Information Security
CS 3002

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Security Planning

- The process of creating information security program includes:
  - Create *policies, standards, and practices*
  - Design of information security architecture
  - Use of a detailed information security mechanism
  - Creation of *contingency planning* consisting of incident response planning, disaster recovery planning, and business continuity plans

- Without policy, blueprints, and planning, organization is unable to meet information security needs of various communities of interest

Security Policy

- Organizations must consider policies as basis for all information security efforts

- Policies direct how issues should be addressed and technologies used
  - Security Plan and associated course of action
  - Convey instructions to ensure Security and Privacy
  - Create Organizational laws
  - Dictate acceptable and unacceptable behavior
  - Define penalties for violating policy

- Security Policy – set of rules that protects and organization's assets

Security Policy

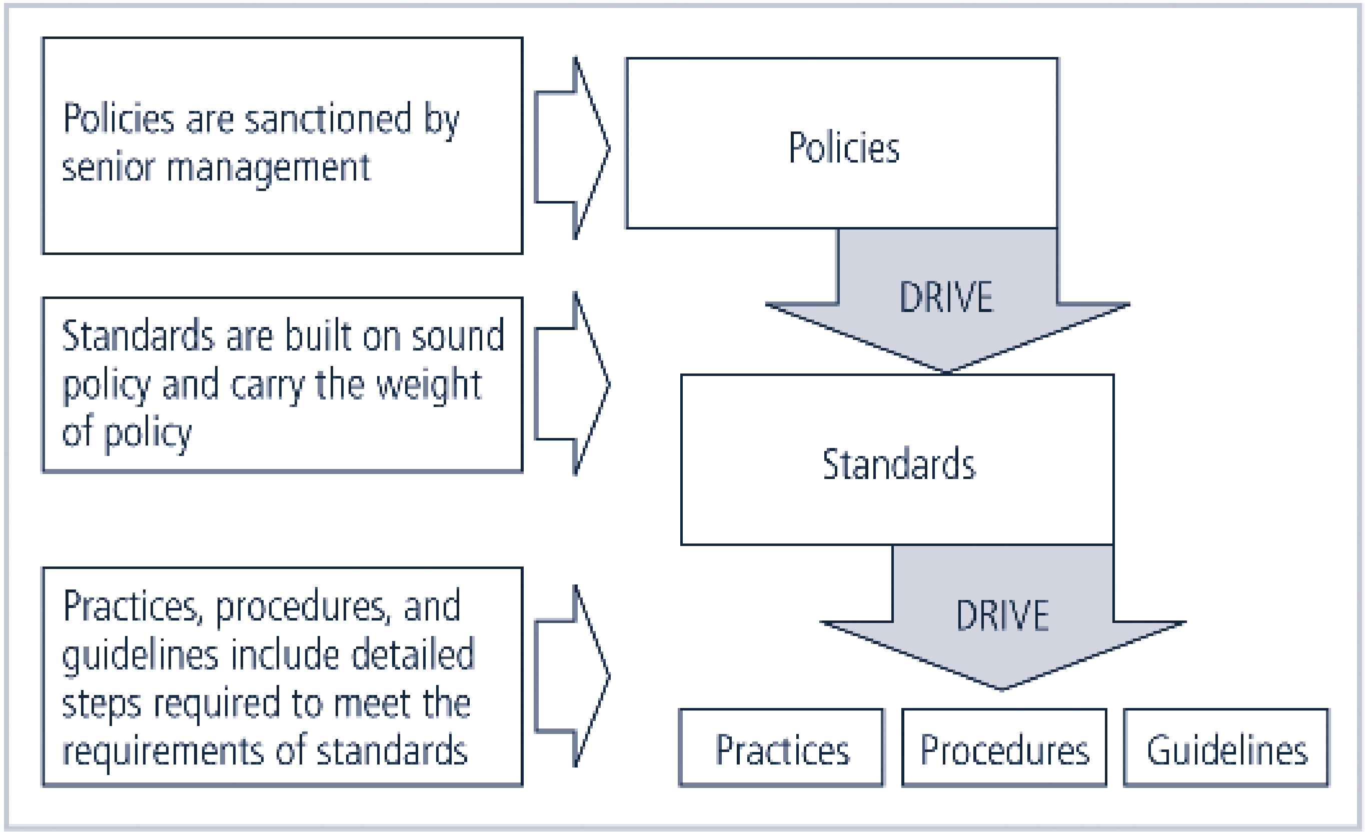
- Security policies are least expensive controls to execute but most difficult to implement

