

NUCLEAR ENERGY & GLOBAL SECURITY



T E C H N O L O G I E S

Physical Protection Systems Determining System Objectives

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Determine PPS System Objectives

- **Facility Characterization**
- **Target Identification**
- **Threat Definition**
- **Risk Management**



Facility Characterization

Investigate anything that impacts performance of the system

- **Physical conditions**
- **Facility operations**
- **Facility policies and procedures**
- **Regulatory requirements**
- **Safety considerations**
- **Legal issues**
- **Corporate goals and objectives**

*Note: This list is from: The Design and Evaluation of Physical Protection Systems
by Mary Lynn Garcia, Butterworth-Heinemann Publishers 2001*



Physical Conditions

- **Site boundaries, fencing, barriers, weather, and environment**
- **Buildings (construction materials for walls, ceilings and floors), rooms, and access points**
- **Heating, ventilation, air conditioning, communication paths and types, power distribution system, environmentally controlled areas, and locations of hazardous materials.**
- **Consult drawings and then “Walk-Down” the facility**



Facility Operations

- **Operational activities**
 - Products and processes
 - Operational hours
 - Number of employees
 - Visitors and vendors
 - Senior executive location
- **On-site location and movement of materials**
 - Shipping and receiving process
 - Tracking mechanisms
 - Material characteristics





Facility Policies and Procedures

- **Written policies and procedures**
 - Plant and corporate documents
- **Training policies and procedures**
- **Other written signs of corporate culture**
- **Unwritten policies and practices**



Other Factors

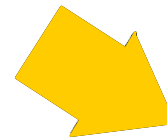
- **Safety regulations and requirements**
- **Security regulations and requirements**
- **Interaction between safety and security**
- **Legal issues, including:**
 - Security liability (provide reasonable security)
 - Failure to protect (negligence liability)
- **Corporate Goals and Objectives**
- **Political environment**
- **Surrounding community relations**
- **Facility and local law enforcement liaison**
- **Mutual aid agreements**
- **Local threat information**





Target Identification

Determine PPS
Protection Goals

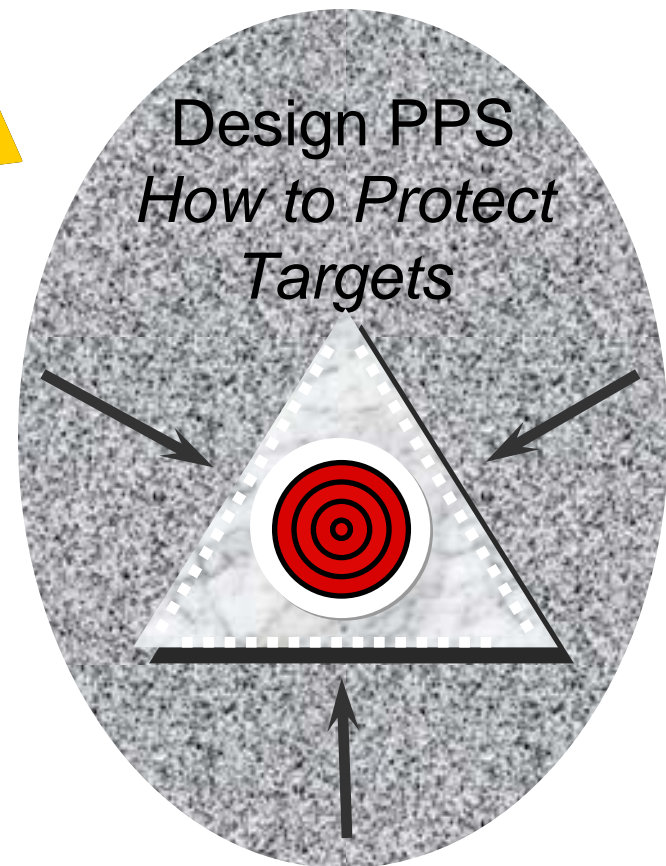


Based on:

