

BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit V

Risk Assessment / Risk Management



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Unit Objectives

Explain what constitutes risk.

Provide a numerical rating for risk and justify the basis for the rating.

Evaluate risk using the Risk (Threat-Vulnerability) Matrix to capture assessment information.

Identify top risks for asset-threat/hazard pairs that should receive measures to mitigate vulnerabilities and reduce risk.



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Risk Management

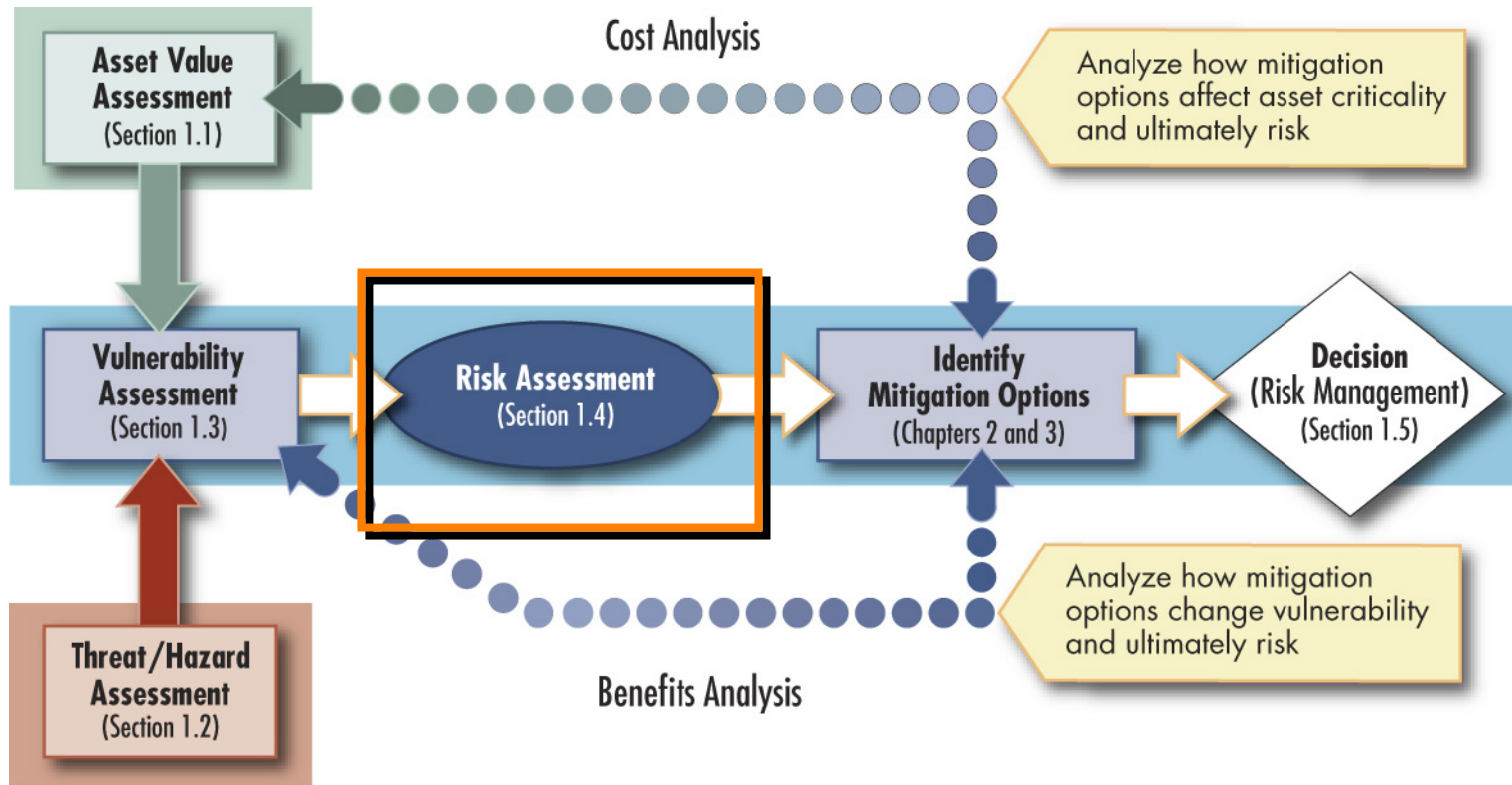
Risk management is the deliberate process of understanding “risk” – the likelihood that a threat will harm an asset with some severity of consequences – and deciding on and implementing actions to reduce it.