- Shaping policy is difficult it should…
  - Never conflict with laws
  - Standup in court if challenged

- For a policy to be effective, must be properly disseminated, read, understood and agreed to by all members of organization

Standards

- **Detail statements of what must be done to comply with policy**



Policies are sanctioned by senior management

Standards are built on sound policy and carry the weight of policy

Practices, procedures, and guidelines include detailed steps required to meet the requirements of standards

Policies

DRIVE

Standards

DRIVE

Practices

Procedures

Guidelines

FIGURE 5-1 Policies, Standards, and Practices

Security Framework: Spheres of Security

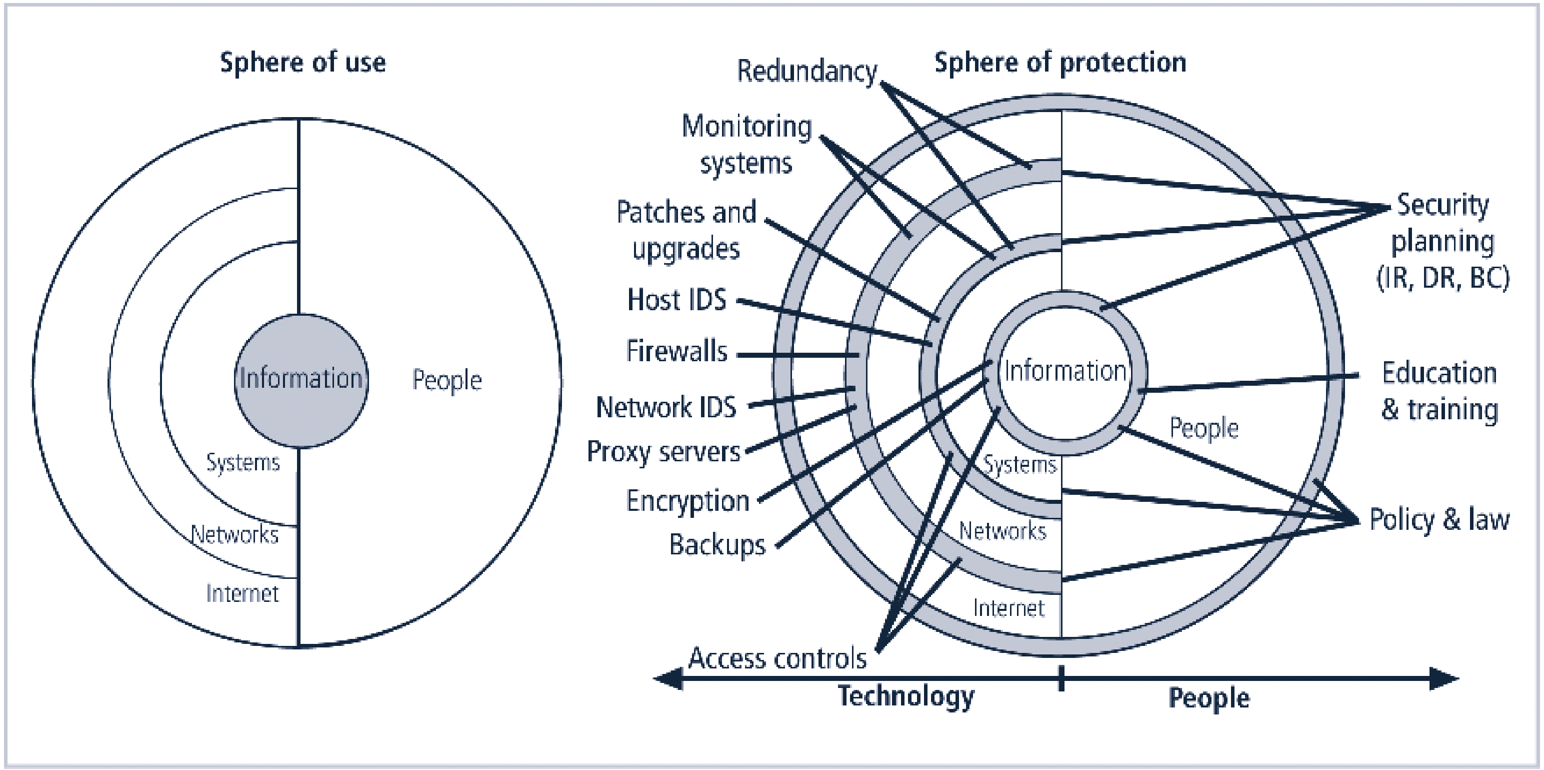


FIGURE 5-15 Spheres of Security

Risk Control Strategies

- Four strategies to control security risks:
  - Apply safeguards that eliminate or reduce residual risks (avoidance)
  - Transfer the risk to other areas or outside entities (transference)
  - Reduce the impact should the vulnerability be exploited (mitigation)
  - Understand the consequences and accept the risk without control or mitigation (acceptance)

Avoidance Strategies

- Attempts to prevent exploitation of the vulnerability
- Preferred approach; accomplished through countering threats, removing asset vulnerabilities, limiting asset access, and adding protective safeguards
- Three common methods of risk avoidance:
  - Application of policy
  - Training and education
  - Applying technology

Transference

- Control approach that attempts to shift risk to other assets, processes, or organizations
  - Rethinking how services are offered
  - Revising deployment models
  - Outsourcing
  - Purchasing insurance
  - Implementing service contracts

- In Search of Excellence
  - Concentrate on what you do best

Acceptance

- ***Doing nothing*** **to protect a vulnerability and accepting the outcome of its exploitation**

- **Valid only when the particular function, service, information, or asset does not justify cost of protection**

- ***Risk appetite*** **describes the degree to which organization is willing to accept risk as trade-off to the expense of applying controls**

Mitigation

- Attempts to reduce impact of vulnerability exploitation through planning and preparation

- Approach includes three types of plans:

  - Incident response plan (IRP)

  - Disaster recovery plan (DRP)

  - Business continuity plan (BCP)

Mitigation

- Disaster recovery plan (DRP) is most common mitigation procedure
- The actions to take while incident is in progress is defined in Incident response plan (IRP)
- Business continuity plan (BCP) encompasses continuation of business activities if catastrophic event occurs

