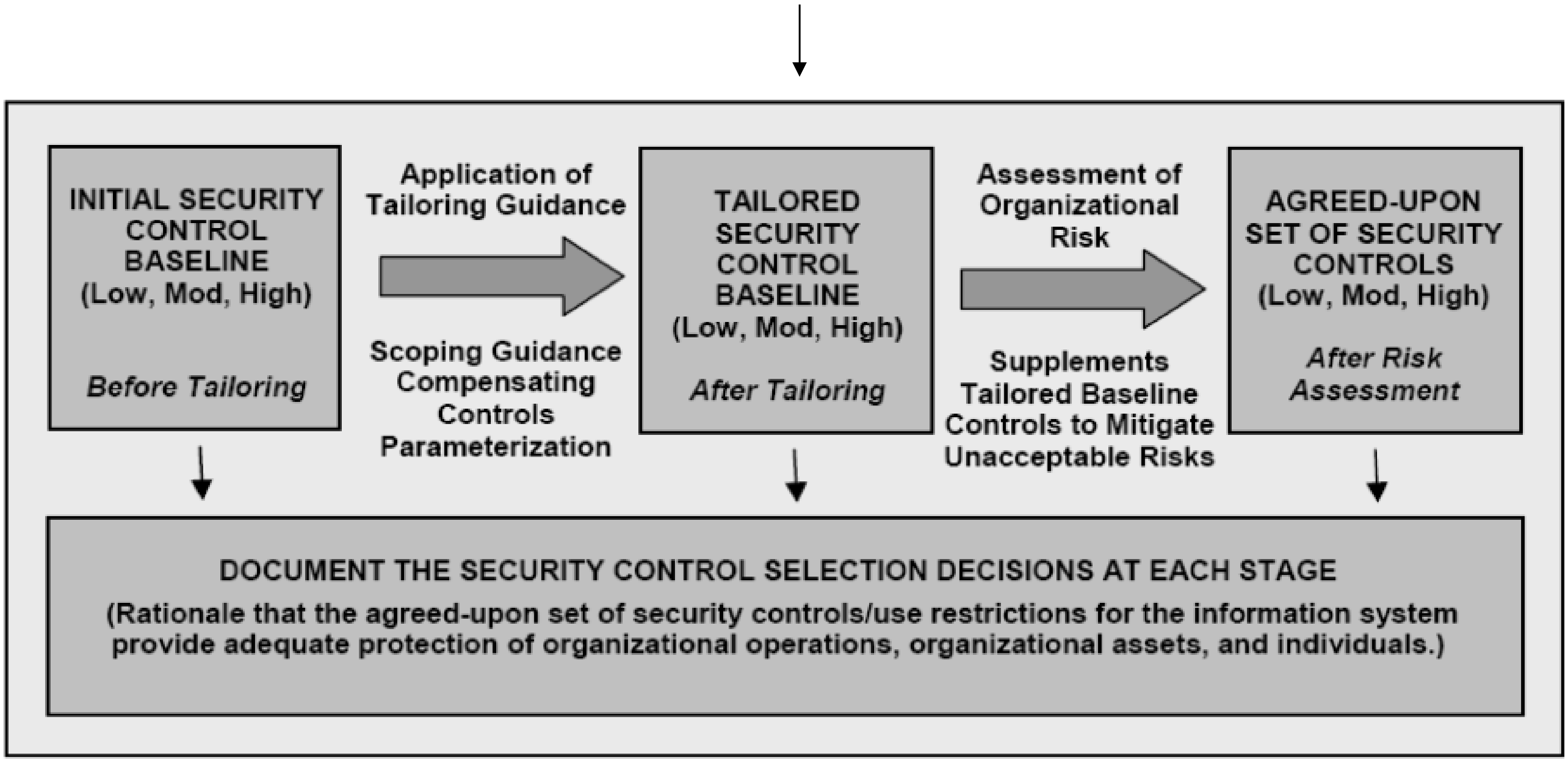
SP 800-53

Minimum Security Controls for Federal IT Systems

- SP 800-53 is part two of the Certification and Accreditation project
- Purpose
  - to establish a set of standardized, minimum security controls for IT systems addressing low, moderate, and high levels of concern for confidentiality, integrity, and availability
- Controls are broken into the three familiar general classes of security controls
  - management,
  - operational, and
  - technical

Security Control Selection Process

Risk-Management Framework



INITIAL SECURITY CONTROL BASELINE (Low, Mod, High)

Before Tailoring

Application of Tailoring Guidance

Scoping Guidance
Compensating Controls
Parameterization

TAILORED SECURITY CONTROL BASELINE (Low, Mod, High)

After Tailoring

Assessment of Organizational Risk

Supplements Tailored Baseline Controls to Mitigate Unacceptable Risks

AGREED-UPON SET OF SECURITY CONTROLS (Low, Mod, High)

After Risk Assessment

DOCUMENT THE SECURITY CONTROL SELECTION DECISIONS AT EACH STAGE

(Rationale that the agreed-upon set of security controls/use restrictions for the information system provide adequate protection of organizational operations, organizational assets, and individuals.)