- Facility Characterization

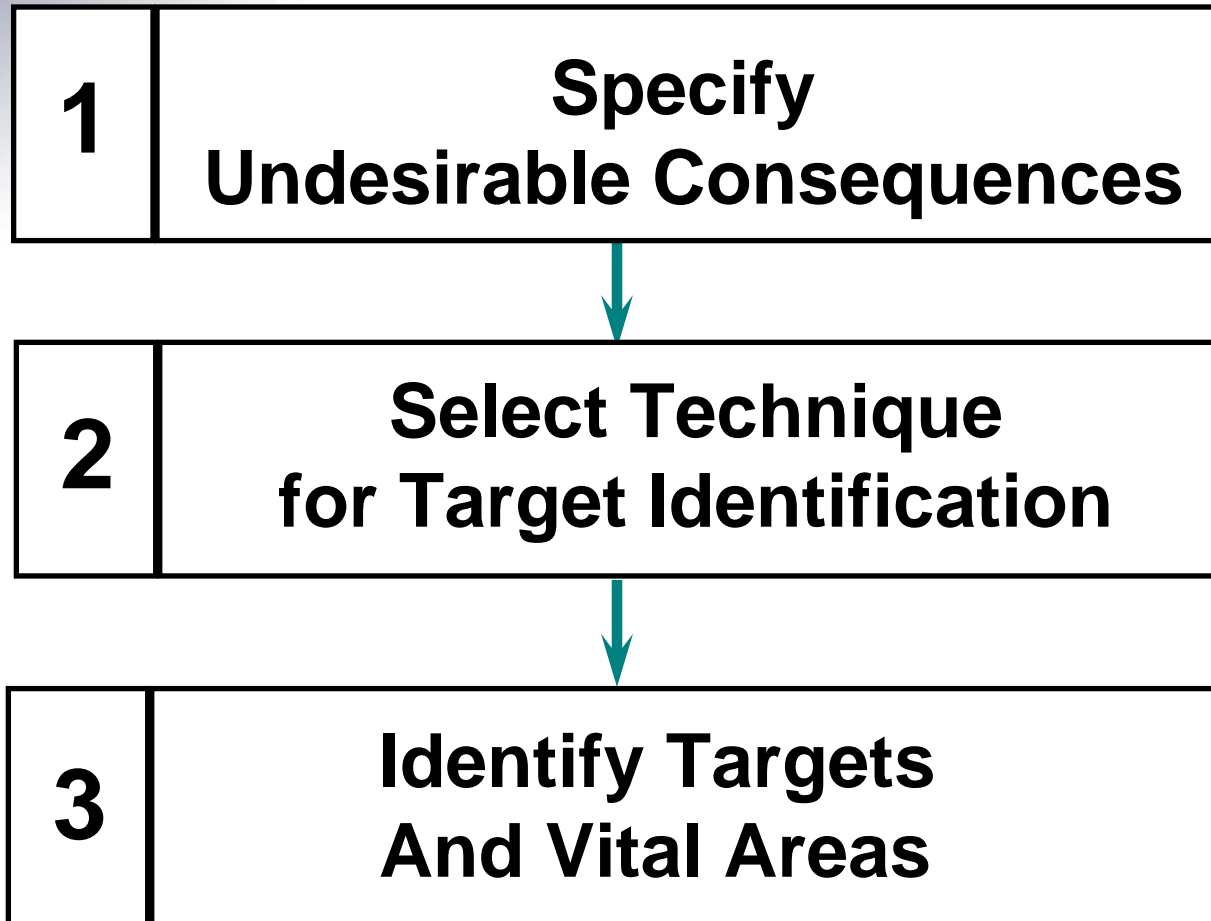
- Threat Definition

- Target Identification
What to Protect?





Steps in Target Identification





Undesirable Consequences

- **Industrial sabotage which would result in loss of production**
- **Industrial sabotage that would have significant repair costs**
- **Sabotage that would be politically embarrassing**
- **Death or injury of personnel**
- **Theft of sensitive information**



Techniques for Target Identification

- **Manual listing used for:**
 - Theft of localized items
 - Simple facilities
- **Logical identification used for:**
 - Sabotage of critical components



Protection Set

Sabotage

- **There may be multiple ways to attack the system and achieve the same end result or same undesirable consequence**
- **May have choices of targets or vital areas to protect**
- **Protection set should be minimum, yet complete**

