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Estimating Security Risk

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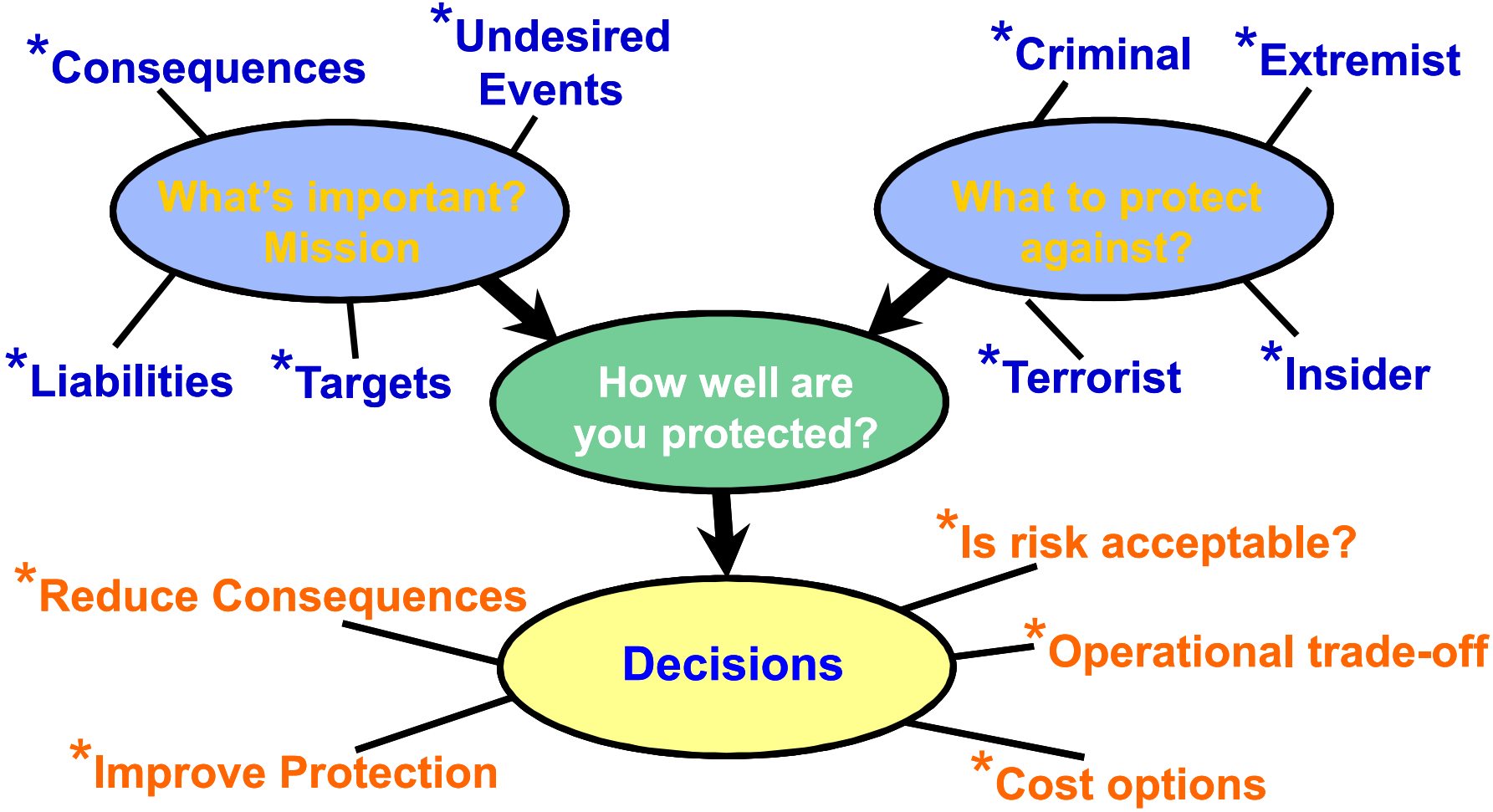
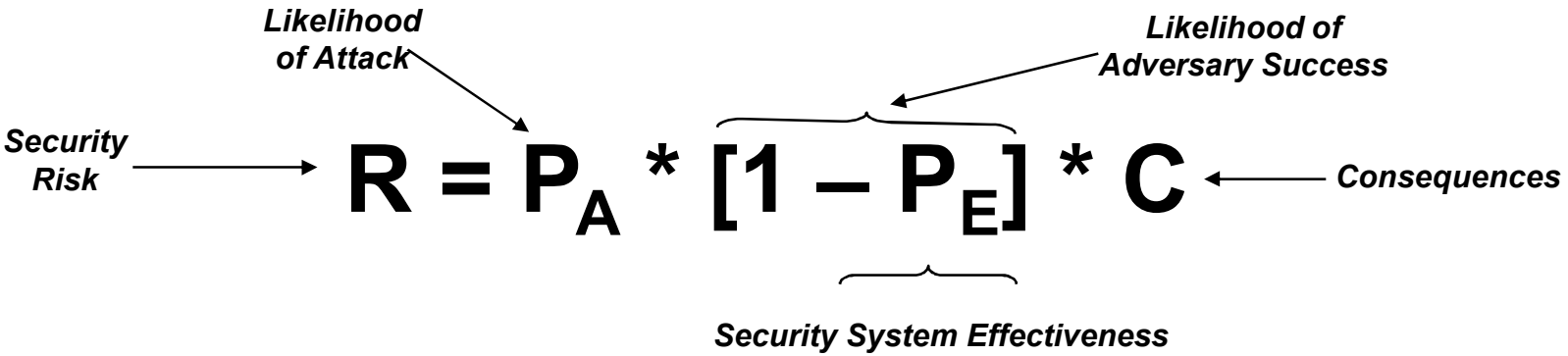
How Much Security Is Enough?