GAO/NSIAD-98-74: Combating Terrorism – Threat and Risk Assessments Can Help Prioritize and Target Program Investments, April 1998



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Assessment Flow Chart



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FEMA 426, Figure 1-3: The Assessment Process Model, p. 1-5

Definition of Risk

Risk is a combination of:

- The probability that an event will occur, and
- The consequences of its occurrence

| | Low Risk | Medium Risk | High Risk |
|--------------------|----------|-------------|-----------|
| Risk Factors Total | 1-60 | 61-175 | ≥ 176 |

Risk = Asset Value x Threat Rating x Vulnerability Rating



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FEMA 426, Table 1-19: Total Risk Color Code, p. 1-38

Quantifying Risk

Risk Assessment

Determine Asset Value

Determine Threat Rating Value

Determine Vulnerability Rating Value

Determine relative risk for each threat against each asset

Select mitigation measures that have the greatest benefit/cost for reducing risk



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An Approach to Quantifying Risk

Table 1-18: Risk Factors Definitions

Risk = Asset Value x
Threat Rating x
Vulnerability Rating

| | |
|--------------------|-----|
| Very High | 10 |
| High | 8-9 |
| Medium High | 7 |
| Medium | 5-6 |
| Medium Low | 4 |
| Low | 2-3 |
| Very Low | 1 |

Table 1-19: Total Risk Color Code

| | Low Risk | Medium Risk | High Risk |
|---------------------------|-----------------|--------------------|------------------|
| Risk Factors Total | 1-60 | 61-175 | ≥ 176 |



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FEMA 426, p. 1-38

Critical Functions

| Function | Cyber attack | Armed attack (single gunman) | Vehicle bomb | CBR attack |
|-----------------------|--------------|------------------------------|--------------|------------|
| Administration | 280 | 140 | 135 | 90 |
| Asset Value | 5 | 5 | 5 | 5 |
| Threat Rating | 8 | 4 | 3 | 2 |
| Vulnerability Rating | 7 | 7 | 9 | 9 |
| Engineering | 128 | 160 | 384 | 144 |
| Asset Value | 8 | 8 | 8 | 8 |
| Threat Rating | 8 | 5 | 6 | 2 |
| Vulnerability Rating | 2 | 4 | 8 | 9 |



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FEMA 426, Adaptation of Table 1-20: Site Functional Pre-Assessment Screening Matrix, p. 1-38

Critical Infrastructure

| Infrastructure | Cyber attack | Armed attack (single gunman) | Vehicle bomb | CBR attack |
|---------------------------|--------------|------------------------------|--------------|------------|
| Site | 48 | 80 | 108 | 72 |
| Asset Value | 4 | 4 | 4 | 4 |
| Threat Rating | 4 | 4 | 3 | 2 |
| Vulnerability Rating | 3 | 5 | 9 | 9 |
| Structural Systems | 48 | 128 | 192 | 144 |
| Asset Value | 8 | 8 | 8 | 8 |
| Threat Rating | 3 | 4 | 3 | 2 |
| Vulnerability Rating | 2 | 4 | 8 | 9 |



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FEMA 426, Adaptation of Table 1-21: Site Infrastructure Systems Pre-Assessment Screening Matrix, p. 1-39

Risk Assessment Results

| Function | Cyber Attack | Armed Attack (single gunman) | Vehicle Bomb | CBR Attack |
|-----------------------|--------------|------------------------------|--------------|------------|
| Administration | 280 | 140 | 135 | 90 |
| Asset Value | 5 | 5 | 5 | 5 |
| Threat Rating | 8 | 4 | 3 | 2 |
| Vulnerability Rating | 7 | 7 | 9 | 9 |
| Engineering | 128 | 128 | 192 | 144 |
| Asset Value | 8 | 8 | 8 | 8 |
| Threat Rating | 8 | 4 | 3 | 2 |
| Vulnerability Rating | 2 | 4 | 8 | 9 |
| Warehousing | 96 | 36 | 81 | 54 |
| Asset Value | 3 | 3 | 3 | 3 |
| Threat Rating | 8 | 4 | 3 | 2 |
| Vulnerability Rating | 4 | 3 | 9 | 9 |
| Data Center | 360 | 128 | 216 | 144 |
| Asset Value | 8 | 8 | 8 | 8 |
| Threat Rating | 9 | 4 | 3 | 2 |
| Vulnerability Rating | 5 | 4 | 9 | 9 |
| Food Service | 2 | 32 | 48 | 36 |
| Asset Value | 2 | 2 | 2 | 2 |
| Threat Rating | 1 | 4 | 3 | 2 |
| Vulnerability Rating | 1 | 4 | 8 | 9 |
| Security | 280 | 140 | 168 | 126 |
| Asset Value | 7 | 7 | 7 | 7 |
| Threat Rating | 8 | 4 | 3 | 2 |
| Vulnerability Rating | 5 | 5 | 8 | 9 |
| Housekeeping | 16 | 64 | 48 | 36 |
| Asset Value | 2 | 2 | 2 | 2 |
| Threat Rating | 8 | 4 | 3 | 2 |
| Vulnerability Rating | 1 | 8 | 8 | 9 |
| Day Care | 54 | 324 | 243 | 162 |
| Asset Value | 9 | 9 | 9 | 9 |
| Threat Rating | 3 | 4 | 3 | 2 |
| Vulnerability Rating | 2 | 9 | 9 | 9 |

* NOTIONAL DATA INSERTED FOR DEMONSTRATION PURPOSES.