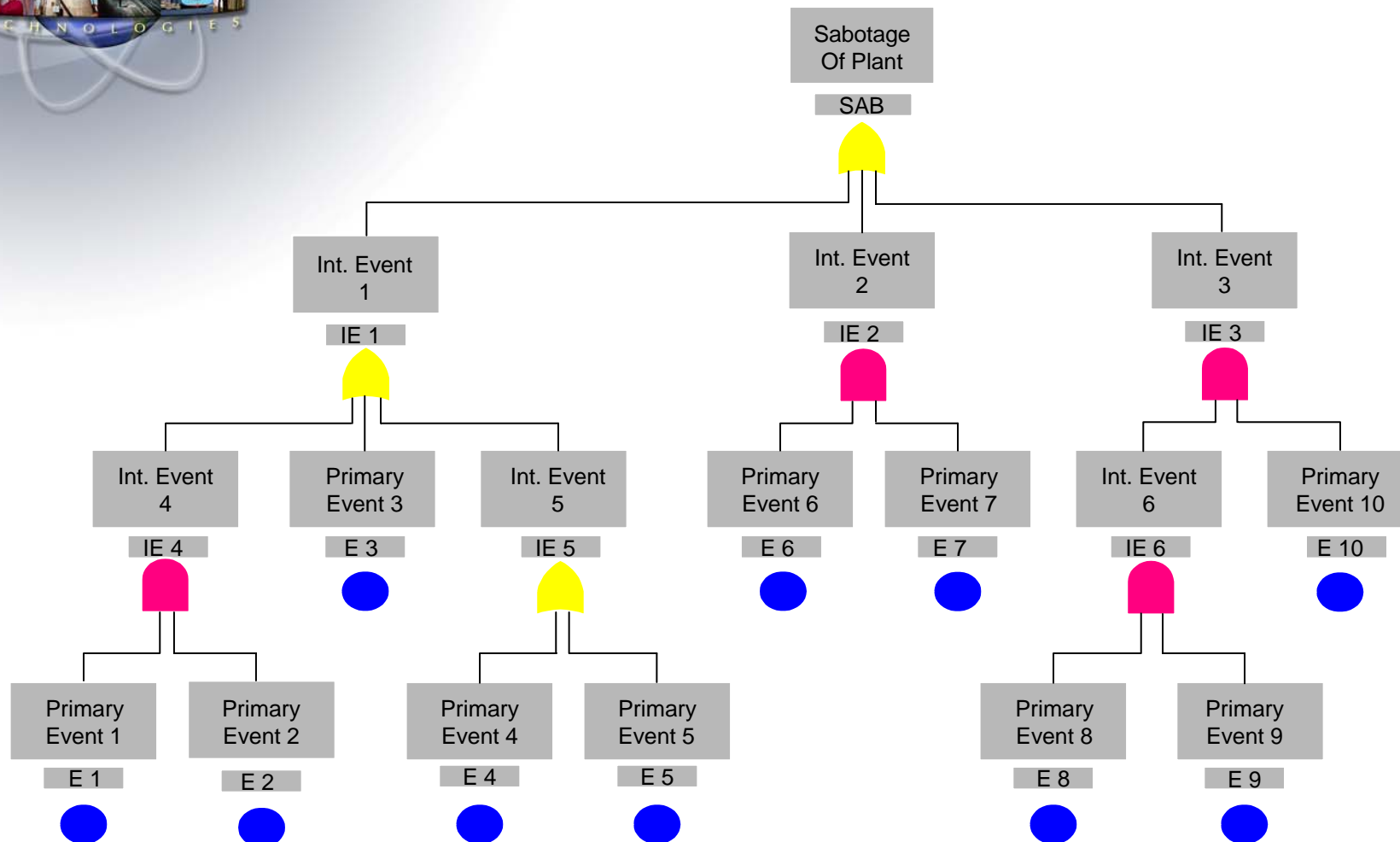


Description of Logic Diagram

- **A graphical representation of combinations of events that can result in a specified state or event**
- **Tool for identifying potential sabotage targets at complex facilities**
- **Identifies specific targets first, then can identify vital areas to protect**