Security Risk Equation



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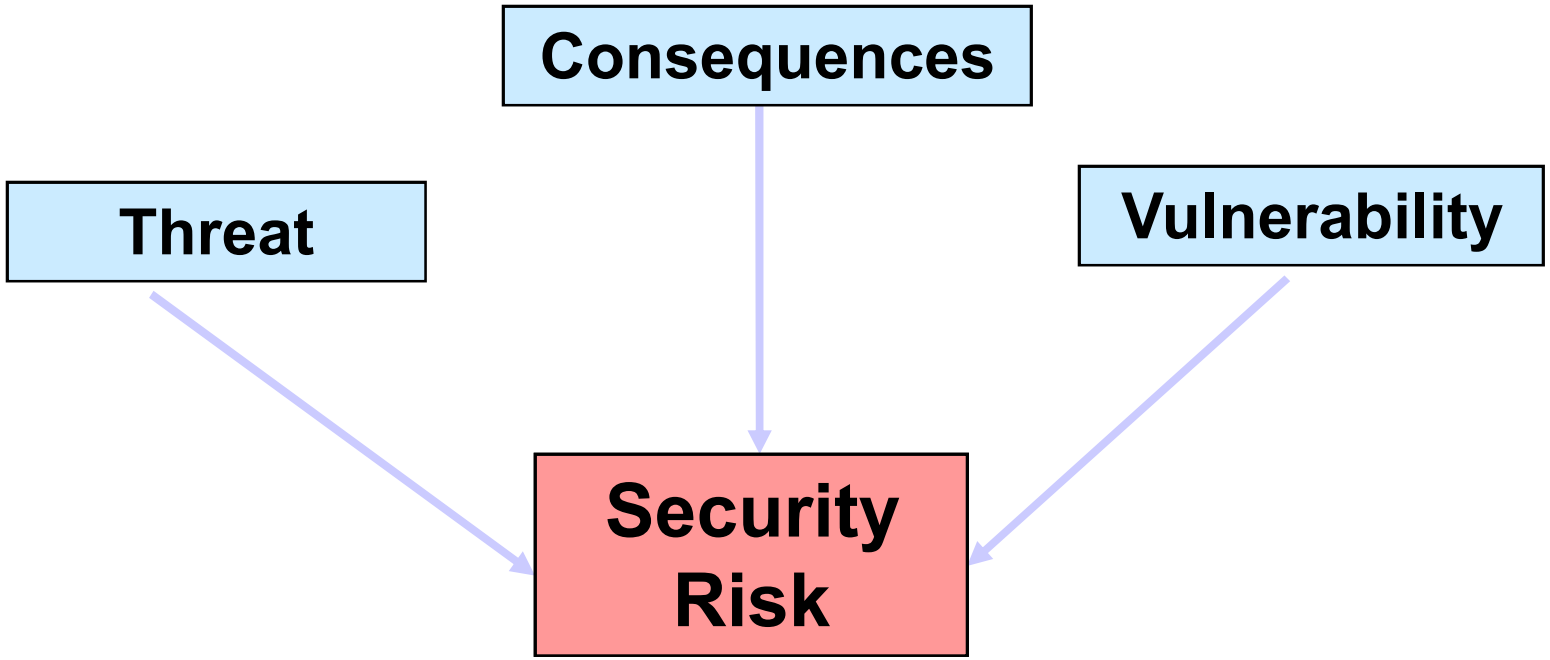
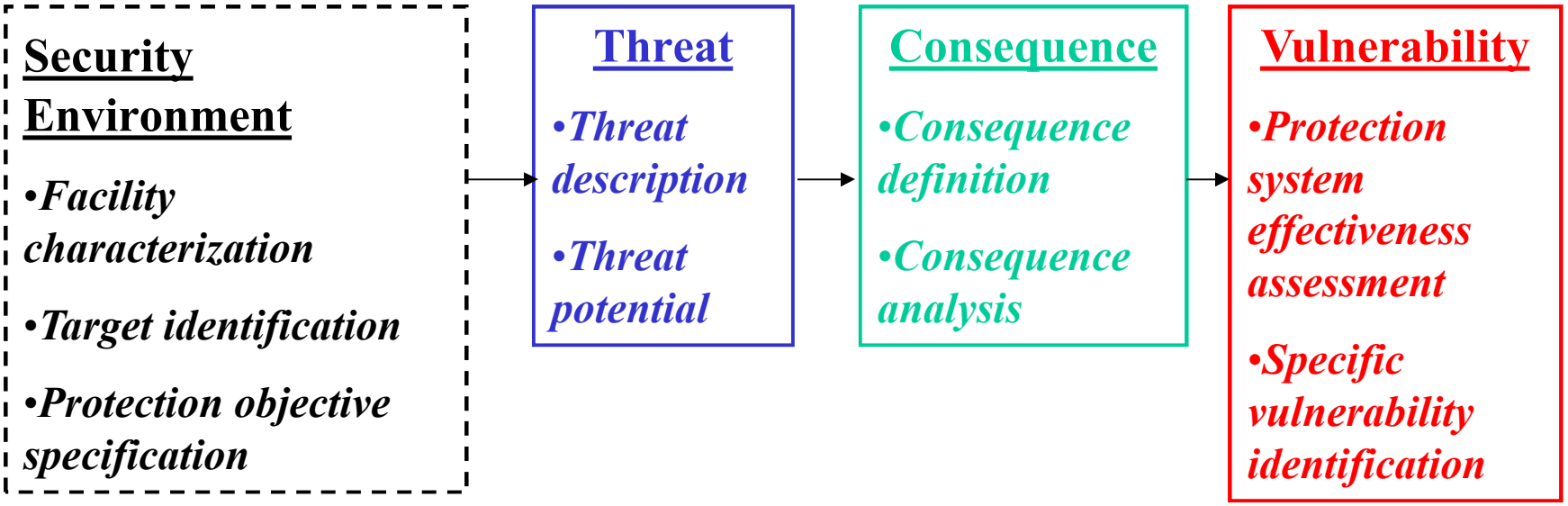
Security Risk is a Function of:



