



NATIONAL HIGHWAY INSTITUTE

# Risk Management

National Transportation in Indian Country

Duluth Minnesota

September 17 - 20, 2018

# Welcome



# Kevin Chesnik Bio

- Education: Bachelor degrees from the University of Wisconsin-Madison: Bachelor of Science degree in Civil Engineering and Construction Administration.
- 36 years of transportation and civil engineering experience in the public and private sectors. Past WisDOT Chief Eng.
- AICCW (American Indian Chamber of Commerce) Board member.

# What Groups are in the Audience?

- State your name and organization or unit
- State your expectations for this Presentation
- Identify risks you may encounter getting home safely and on time today



# Why Address Risk?

There are known knowns; there are things we know that we know.

There are known unknowns; that is to say, there are things that we now know we don't know.

But there are also unknown unknowns—there are things we do not know we don't know.

*Donald Rumsfeld Former United States Secretary of Defense*

# Presentation Objectives

- Recognize the connection between effective risk management and achieving objectives
- Follow the steps of the risk management process to identify and develop risk response strategies
- Apply the risk management process to one's own level of decision-making within an organization



# RISK MANAGEMENT CONCEPTS

# Learning Outcomes

- Define risk
- Explain the need for risk management
- Describe different levels of the organization at which risk management can be applied
- Describe the risk management process steps

# The Definition of Risk

The effect of uncertainty on objectives

Effect	Uncertainty	Objectives
<b>Positive</b> <i>or</i> <b>Negative</b>	<b>Always</b> in the future  May or may <i>not</i> happen	<b>Know</b> what you are trying to achieve  <b>Apply</b> to organization, program, or project

# Why Manage Risks?

## Consider these 2 examples

- Seismic Vulnerability Of Highway Bridges
- Geotechnical Investigation

# Seismic Vulnerability Of Highway Bridges

- When to perform earthquake bridge retrofit
- What level of retrofit to perform



# Geotechnical Investigation

- Boundary modification to construction site
- Decision to perform investigation or not



# Why Manage Risks?

- Protect public safety
- Protect public value
- Achieve public objectives
- Comply with regulations
- Increase public trust
- Identify opportunities
- Improve decision making

# Where Does Risk Management Fit?



# Levels of Risk Management



Threats or opportunities to the organization's strategic goals or that involves multiple levels  
**Responsibility: Senior executives, policy makers**



Common to groups of projects that achieve strategic goals  
**Responsibility: Program managers**



Specific to individual projects  
**Responsibility: Project managers**



Specific to ongoing functions that support programs or projects  
**Responsibility: Activity managers**

# Exercise: Level of Risk Management and Responsible Party

- Revenues exceed projections
- Change in elected officials or administration affecting agency priorities
- Missing material certification
- Construction crew unfamiliar with new technique or equipment
- Changed site conditions
- Change in funding eligibility or match

# Risk Management Process

Communicate and Consult with Stakeholders

## Risk Assessment

Identify  
Risk  
Context

Identify  
the Risks

Analyze  
the Risks

Evaluate  
and  
Prioritize  
the Risks

Respond  
to the  
Risks

Monitor, Review, and Adjust

# Summary

- Defined risk as: The effect of uncertainty on objectives
- Reviewed reasons or the need to manage risk
- Identified how risk management can be applied at different organization levels
- Described the risk management process steps



# RISK MANAGEMENT PROCESS

# COMMUNICATE AND CONSULT

Communicate and Consult with Stakeholders

## Risk Assessment

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# Learning Outcome

- Develop plans to communicate and consult with stakeholders throughout the risk management process

# Key Questions

**Who needs to be involved?**

**How will we communicate and consult with them?**

Meetings,  
verbal or  
written reports,  
surveys, teams,  
leadership  
activities

**Communicate and Consult**

# Exercise: Communicate and Consult

- What methods?
- How often?
- Who is included?



# Summary

- Developed plans to communicate and consult with stakeholders throughout the risk management process

## Lesson 2.2

# DEFINE OBJECTIVES AND IDENTIFY CONTEXT

Communicate and Consult with Stakeholders

### Risk Assessment

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# Learning Outcomes

- Identify and document an objective
- Identify internal and external environment
- Identify potential categories of risk
- Identify appropriate stakeholders to assist with establishing risk context

# Key Questions

What are the things to consider when we assess them?

What criteria will we use to assess our risks?

Who will do the assessment?

What program or other objective areas will we assess?

An understanding of the risk context and the objectives against which risk will be managed

What are the existing controls? How are they working? How do you know?

## Context and Objectives

# Identify Objective



**What are we  
assessing  
for risk?**

**or**

**Risk to  
what?**

# Objective Format

Direction or accomplishment

**verb + object (+ adjective)**

- Increase the percent of population with access to 511
- Minimize the potential for fraud, waste, and abuse
- Reduce obligations in inactive projects

# Objective Examples

- Minnesota's multimodal transportation system enhances the health of people, the environment, and the economy
- Provide a world-class transportation experience that delights our customers and promotes a prosperous Missouri
- Preserve, maintain, and operate the transportation system in a cost effective and environmentally responsible manner

# Objective Examples

- Maintain structures assets on the NHS in a state of good repair
- Implement an Asset Management Program and integrate it with Planning and Programming
- Provide stewardship and oversight of a highway program
- Replace bridge on NS3090 over Finn creek 4.0 miles east and 0.4 miles south of Criner

# Establish Context

- **Internal Environment:** anything within the organization that influences the way in which the agency will manage risk
- **External Environment:** key drivers and trends that impact objectives of the organization, relationships with, perceptions and values of external stakeholders

# Establish Context

- **Risk Management Governance**
  - Who will own
  - Who will assess
  - What procedures will be used
  - What criteria will be applied

# Risk Category Examples

**Health and  
Safety**

**Operational**

**Economic**

**Political**

**Regulatory**

**Information**

**Natural  
Environment**

**Fraud or  
Malfeasance**

**Litigation**

# Establish Context

- Internal environment
- External environment



**Seismic Vulnerability**



**Geotechnical Investigation**

# Risk Register

Use a risk register to help organize identified risks:

- Because risk events can have multiple impacts, document the risks by event and effect
- List all risks identified within each project, program, or organization

# Summary

- Established an objective based on what you are trying to accomplish
- Identified internal and external environment
- Explored some categories of potential risks
- Remember to review communication practices for working with stakeholders to establish context

## Lesson 2.3

# IDENTIFY RISKS

Communicate and Consult with Stakeholders

### Risk Assessment

Identify  
Risk  
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Identify  
the Risks