Contingency Planning

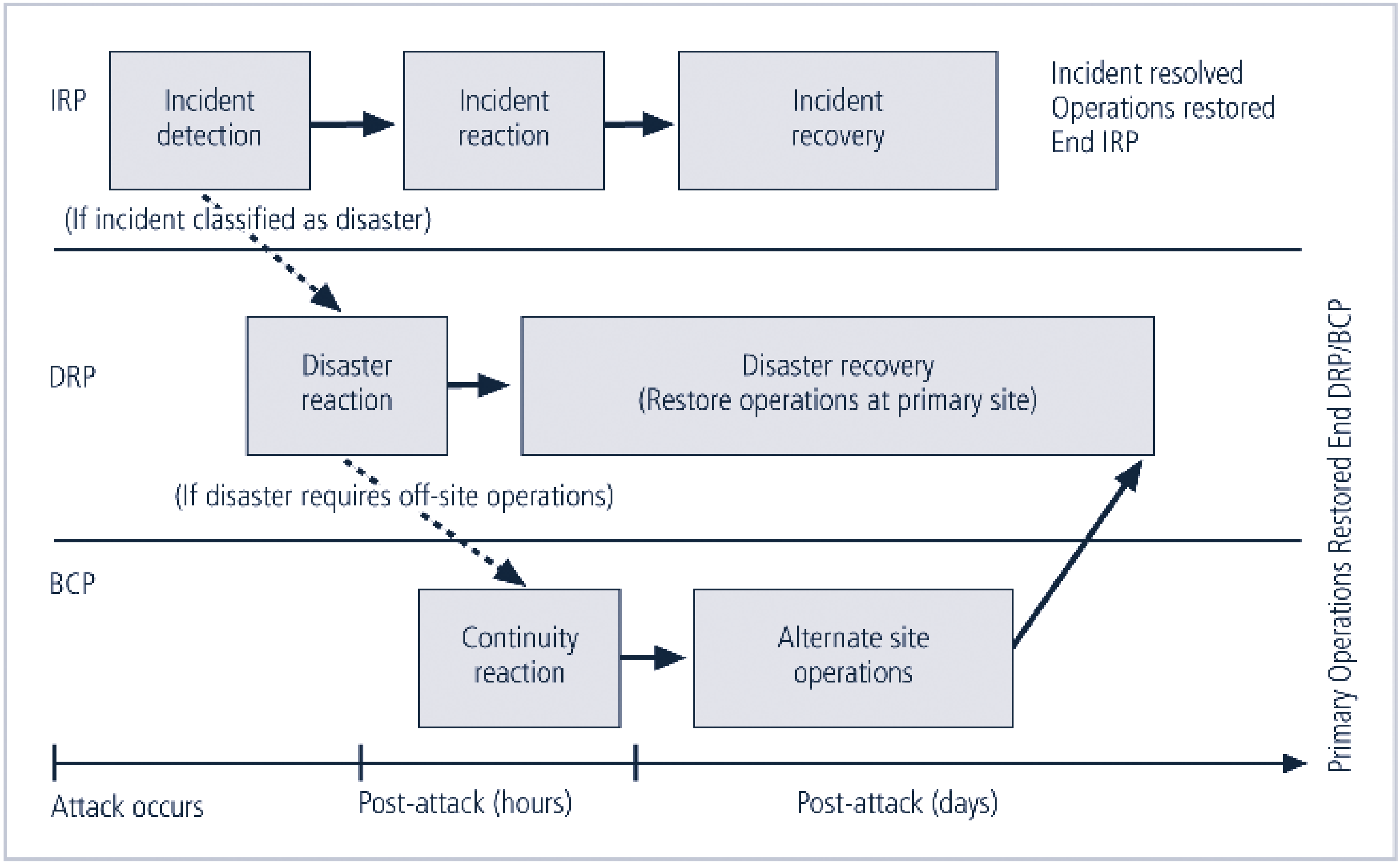