Security Risk Assessment



Facility Characterization

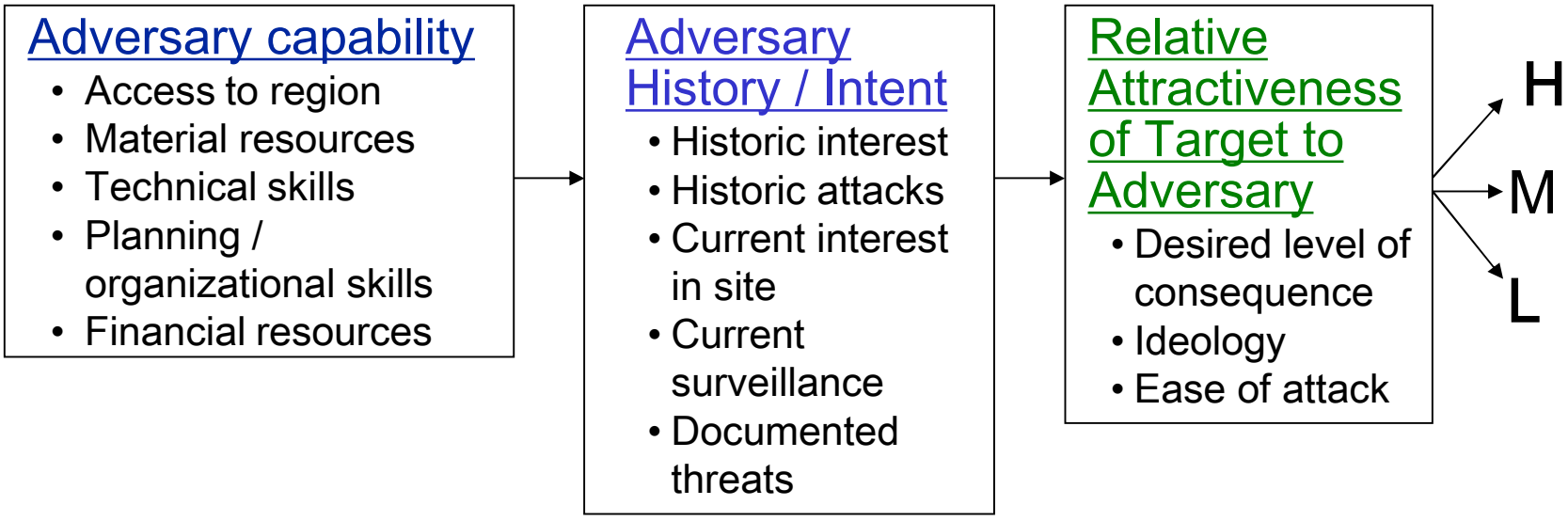
- Facility description
  - Physical layout and description
  - Information system architecture (process control/SCADA)
  - Operations
  - Physical and cyber protection system features
  - Work force
- Undesired events - what events to prevent
- Targets – what items to protect
- Protection objectives – prevent events or mitigate consequences

Threat Definition

- Type of adversary
  - *Terrorists, criminals, extremists, militia, insider*
- Potential actions
  - *Theft, bombing, sabotage, damage*
- Motivations
  - *Ideological, economic, personal*
- Capabilities
  - *Numbers, weapons, equipment, transportation, technical experience*

Threat Potential

- Relative score – not a probability
- Scored per undesired event and per adversary group



Consequence Assessment

- Consequence of loss of the target should be developed.
- Establish units of consequence
  - Loss of human life
  - Loss of dollars
  - Loss of asset
  - Loss of operations/activity

- Rank in order of importance/value
- Assign relative value to each consequence

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Sample Consequence Table

Measure of Consequence	High	Medium	Low
Economic loss (property loss + revenue)	> $5M	$1 – 5M	< $1M
Economic loss (users)	> $5M	$1 – 5M	< $1M
Deaths	>3	1 - 3	0
Geographic Impact	National	Regional	Local