Analyze  
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Evaluate  
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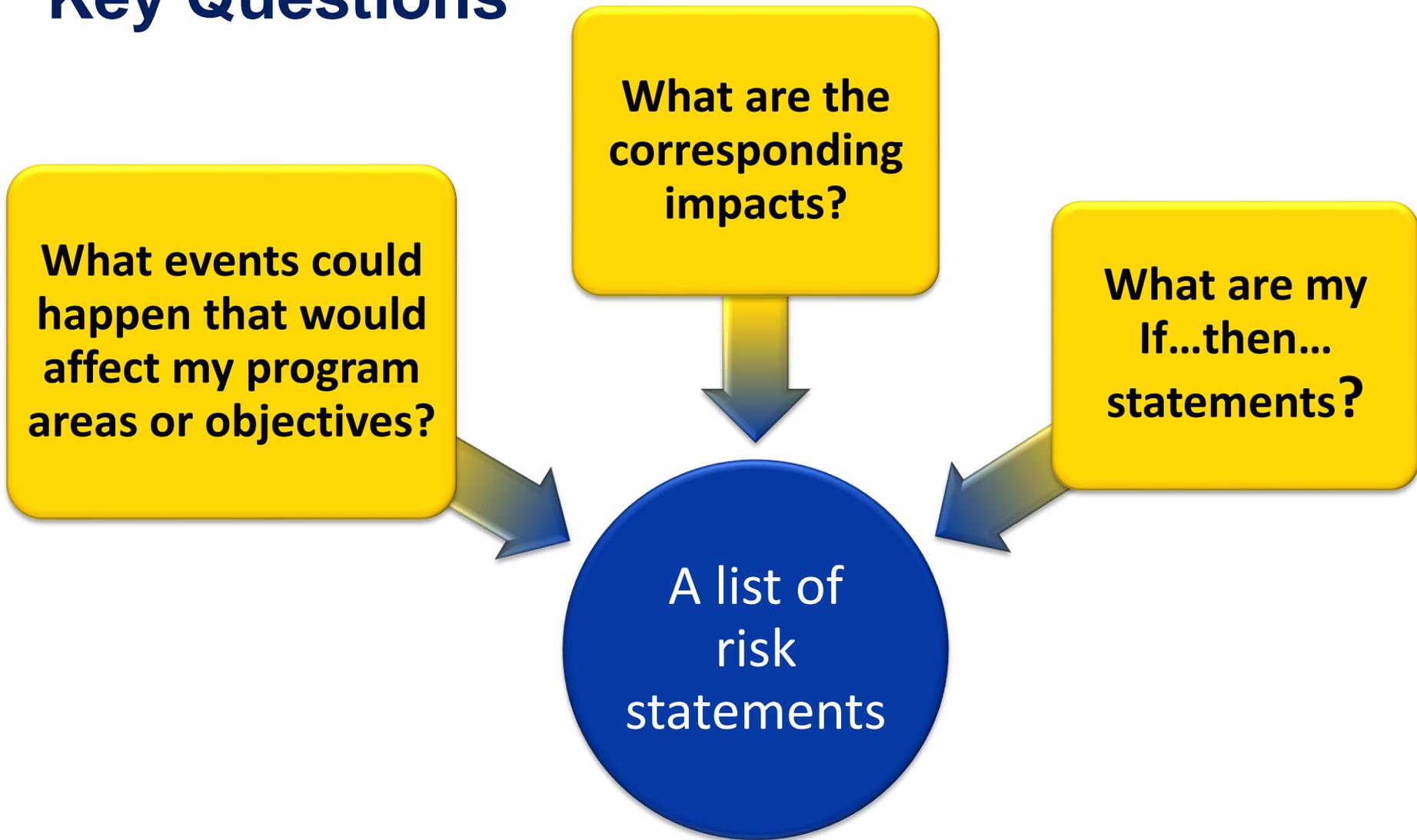
Respond  
to the  
Risks

Monitor, Review, and Adjust

# Learning Outcomes

- Differentiate between risk identification tools and select an appropriate tool
- Perform initial risk identification
- Write an effective risk statement
- Use risk register to communicate identified risks to stakeholders

# Key Questions

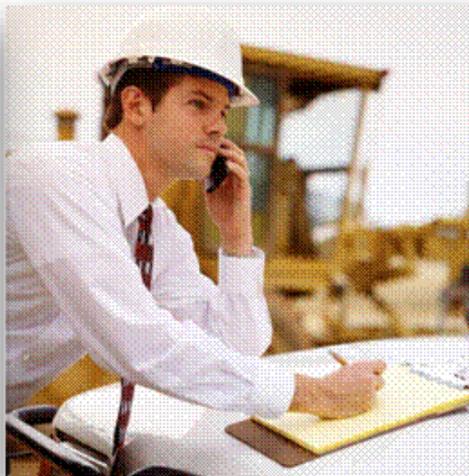


## Identify Risks

# Objective: To travel by train from A to B for a meeting at a certain time

- ✘ Failure to get from A to B on time for the meeting
- ✔ Missing the train causes me to be late and miss the meeting
- ✘ Being late and missing the meeting
- ✘ There is no buffet on the train so I get hungry
- ✔ Severe weather prevents the train from running and me from getting to the meeting

# Who Needs to be Involved?



# Tools and Techniques

- Brainstorming
- SWOT analysis
- Delphi technique
- Expert interviews
- Checklists
- Assumption analysis
- Crawford slip
- Affinity diagram



# Risk Identification Guidelines

- Identify as many risk events as possible, given the time you have
- Make each risk event specific and fully defined
- Use your team
- Use known risks
- Use historic information
- Use context
- Do not analyze risk events yet

# Risk Statements

- Consist of a defined event and its impact
- Represent **one** risk event
- Necessary for the next step of analyzing likelihood and impact
- Aids in response strategy to address the event or impact

# How to Write a Risk Statement

**If {risk event} happens,**

**then {resulting impact or  
consequences}**

# Case Example Risk Statement

**If** differing site conditions require extra work,  
**then** our costs can increase causing the  
project to go over budget.

# Risk Statement Examples

- If documentation does not exist to support project payments, then improper payments could be made.
- If non-conforming material is built into the project, then the asset may fail earlier than expected.
- If the public involvement activities miss key stakeholders, then the plans could be unacceptable to some groups resulting in litigation, delay or loss of funding.
- If disruptive vehicle technologies decrease congestion, we may have unneeded capacity in the network.