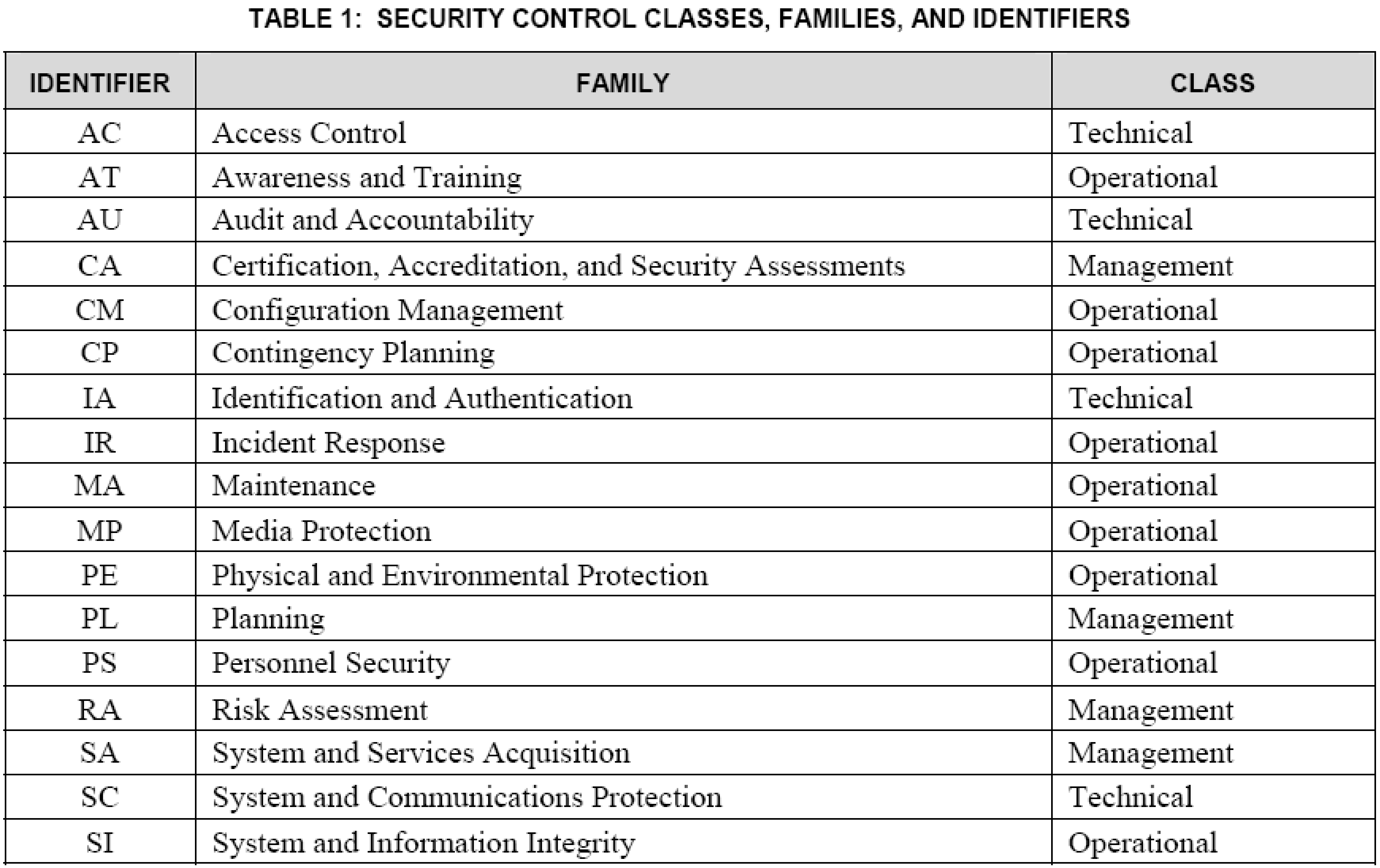
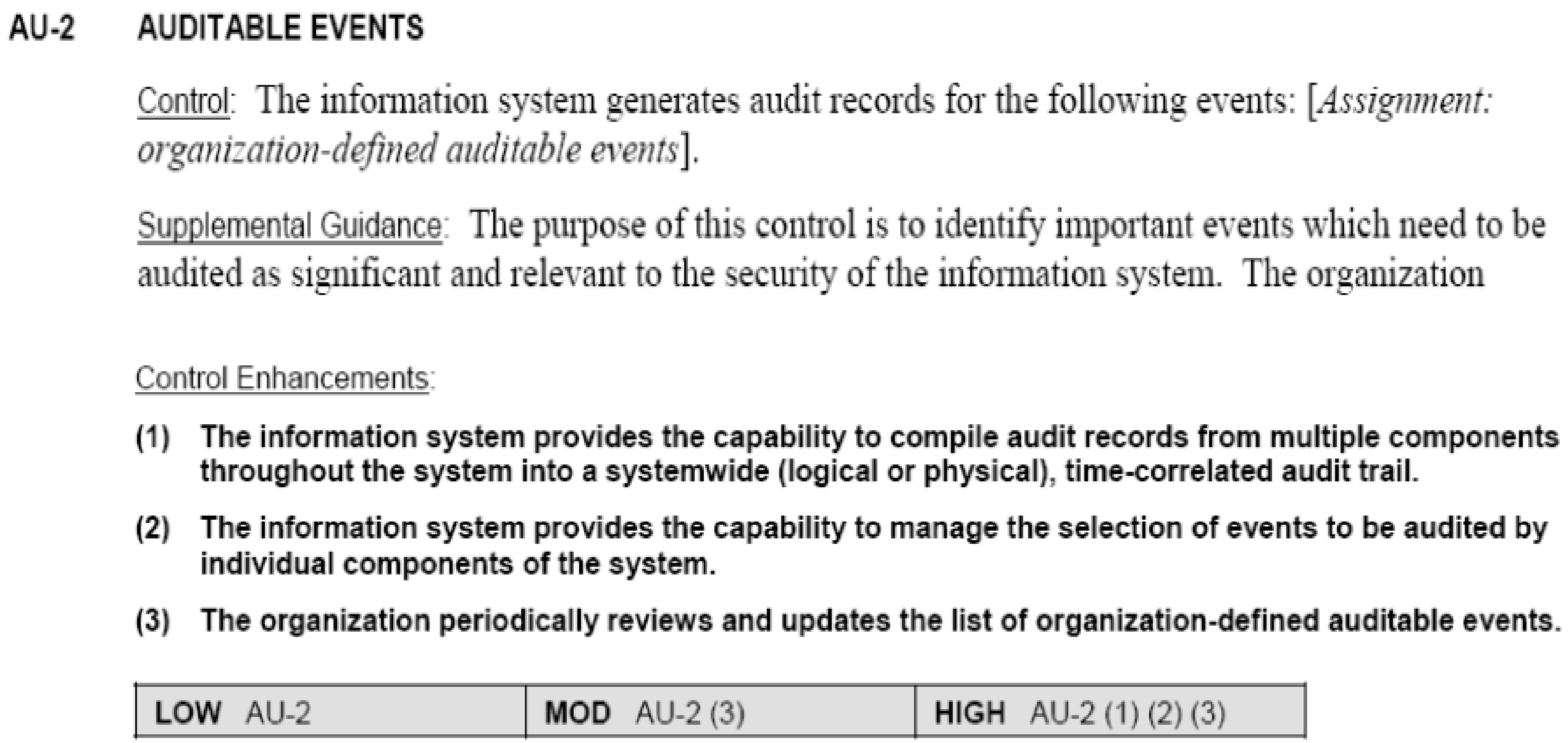