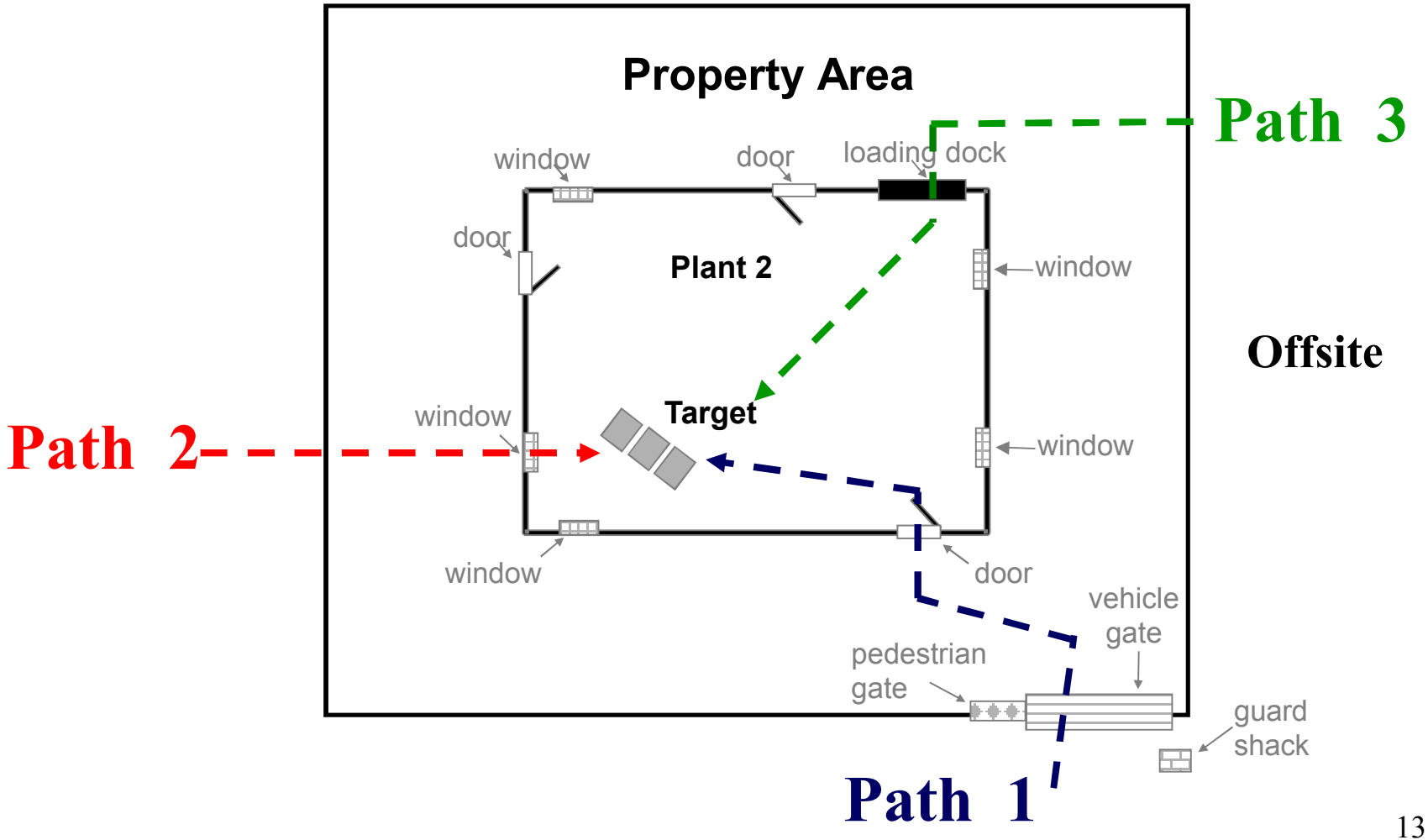
Prioritization

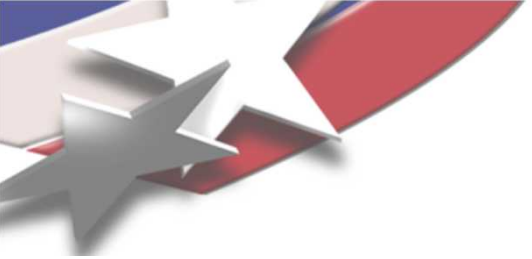
Consequence	Threat: Low	Threat: Med	Threat: High
High	Terrorist (sabotage)		Insider (theft)
Med		Insider (sabotage)	
Low	Vandal (graffiti)		Hacker (web deface)

System Effectiveness

- A measure of how effectively security system meets protection objective(s):
  - Physical attack: Prevent undesired event(s) with functions of detection, delay, response
  - Cyber attack: Preserve confidentiality, integrity, and availability of critical data with functions of authentication, authorization, audit

Physical Paths





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Physical Protection Functions

Detection

- Intrusion Sensing
- Alarm Communication
- Alarm Assessment
- Access Control
- Contraband Detection