# Communicate and Consult

- Use risk register to communicate identified risks to stakeholders
- Consult with agency and stakeholders



# Summary

- Reviewed how to identify risks: systematic process of consistent discovery and detection of potential risk events
- Explored appropriate tools to identify risks
- Worked on defining each risk event
- Developed good risk statements including the specific event and the impact
- Discussed use of risk register to communicate to stakeholders

## Lesson 2.4

# ANALYZE RISKS

Communicate and Consult with Stakeholders

### Risk Assessment

Identify  
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Identify  
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Analyze  
the Risks

Evaluate  
and  
Prioritize  
the Risks

Respond  
to the  
Risks

Monitor, Review, and Adjust

# Learning Outcomes

- Determine the likelihood and impact of risk events
- Differentiate between qualitative and quantitative methods and tools for analyzing risk
- Compare risk assessment tools
- Explain the need to consult with stakeholders to assess likelihood and impact of risk events

# Key Questions

**What is the likelihood that this risk event will occur?**

**What is the severity of this impact according to my criteria?**

**A risk register with risk events, likelihood of occurrence, and impact levels**

## Analyze Risks

# Risk Analysis

- Identify most appropriate tool for analysis
- Perform **qualitative** or quantitative analysis
  - Determine likelihood of occurrence
  - Determine impact

## Likelihood

The chance of something happening

- Falls between 0% and 100%

## Impact

To project, program, or enterprise objectives such as

- Freight movement
- Reduction of fatality rate
- Bridge condition

# Likelihood of Weather Event

Level	Descriptor	Likelihood of Occurrence	Risk
1	Unlikely	Very low	Tornado
2	Possible	Low	Flooding
3	Likely	Moderate	Thunderstorm
4	Almost Certain	High	Rainstorm

# Impact Risk Ranking of Weather Event to Assets

Level	Impact	Risk
1	Insignificant	Assets receive minimal damage or are only temporarily unavailable or restricted.
2	Minor	A number of assets are unusable or restricted but can be replaced within an acceptable timeframe.
3	Moderate	Some assets, not including, significant or critical assets, are unusable or restricted for weeks.
4	Major	Non-critical infrastructure assets are destroyed. Significant or critical infrastructure assets are unusable or restricted for weeks.
5	Catastrophic	Significant or critical infrastructure assets are destroyed. Significant or critical infrastructure assets are unusable for months.

## Qualitative

- Subjective evaluation of likelihood and impact
- Quick and easy to perform
- Dependent on expert input

## Quantitative

- Probabilistic estimates of time and cost
- Time consuming
- Dependent on quality data availability

# Guidelines for Risk Analysis

- Consider the time horizon
- Evaluate the quality of available information
- Watch the trends
- Use past data and projects

# Guidelines for Risk Analysis

(continued)

- Develop a consistent scale for likelihood and impact
- Use information obtained from various models to predict future performance or condition
- Consult experts to assess each risk

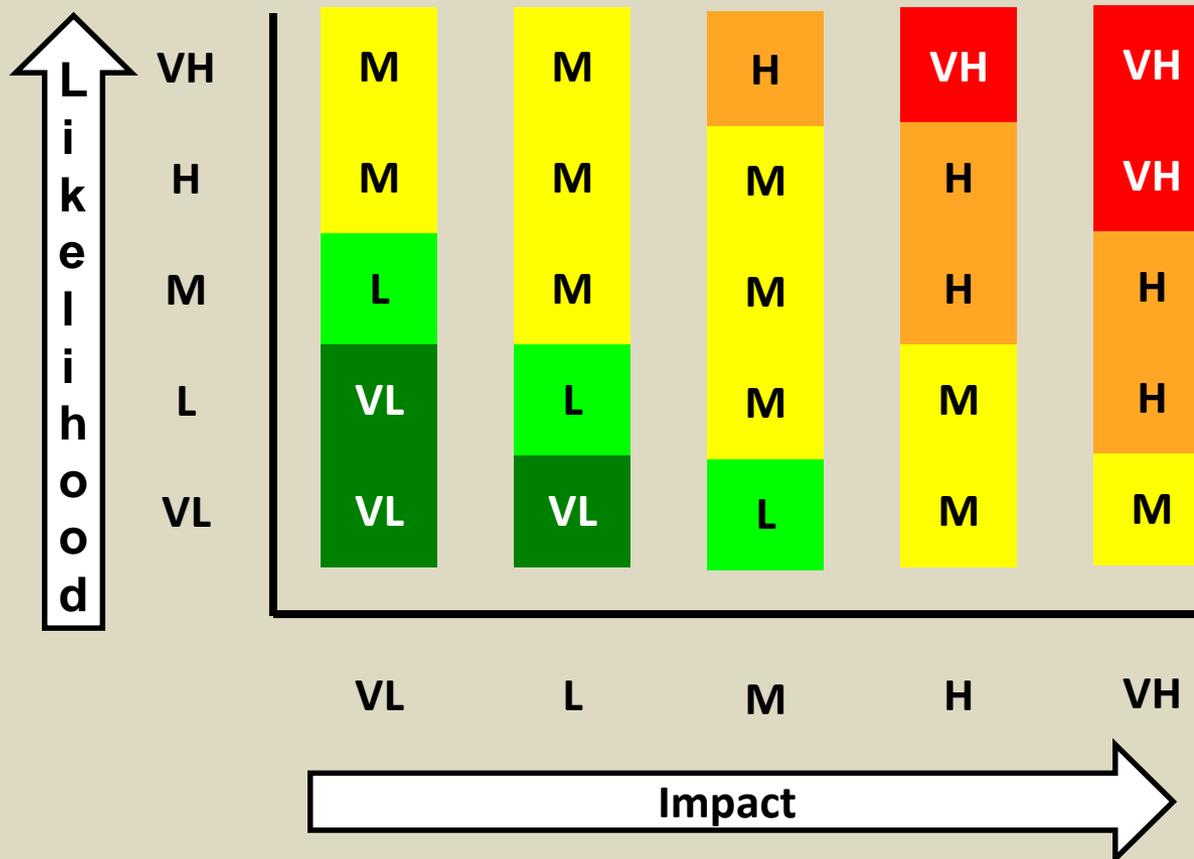
# Risk Assessment Tools

- Heat map
- Qualitative risk rating matrix
- Quantitative risk rating matrix
- Risk mapping

