Unit V
Risk Assessment / Risk Management

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Unit Objectives

Explain what constitutes risk.

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

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

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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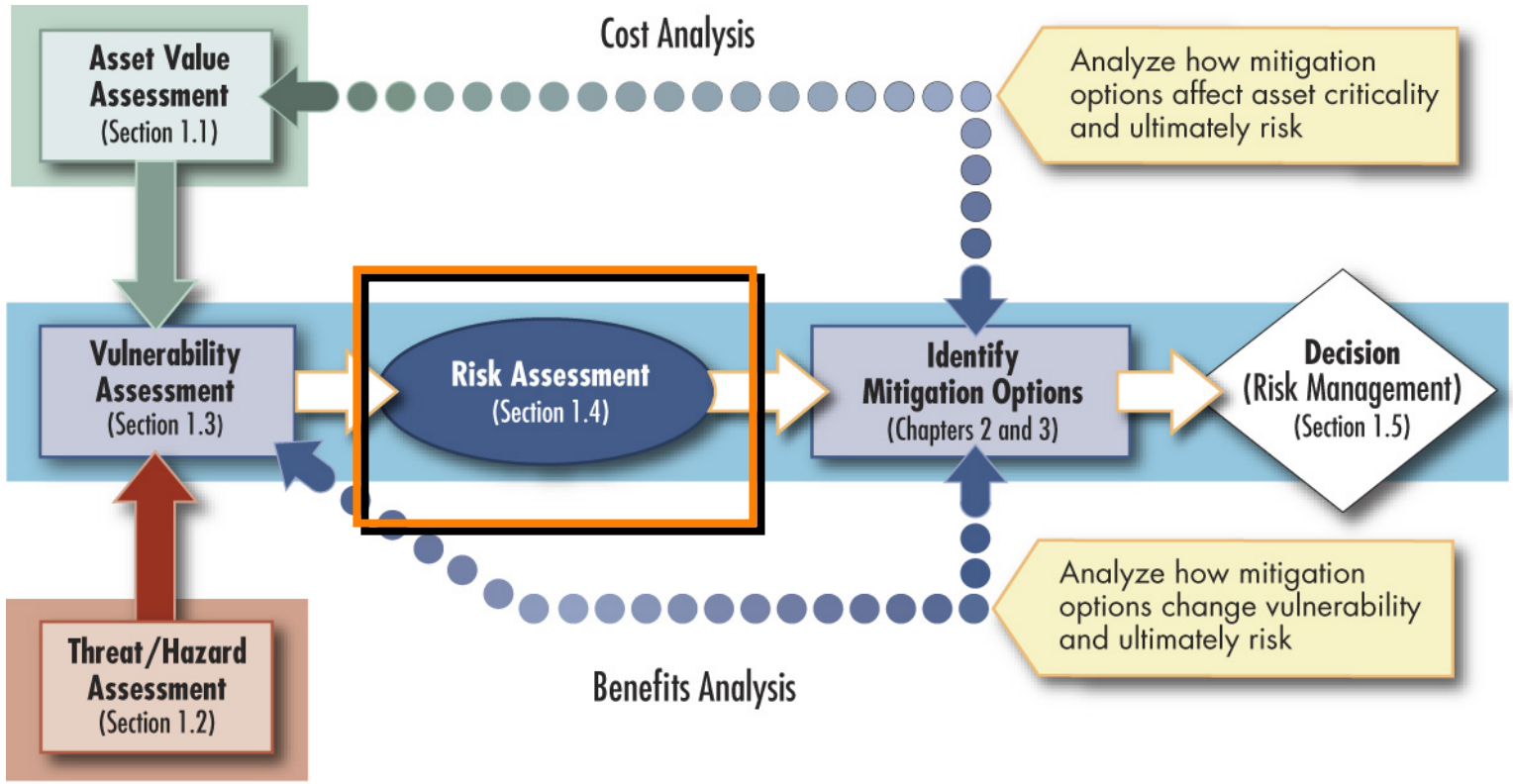
Assessment Flow Chart



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

Risk = Asset Value x Threat Rating x Vulnerability Rating

Table 1-18: Risk Factors Definitions

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

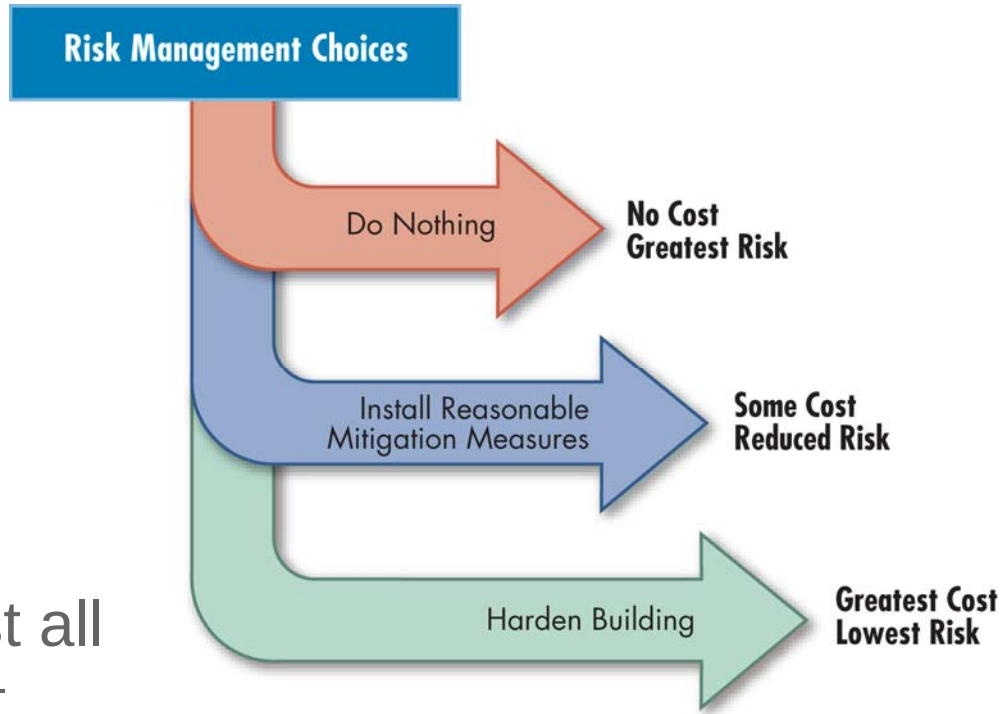
Selecting Mitigation Measures

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**
- **Adversely Effects on the Built Env.**
- **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.

Process Review

Calculate the relative risk for each threat against each asset

Identify the high risk areas

Identify Mitigation Options to reduce the risk

Summary

Risk Definition

Critical Function and Critical Infrastructure Matrices

Numerical and color-coded risk scale

Identify Mitigation Options

Unit V Case Study Activity

Risk Rating

Background

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

Risk = Asset Value x Threat Rating x Vulnerability Rating

Requirements: Vulnerability Rating Approach

Use worksheet tables to summarize Case Study asset, threat, and vulnerability ratings conducted in the 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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