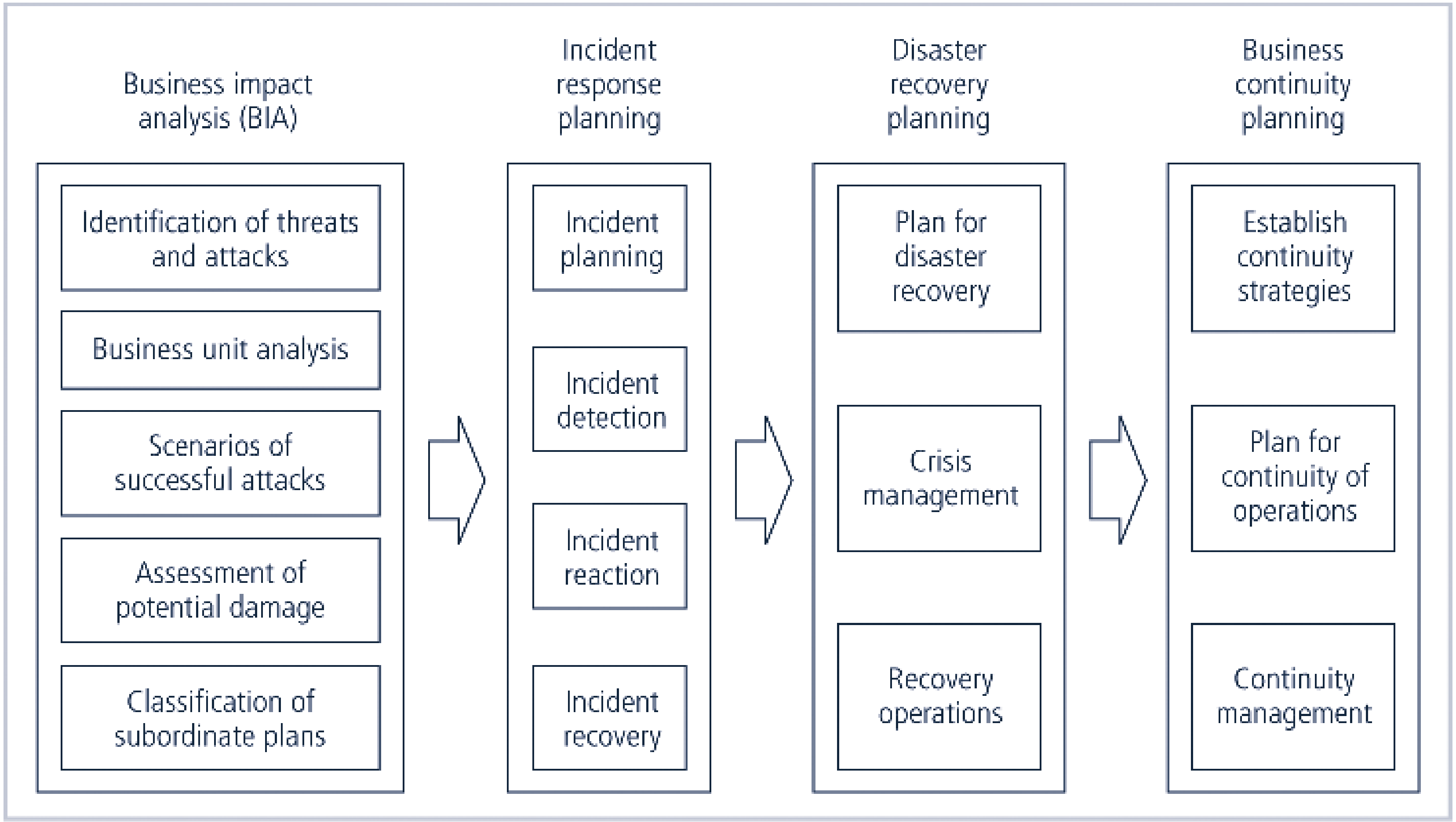