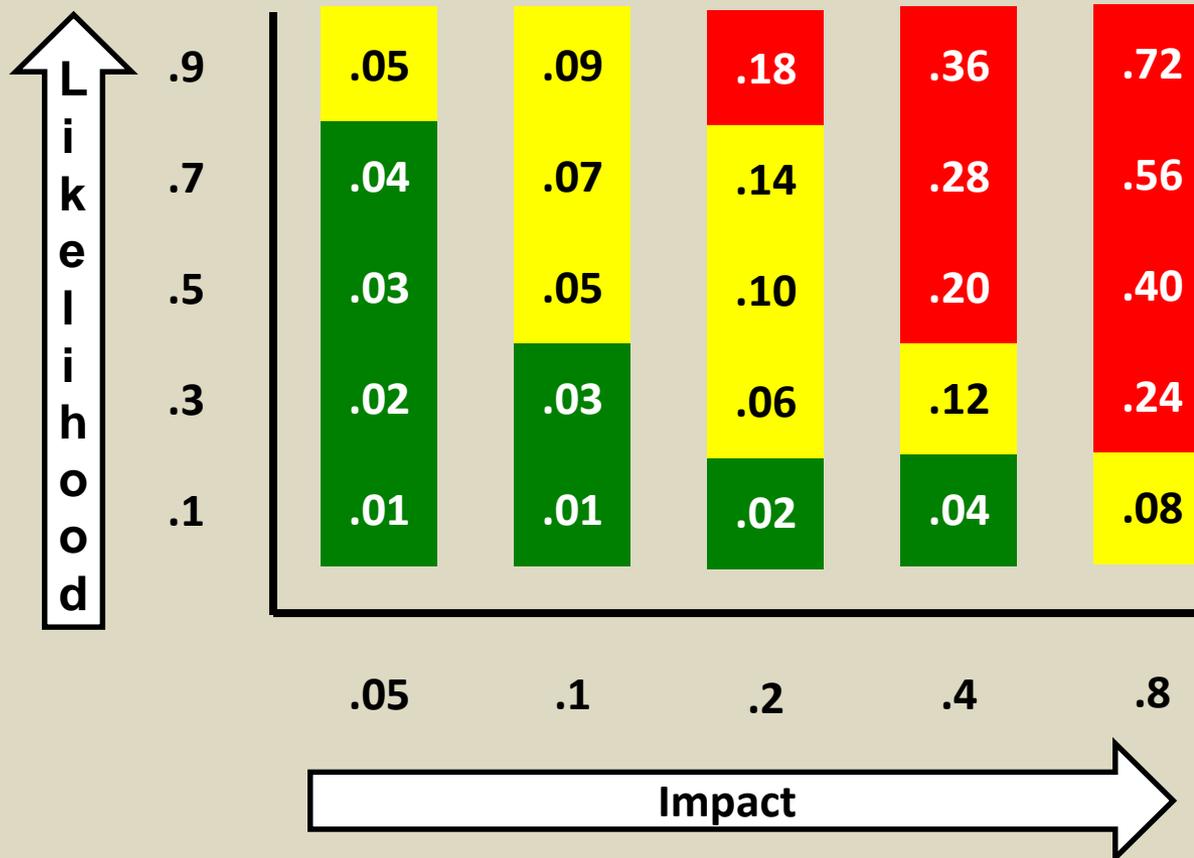
# Heat Map

	Rare	Unlikely	Possible	Likely	Almost Certain
Catastrophic	Moderate	Moderate	High	Very High	Very High
Major	Moderate	Moderate	Moderate	High	Very High
Moderate	Low	Moderate	Moderate	Moderate	High
Minor	Very Low	Low	Moderate	Moderate	Moderate
Insignificant	Very Low	Very Low	Low	Moderate	Moderate

# Qualitative Risk Rating Matrix



# Quantitative Risk Rating Matrix



# Risk Mapping

Very High	<b>Likelihood</b>	<b>Risk E</b>	<b>Risk H</b>	<b>Risk A</b> <b>Risk D</b>	
High		<b>Risk B</b>			
Medium			<b>Risk C</b>	<b>Risk G</b>	
Low		<b>Risk F</b>		<b>Risk I</b>	
		<b>Impact</b>			
		Low	Medium	High	Very High

# Communicate and Consult

- Consult stakeholders to aid likelihood and impact assignment
- Share heat maps or other matrices used in decision making
- Share risk register updates



# Summary

- Likelihood and impact are used to assess risk
- **Qualitative** and quantitative methods may be used to analyze risk
- Various tools such as heat maps, ordinal charts, and cardinal charts may be used to assess risk
- Consult with stakeholders to assign likelihood and impact values
- Communicate analysis results to stakeholders