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FEMA 426, Table 1-20: Site Functional Pre-Assessment Screening Matrix, p. 1-38

BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit V-C-10

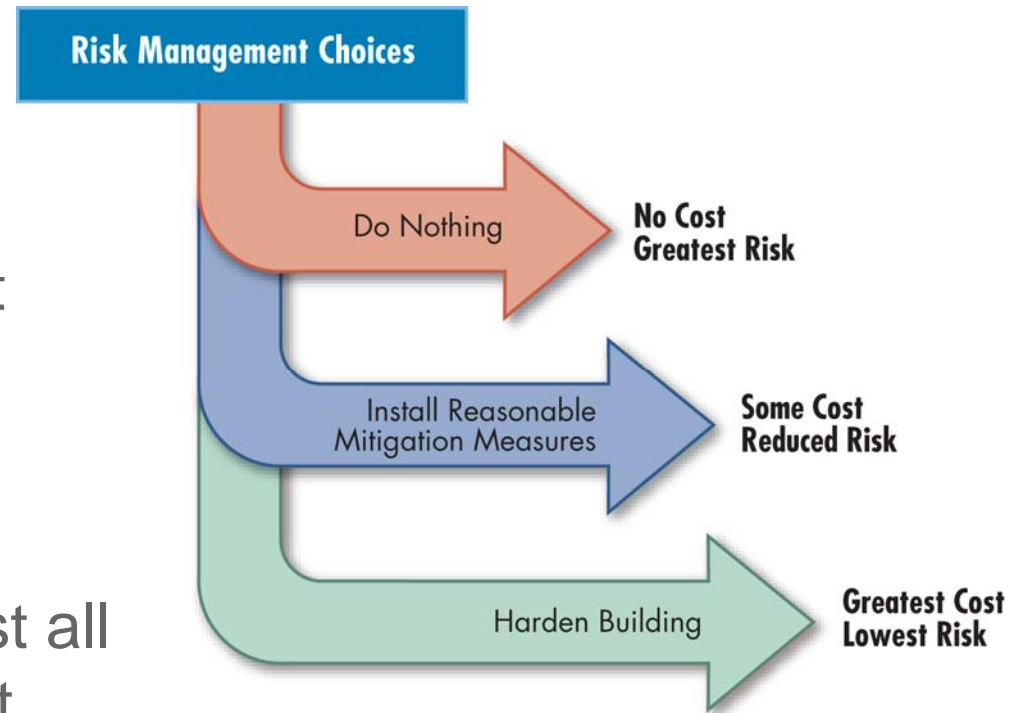
Selecting Mitigation Measures

Three Options:

Do nothing and accept the risk.

Perform a risk assessment and manage the risk by installing reasonable mitigation measures.

Harden the building against all threats to achieve the least amount of risk.



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FEMA 426, Figure 1-13: Risk Management Choices, p. 1-44

Mitigation Measures

A mitigation measure is an action, device, or system used to reduce risk by affecting an asset, threat, or vulnerability.

- **Regulatory measures**
- **Rehabilitation of existing structures**
- **Protective and control structures**



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Mitigation Measures

- **Mitigation measures can be evaluated against the following parameters**

- **Political Support**
- **Community Acceptance**
- **Cost and Benefit**
- **Financial Resources**
- **Legal Authority**
- **Adversely Affected Population**
- **Adverse Effects on Built Environment**
- **Environmental Impact**
- **Technical Capacity**
- **Maintenance and Operations**
- **Ease and Speed of Implementation**
- **Timeframe and Urgency**
- **Short-term and Long-Term Solutions**
- **Estimated Cost**



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Achieving Building Security: Planning Factors

Building security integrates multiple concepts and practices.

Objective is to achieve a balanced approach that combines aesthetics, enhanced security, and use of non-structural measures.



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Process Review

Calculate the relative risk for each threat against each asset

Identify the high risk areas

Identify Mitigation Options to reduce risk



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Summary

Risk Definition

Critical Functions and Critical Infrastructure
Matrices

Numerical and color-coded risk scale

Identify Mitigation Options



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Unit V Case Study Activity

Risk Rating

Background

Formula for determining a numeric value risk for each asset-threat/hazard pair:

$$\text{Risk} = \text{Asset Value} \times \text{Threat Rating} \times \text{Vulnerability Rating}$$

Requirements: Vulnerability Rating Approach

Use worksheet tables / Risk Matrix poster to summarize Case Study asset, threat, and vulnerability ratings determined in previous activities

Use the risk formula to determine the risk rating for each asset-threat/hazard pair for:

- Critical Functions
- Critical Infrastructure



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