TABLE 1: SECURITY CONTROL CLASSES, FAMILIES, AND IDENTIFIERS

IDENTIFIER	FAMILY	CLASS
AC	Access Control	Technical
AT	Awareness and Training	Operational
AU	Audit and Accountability	Technical
CA	Certification, Accreditation, and Security Assessments	Management
CM	Configuration Management	Operational
CP	Contingency Planning	Operational
IA	Identification and Authentication	Technical
IR	Incident Response	Operational
MA	Maintenance	Operational
MP	Media Protection	Operational
PE	Physical and Environmental Protection	Operational
PL	Planning	Management
PS	Personnel Security	Operational
RA	Risk Assessment	Management
SA	System and Services Acquisition	Management
SC	System and Communications Protection	Technical
SI	System and Information Integrity	Operational

Security Control Structure (example)



AU-2 AUDITABLE EVENTS

Control: The information system generates audit records for the following events: [*Assignment: organization-defined auditable events*].

Supplemental Guidance: The purpose of this control is to identify important events which need to be audited as significant and relevant to the security of the information system. The organization

Control Enhancements:

(1) The information system provides the capability to compile audit records from multiple components throughout the system into a systemwide (logical or physical), time-correlated audit trail.

(2) The information system provides the capability to manage the selection of events to be audited by individual components of the system.

(3) The organization periodically reviews and updates the list of organization-defined auditable events.

LOW AU-2	**MOD** AU-2 (3)	**HIGH** AU-2 (1) (2) (3)

(Complete catalog is provided at the end of 800-53)