## Lesson 2.5

# EVALUATE AND PRIORITIZE RISKS

Communicate and Consult with Stakeholders

### Risk Assessment

Identify  
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Identify  
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Analyze  
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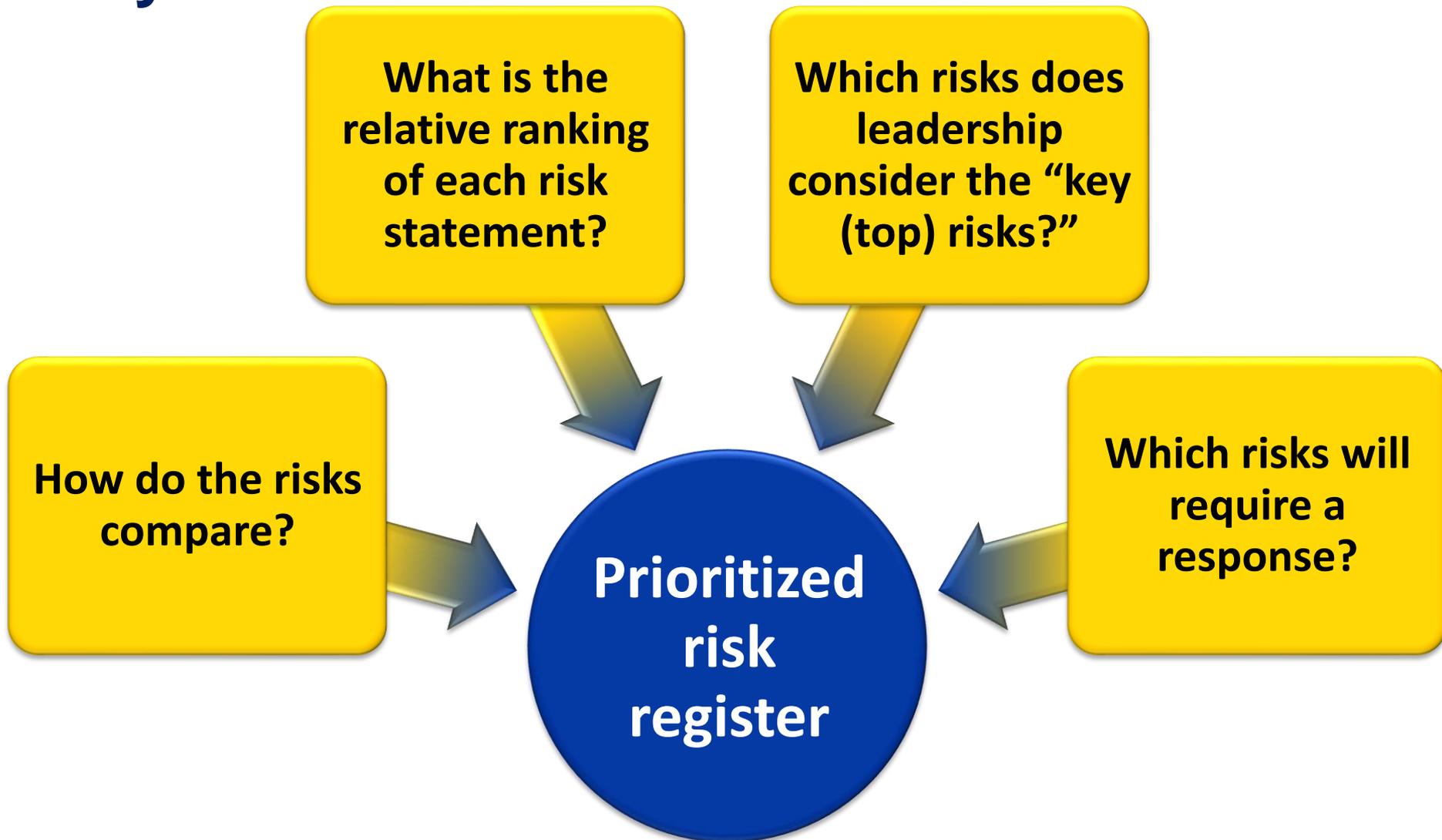
Respond  
to the  
Risks

Monitor, Review, and Adjust

# Learning Outcomes

- Examine risk evaluation and prioritization methods
- Prioritize risks based on qualitative and quantitative factors
- Describe risk appetite and risk tolerance
- Develop risk comparison charts and perform risk mapping

# Key Questions



## Evaluate and Prioritize Risks

# Risk Prioritization



# Risk Appetite vs. Risk Tolerance

Amount and type of risk that an organization is prepared to pursue, retain, or take

- High-level policy statement
- Sets a range

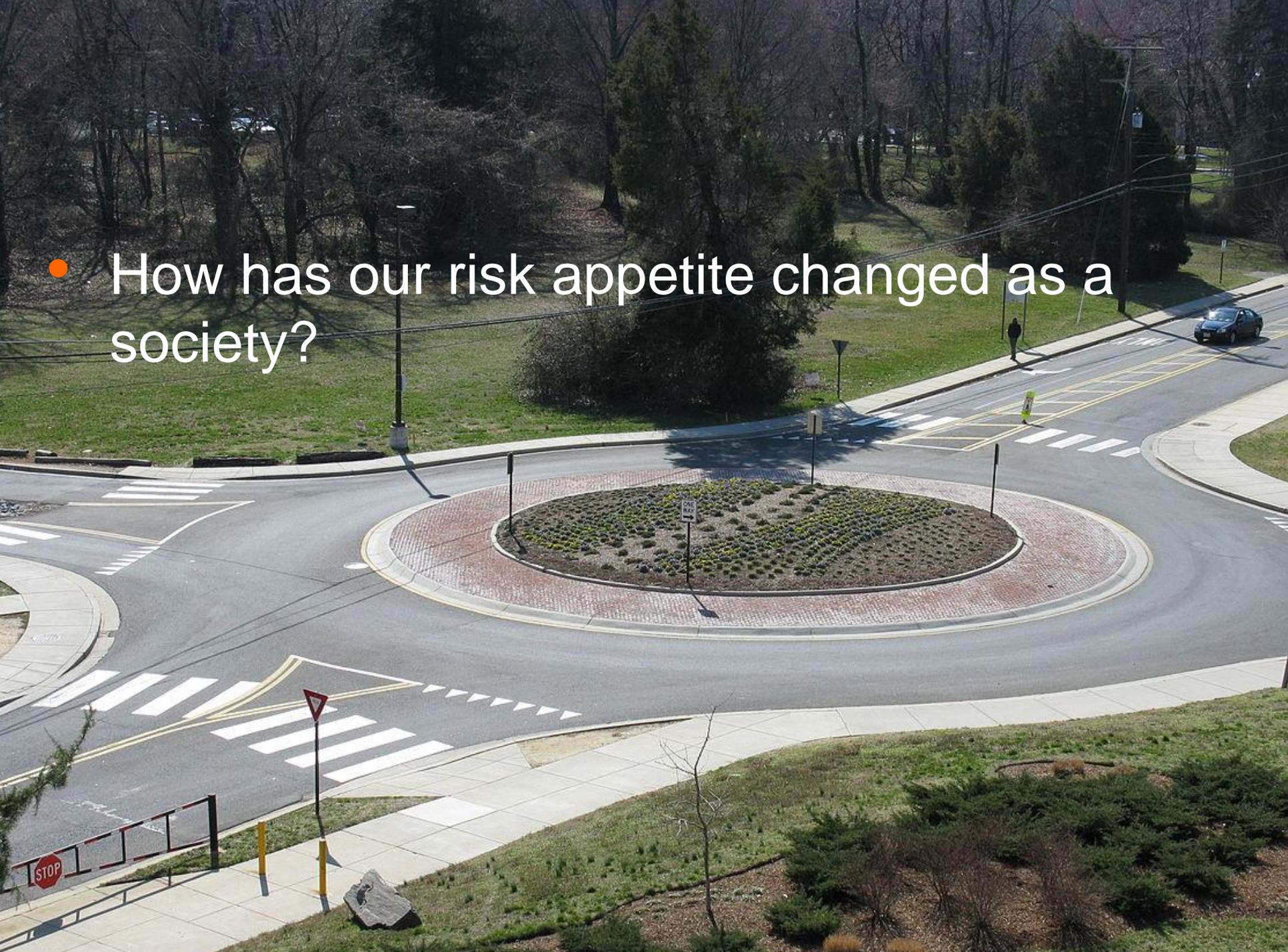
Range of acceptable outcomes related to achieving objectives