Fault Tree Events

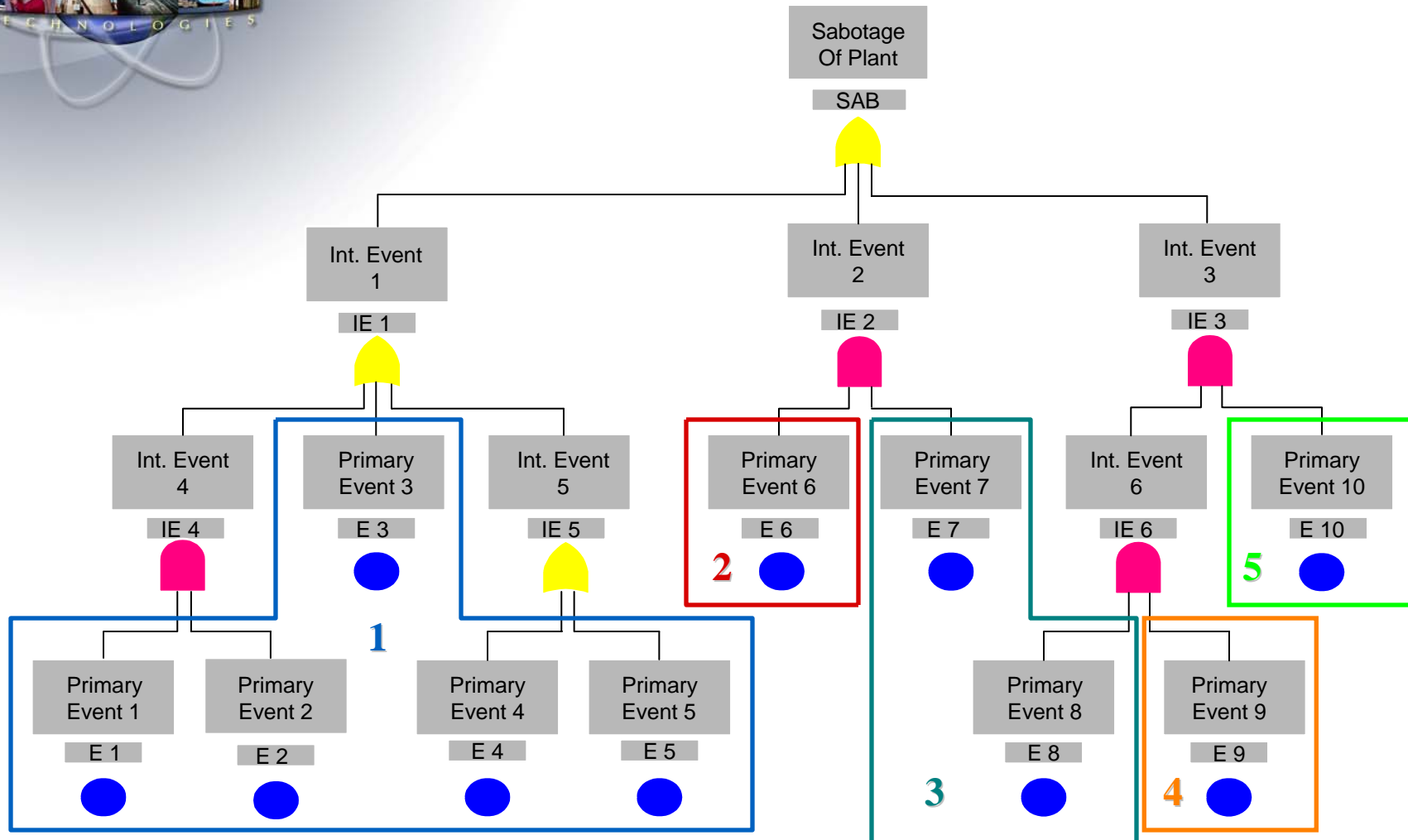


● - Primary Event (Starting Point)