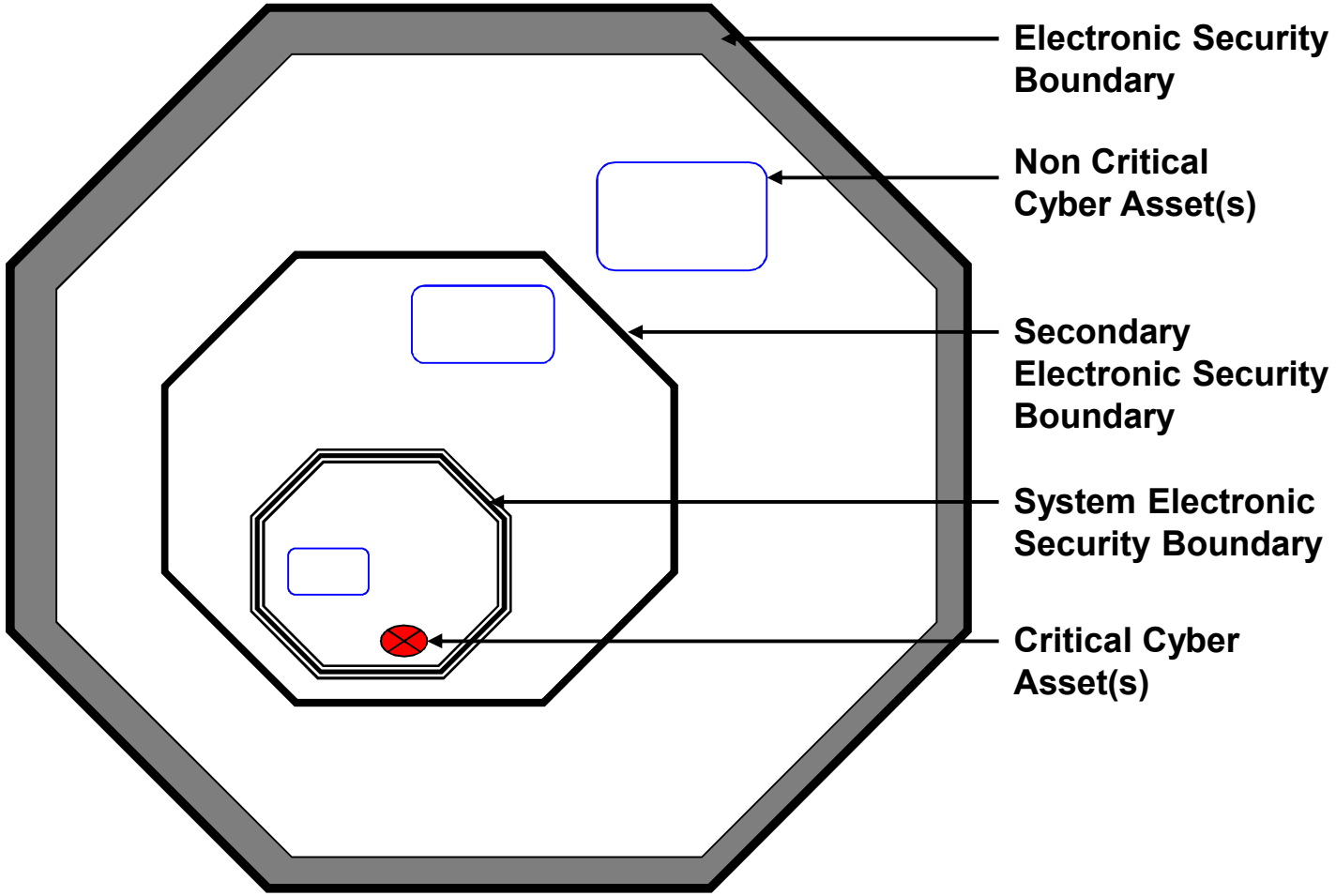
Delay

- Barriers
- Dispensable Barriers

Response

- Interruption:
  - Communication to Response Force
  - Deployment of Response Force
- Neutralization

Cyber Paths


Electronic Security Boundary
Non Critical Cyber Asset(s)
Secondary Electronic Security Boundary
System Electronic Security Boundary
Critical Cyber Asset(s)

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Cyber Protection Functions

Authentication

- Validity of identity;