- Narrower in scope, operational
- Specifies limits

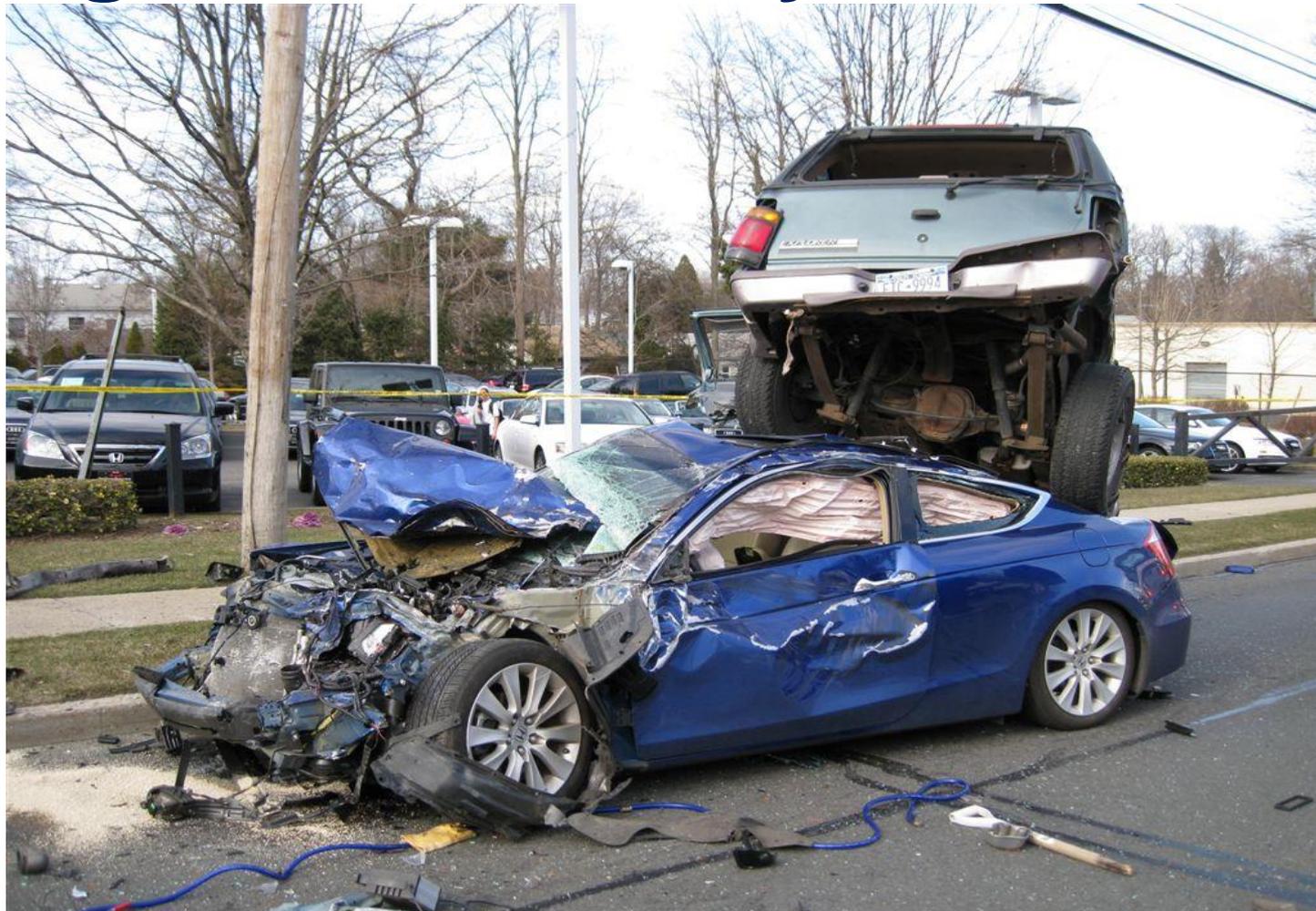
# Risk Appetite Considerations

- Identify specific points beyond which the organization will not knowingly go under any circumstances
- Establish absolute limits of acceptable risk and risk behavior
- Establish a risk analysis criteria (what is high, medium, or low?) as part of understanding the organization's risk appetite

- How has our risk appetite changed as a society?



# How has our risk appetite changed as a society?



# Risk Tolerance Considerations

- Think openly about risk tolerance
- Recognize not all activities are treated with the same level of risk tolerance
- Determine if managers or senior leaders will validate prioritized risks to set program or organizational risk tolerance
- Consider time horizons

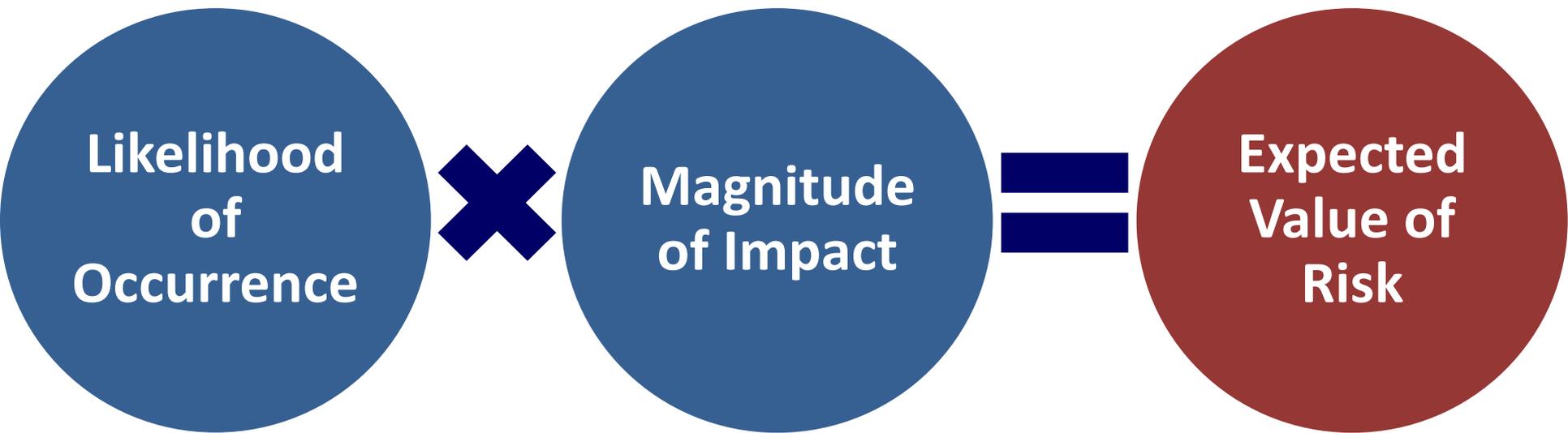
# Evaluation and Prioritization Methods

- Risk rating matrices
- Quantitative measures
- Risk comparison table



# Prioritizing Quantitative Risk

Decide which threats and opportunities have the greatest impact on the project



# Quantitative Risk Prioritization

Event	Likelihood	Impact	Expected Value	Rank
Permits are delayed	25%	\$2M	\$500K	5
Property values increase	50%	\$20M	\$10M	1
Utilities need to be relocated	25%	\$5M	\$1.25M	2
Key staff turnover	10%	\$500K	\$50K	6
Cost increases due to inexperienced contractor	30%	\$2M	\$600K	4
Wage increases	15%	\$5.5M	\$825K	3