■ ■ - AND Gate and OR Gate



Events and Corresponding Vital Areas





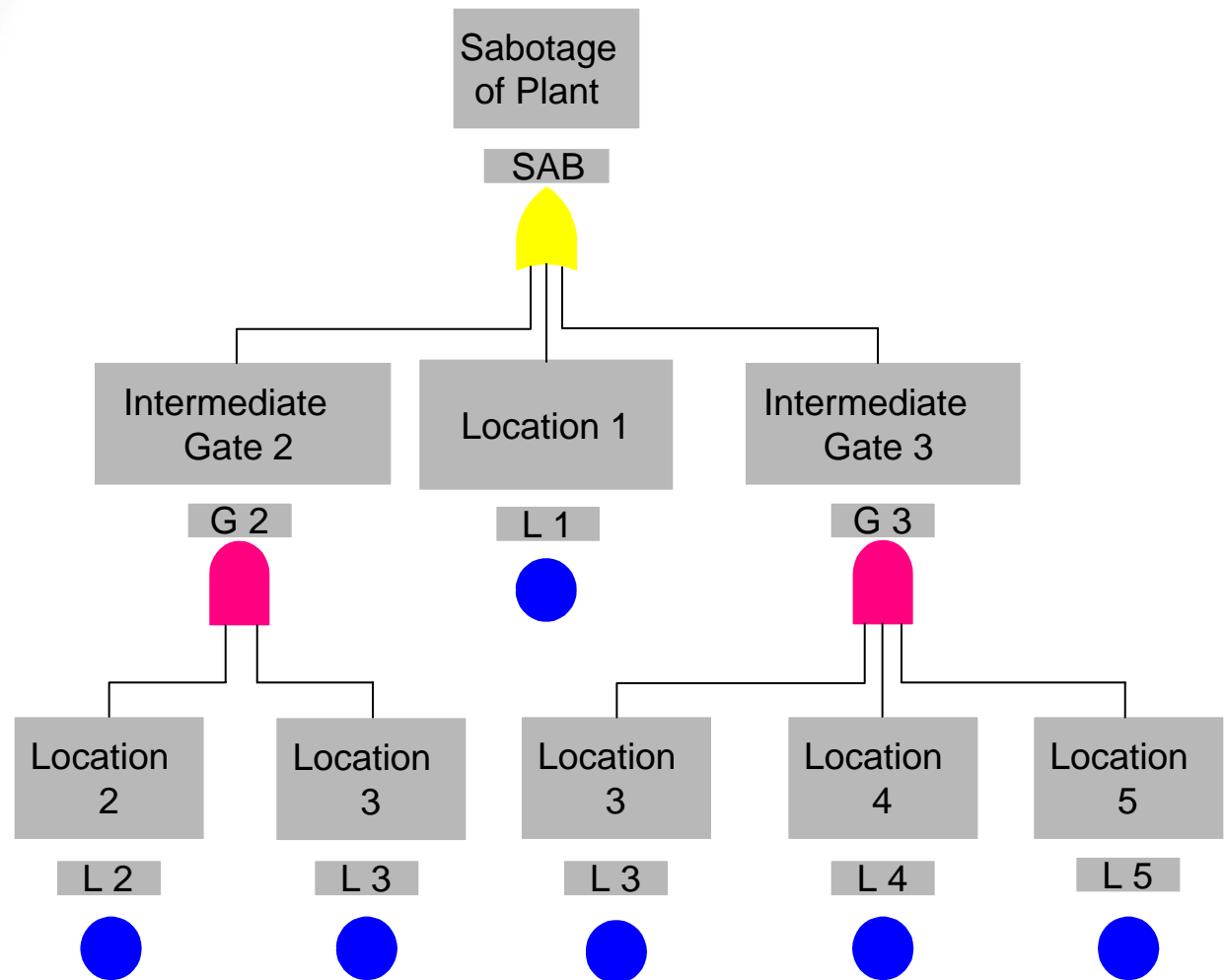
Location Tree

Locations where sabotage can occur

- 1) L1
- 2) L2 and L3
- 3) L3, L4, and L5

Protection sets

- 1) L1 and L3
- 2) L1, L2 and L4
- 3) L1, L2, and L5



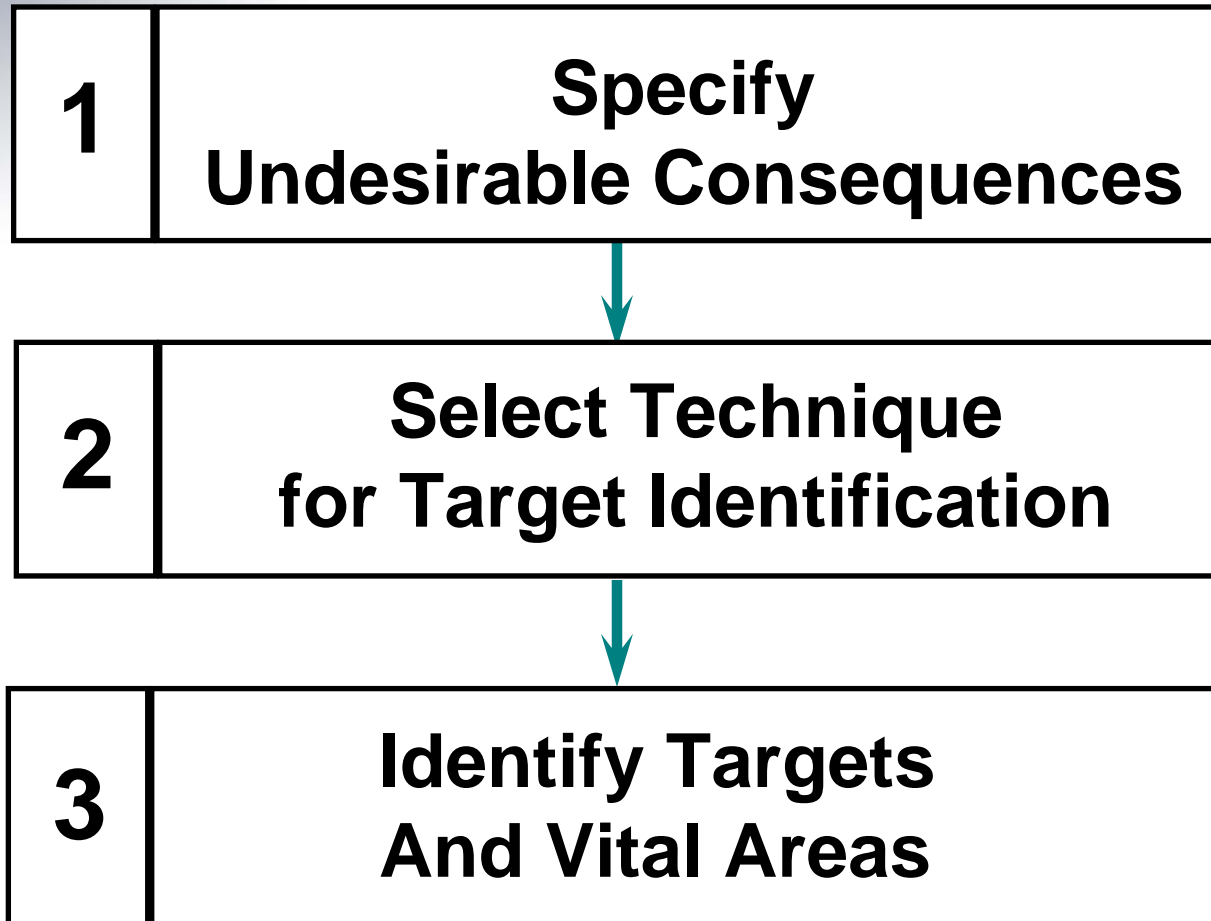


Vital Areas

- **Protection Sets are groupings of Vital Areas that, if protected, will prevent successful sabotage**
 - **L1 and L3**
 - **L1, L2 and L3**
 - **L1, L2 and L5**
- **In this exercise:**
 - **L1 must be protected**
 - **L3 or the grouping L2 and L5 must also be protected**
- **It makes no sense to protect both L2 and L3 (second bullet)**



Target Identification Summary





Threat Definition





Steps for Defining Threat

- **List information required**
- **Collect information**
- **Organize information**



Information Required to Define Threat

- **Type of Adversary**
- **Motivations**
- **Goals based on targets**
- **Tactics**
- **Numbers and capabilities**



Adversary Types

- **Outsiders**
 - Terrorists
 - Criminals
 - Nuclear Extremists
- **Insiders**
 - Disgruntled employees
 - Psychotics
 - Blackmailed or coerced employees
 - Criminals
- **Outsiders in collusion with insiders**



Motivations of Adversary

- **Ideological**
 - Political or philosophical opposition
- **Economic**
 - Desire for financial gain
- **Personal**
 - Desire for revenge
 - Mental instability
 - Under threat, coercion



Potential Goals of Adversary

- **Theft**
- **Sabotage**
- **Other**



Tactics Adversary Might Use

- **Force**
- **Stealth**
- **Deceit**



Capabilities of Outsider Adversary