FIGURE 5-22 Contingency Planning Timeline

Steps of Contingency planning



Business impact analysis (BIA)
Identification of threats and attacks
Business unit analysis
Scenarios of successful attacks
Assessment of potential damage
Classification of subordinate plans
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 operations
Continuity management

FIGURE 5-23 Major Steps in Contingency Planning

Incident Response Planning (IRPs)

- Incident response planning covers identification of, classification of, and response to an incident

- Attacks classified as incidents if they:
  - Are directed against information assets
  - Have a realistic chance of success
  - Could threaten confidentiality, integrity, or availability of information resources

- Incident response (IR) is more reactive, than proactive, with the exception of planning that must occur to prepare IR teams to be ready to react to an incident

Incident response

- Set of activities taken to plan for, detect, and correct the impact

- Incident planning
  - Requires understanding BIA scenarios
  - Develop series of predefined responses
  - Enables org to react quickly

- Incident detection
  - Mechanisms – intrusion detection systems, virus detection, system administrators, end users

Incident detection

- Possible indicators
  - Presence of unfamiliar files
  - 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 form IDS

Incident detection

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

- Predefined Situation
  - Loss of availability
  - Loss of integrity
  - Loss of confidentiality
  - Violation of policy
  - Violation of law

Incident reaction

- Actions outlined in the IRP
- Guide the organization
  - Stop the incident
  - Mitigate the impact
  - Provide information recovery
- Notify key personnel
- Document incident

Incident Containment Strategies

- Sever affected communication circuits
- Disable accounts
- Reconfigure firewall
- Disable process or service
- Take down email
- Stop all computers and network devices
- Isolate affected channels, processes, services, or computers

Incident Recovery

- Get everyone moving and focused

- Assess Damage

- Recovery
  - Identify and resolve vulnerabilities
  - Address safeguards
  - Evaluate monitoring capabilities
  - Restore data from backups
  - Restore process and services
  - Continuously monitor system
  - Restore confidence

Disaster Recovery Plan (DRPs)

- Provide guidance in the event of a disaster
- Clear establishment of priorities
- Clear delegation of roles & responsibilities
- Alert key personnel
- Document disaster
- Mitigate impact
- Evacuation of physical assets

Hybrid Security Framework

- Managerial Controls
  - Cover security process
  - Implemented by security administrator
  - Set directions and scope
  - Addresses the design and implementation
  - Addresses risk management & security control reviews
  - Necessity and scope of legal compliance

Hybrid Security Framework

- Operational Controls
  - Operational functionality of security
  - Disaster recovery
  - Incident response planning
  - Personnel and physical security
  - Protection of production inputs and outputs
  - Development of education, training & awareness
  - Addresses hardware and software system maintenance
  - Integrity of data

Hybrid Security Framework

- Technical Controls
  - Addresses the tactical & technical issues
  - Addresses specifics of technology selection & acquisition
  - Addresses identification
  - Addresses authentication
  - Addresses authorization
  - Addresses accountability
  - Addresses development and implementation of audits
  - Covers cryptography
  - Classification of assets and users

Design of Security Architecture

- **Defenses in Depth,**
  - **Implementation of security in layers, policy, training, technology.**
  - **Requires that organization establish sufficient security controls and safeguards so that an intruder faces multiple layers of controls**

- **Security Perimeter**
  - **Point at which an organization's security protection ends and outside world begins**
  - **Does not apply to internal attacks from employee threats or on-site physical threats**

Key Technology Components

- Firewall
  - Device that selectively discriminates against information flowing in and out
  - Specially configured computer
  - Usually on parameter part of or just behind gateway router

- Proxy Server
  - Performs actions on behalf of another system
  - Configured to look like a web server
  - Assigned the domain name
  - Retrieves and transmits data
  - Cache server

Key Technology Components

- DMZ
  - Buffer against outside attacks
  - No mans land between computer and world
  - Web servers often go here
- IDS
  - Intrusion Detection System

- Host based
- Installed on machines they protect
- Monitor host machines

- Network based
  - Look at patterns of network traffic
  - Attempt to detect unusual activity
  - Requires database of previous activity
  - Uses “machine learning” techniques
  - Can use information form similar networks