# Communicate and Consult

- Consult to understand organization tolerances and thresholds
- Describe conditions for each area which, if met, demand that leadership be notified
- Communicate the most critical 3 to 5 areas for scrutiny



# Summary

- Reviewed methods to prioritize risk
- Distinguished between risk appetite and risk tolerance
- Prioritized risk for the work group objective
- Explored organizational risk thresholds and tolerances
- Reviewed the need to communicate critical areas to upper management

## Lesson 2.6

# RESPOND TO RISKS

Communicate and Consult with Stakeholders

### Risk Assessment

Identify  
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Identify  
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Analyze  
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Evaluate  
and  
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the Risks

Respond  
to the  
Risks

Monitor, Review, and Adjust

# Learning Outcomes

- Describe threat and opportunity responses
- Construct a risk response matrix for identified risks
- Indicate how the risk register is used to communicate risk response strategies to stakeholders.

# Key Questions



# Threat and Opportunity Responses

## A-TEAM



# Accept (Tolerate)

- Active or passive willingness to take the responsibility of the risk event consequences
  - Develop a contingency plan including
    - Contingency allowance
    - Contingency reserve
    - Management reserve



# Transfer (Transfer)

- Pass some or all of the risk to someone or something else through:
  - Insurance
  - Warranties
  - Contracts



# Enhance (Take Advantage)

- Take measures to increase the chance of the event happening
- Modify the size of the positive risk
- Maximize benefits



# Avoid (Terminate)

- Remove source of the risk
  - Change approach or process
  - Choose another development method
  - Eliminate the root cause of the threat
  - Terminate the project



# Mitigate (Treat)

- Take action(s) to lessen impact or likelihood of a risk event



# Guidelines for Effective Responses

- Appropriate to the severity of the risk
- Cost-effective
- Timely
- Realistic and within context

# Guidelines for Effective Responses (continued)

- Consider how other risks may be impacted
- Agreed upon by all parties involved
- Owned by a responsible person
- Include primary and backup strategies

# Communicate and Consult

- When response action is required
  - Notify responsible party
  - Provide timeline for start and completion
- Share risk register updates



# Summary

- Reviewed threat and opportunity responses
- Explored comparison tools to evaluate the effectiveness of potential responses
- Recalled the importance of communicating the risk response strategy to stakeholders

## Lesson 2.7

# MONITOR, REVIEW, AND ADJUST

Communicate and Consult with Stakeholders

### Risk Assessment

Identify  
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Respond  
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Monitor, Review, and Adjust

# Learning Outcomes

- Identify processes to track and continuously manage risk
- Evaluate response strategy effectiveness
- Describe residual risk
- Explain how to use the risk register to communicate response strategy effectiveness to stakeholders

# Key Questions

Are they completed, in progress, not started, or has the action been deferred?

Did the action have the desired effect?

What is the status of our response actions?

What is the residual risk and how should we respond?

Updated risk register and risk tracker

Monitor, Review, and Adjust

# Risk Monitoring and Control

- Identify and track risks
- Execute risk management plans
- Evaluate the effectiveness of risk plans
- Communicate to all stakeholders
- Document actions and results

# Response Strategy Effectiveness

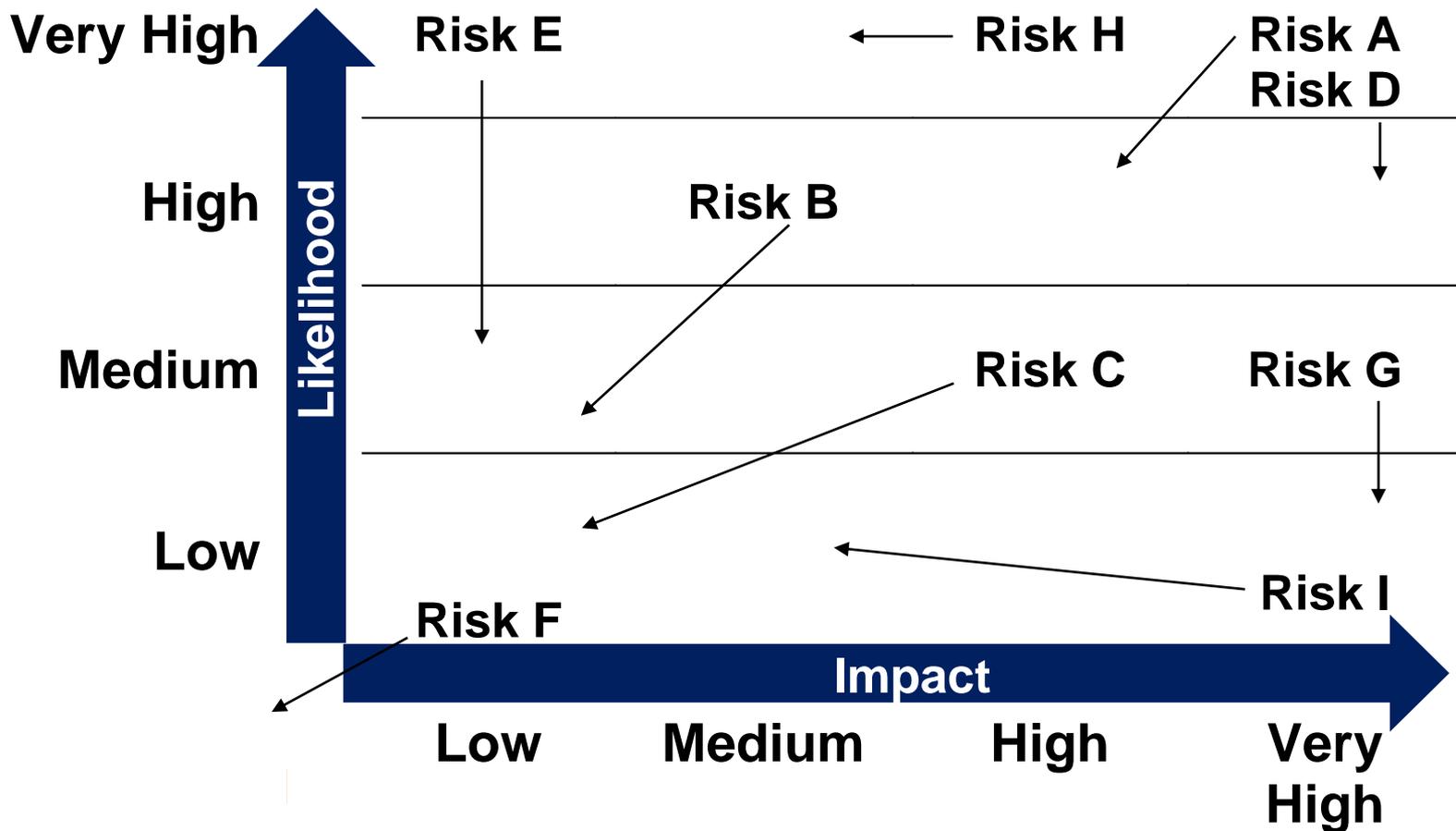
- How do we define an effective strategy?
- Were responses implemented as planned?
- Were proper policies and procedures followed?
- Does data demonstrate the effectiveness of the risk strategy?
- Are assumptions still valid?
- Did likelihood or impact change?