- **Number of attackers**
- **Weapons, explosives**
- **Equipment, special tools**
- **Transportation, ground / air**
- **Technical experience**
- **Insider assistance (knowledge of site)**



Types of Insiders

- **Passive**
 - no overt acts, provide information
- **Active**
 - non-violent acts, active participation
 - violent acts, active violent participation



Insider Characteristics

- **All employees are a potential threat**
- **Authorized access**
- **System knowledge**
- **Routine opportunity**



Collect Threat Information

- **National and international sources**
 - Intelligence organizations
 - Literature search, crime studies, analysis
 - Professional organizations
- **Local sources**
 - Local police agencies
 - Local professional organizations
 - Industry
 - Security



Organize Threat Information

- **Compile and summarize collected threat information**
- **Rank adversaries in order of threat potential**
 - **Likelihood of occurrence**
 - **Consequence of event**



Features of Good Threat Policy

- **Established by appropriate entity with relevant information**
- **Periodic review and revision**
- **Local assessment supplements national policy**
- **Addresses inside and outsider potential**
- **Identifies numbers, motivation, goals, equipment, weapons, and transportation**



Threat Summary

- **Threat Assessment (DBT) is the basis for PPS design and analysis**
- **In some cases, national policy sets threat**
- **Methodology for threat definition includes:**
 - **Types of adversary information required**
 - **Sources of information**
 - **Tables to organize information for ranking threats**



Determine PPS Objectives