  Something you know

  Something you have

  Something you are

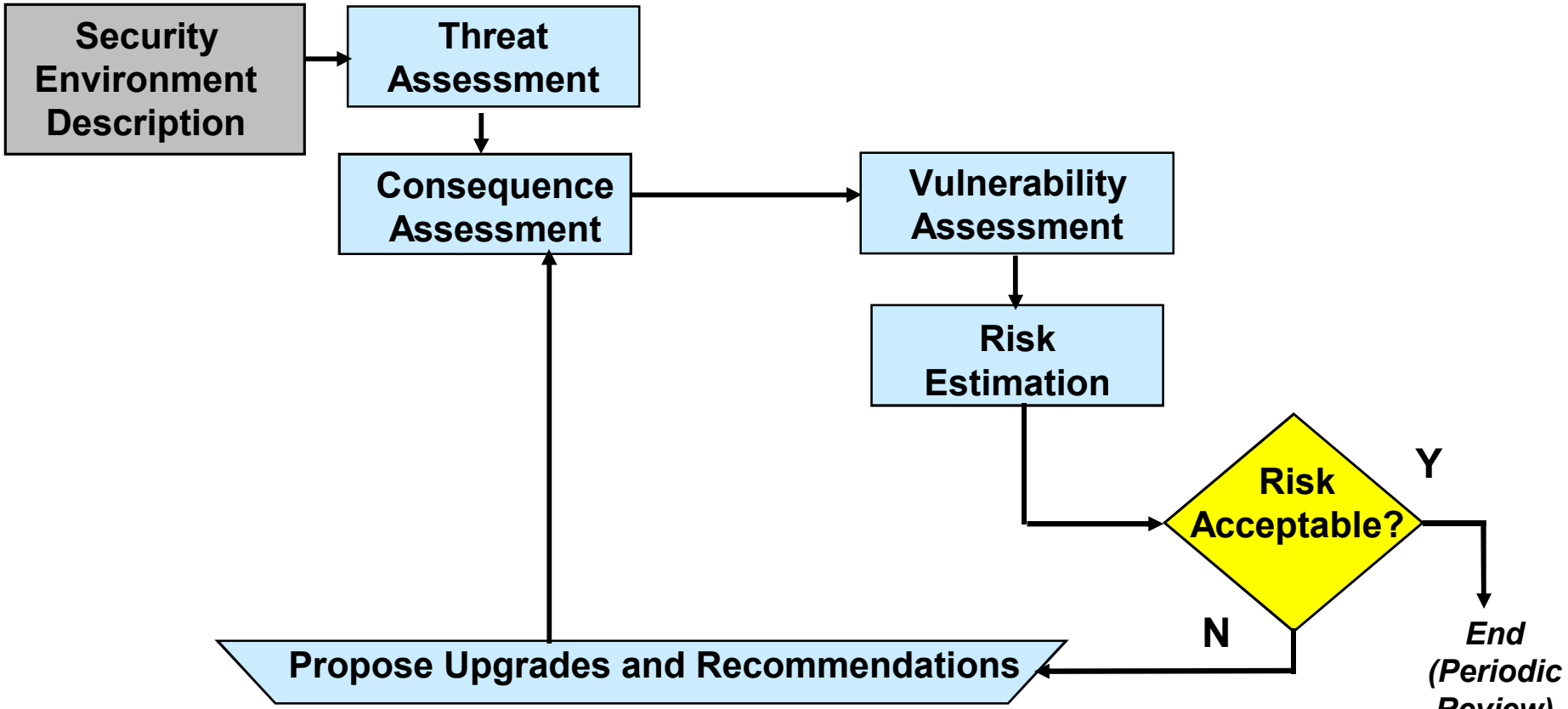
Authorization

- Control access to information, systems, and applications
- Only authorized users can access assets based on authenticated identity

Audit

- Record actions or attempted actions
- Intrusion detection system

Security Risk Assessment



Reducing Security Risk

- Reduce Threat level
  - Deterrence
  - Difficult to measure
- Reduce Vulnerability
  - Detection, Delay, Response
  - Authentication, Authorization, Audit
- Reduce Consequence level
  - Mitigation features
    - Redundant equipment
    - Function transfer
    - Structural hardening
  - Improve emergency response

Summary

- Security risk assessment provides valuable information for risk managers
  - Total system approach
  - Metrics
  - Addresses physical and cyber attacks
  - Defendable results: repeatable & traceable to original assumptions

- Method has been applied to dams, electric power transmission, chemical facilities, energy infrastructure, municipal water systems, prisons, & communities

Contact Information

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