# Residual Risk

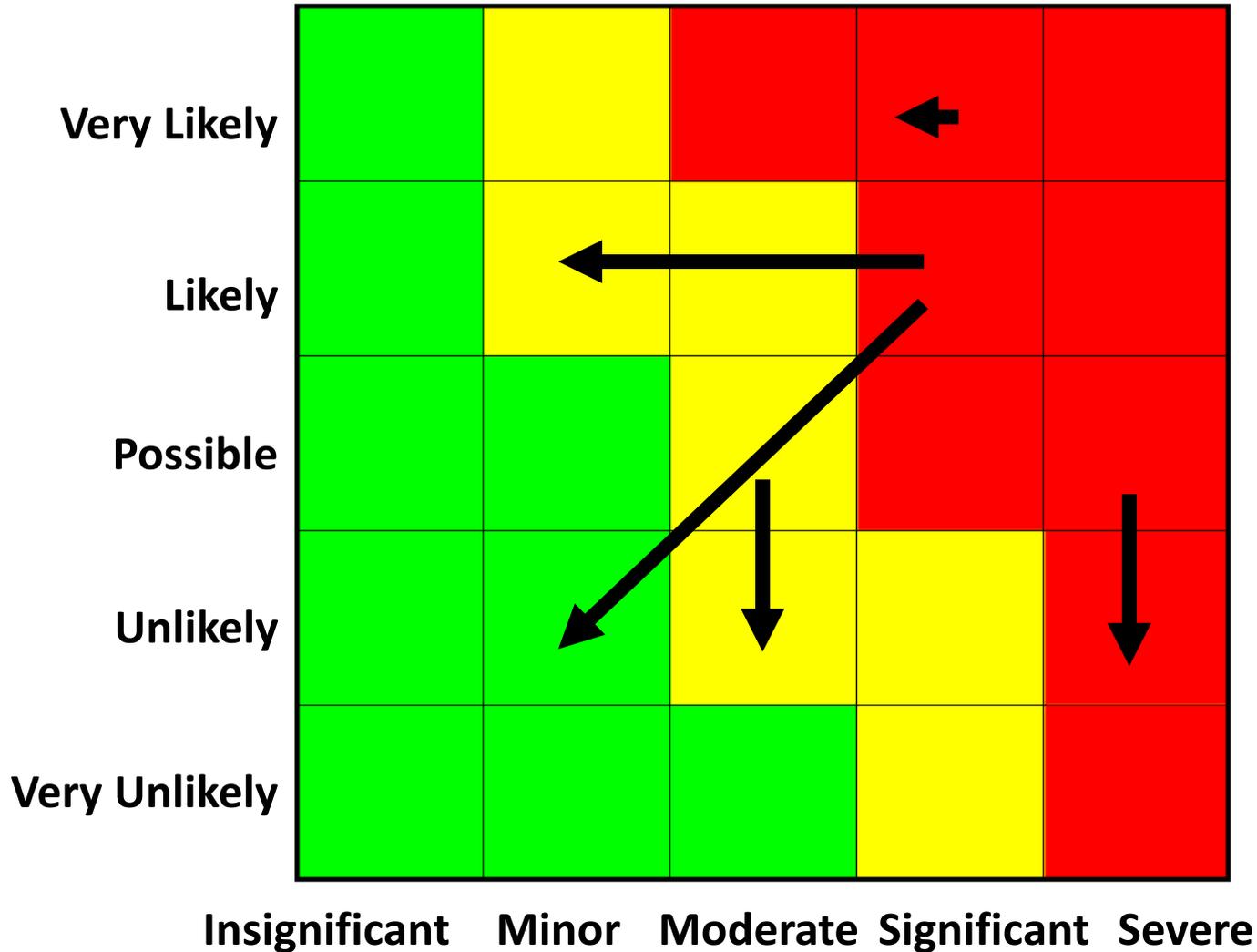
Definition: Risk remaining after implementing the risk response

- In many situations it is not possible or practical to completely eliminate a risk
- Residual risk can contain unidentified risk

# Risk Map: Residual Risk as a Result of Response Strategies



# Heat Map: Response Strategy Effectiveness



# Reassess the Risk

- Develop new responses
- Choose alternative strategies
- Implement contingency plans
- Take corrective action
- Re-plan the project

# Communicate and Consult

- Report status of each response strategy
  - Effectiveness
  - Residual risk
  - Corrective or alternate strategies
- Share risk register updates



# Summary

- Identified risk monitoring processes
- Reviewed visual methods for evaluating response strategy effectiveness
- Reviewed examples of residual risk
- Explored use of risk register to communicate response strategy effectiveness to stakeholders

# Risk Management Process

Communicate and Consult with Stakeholders

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# Course Summary

- Recognize the connection between effective risk management and achieving objectives
- Follow the steps of the risk management process to identify and develop risk response strategies
- Apply the risk management process to one's own level of decision-making within an organization