Security Architecture

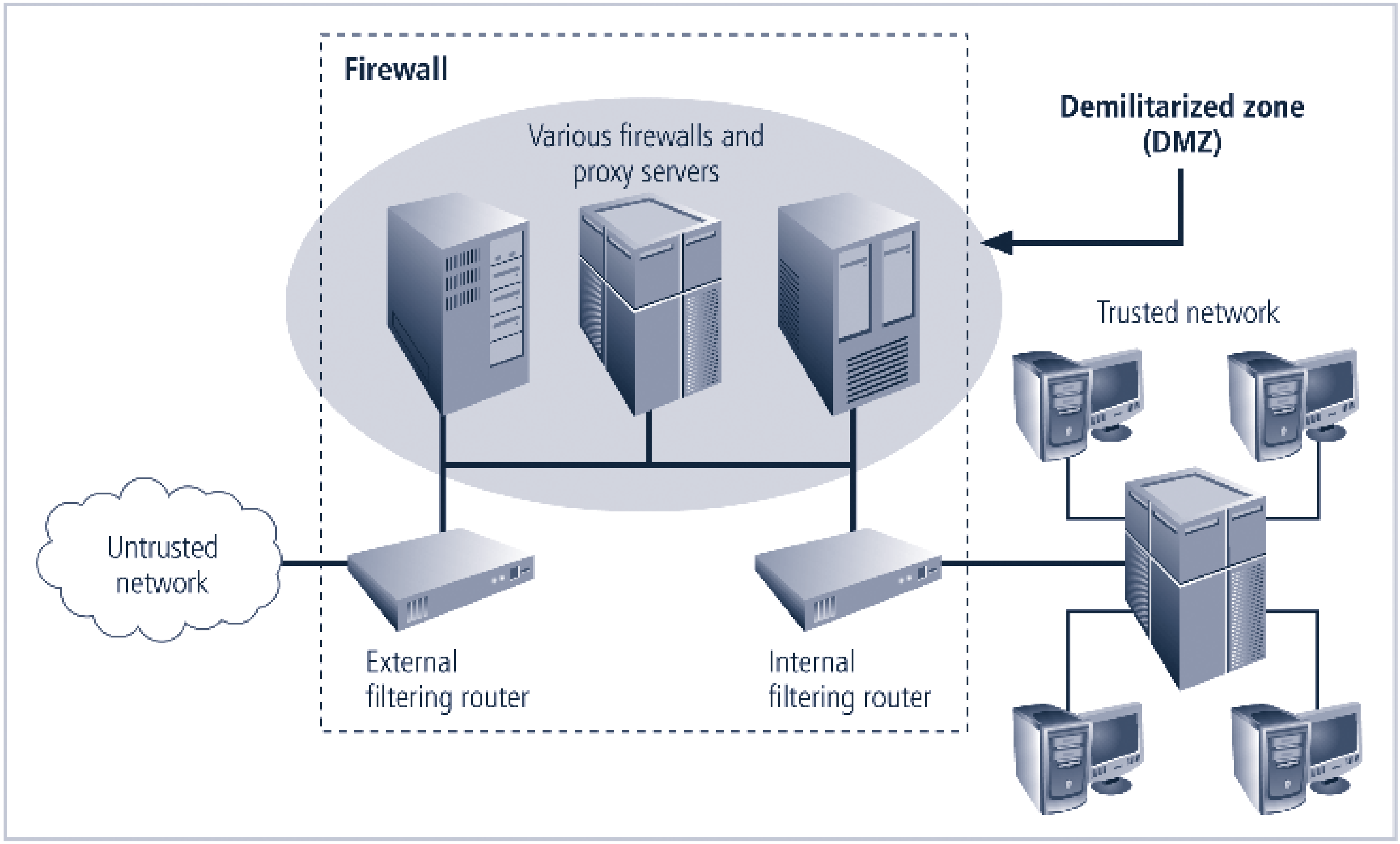

Firewall
Various firewalls and proxy servers
Demilitarized zone (DMZ)
Trusted network
Untrusted network
External filtering router
Internal filtering router

FIGURE 5-18 Firewalls, Proxy Servers, and DMZs

Best Practice from Microsoft

1. Use antivirus software
2. Use strong passwords
3. Verify your software security settings
4. Update product security
5. Build personal firewalls
6. Back up early and often
7. Protect against power surges and loss