SE 329 – Software Project Management

Project Risk Management

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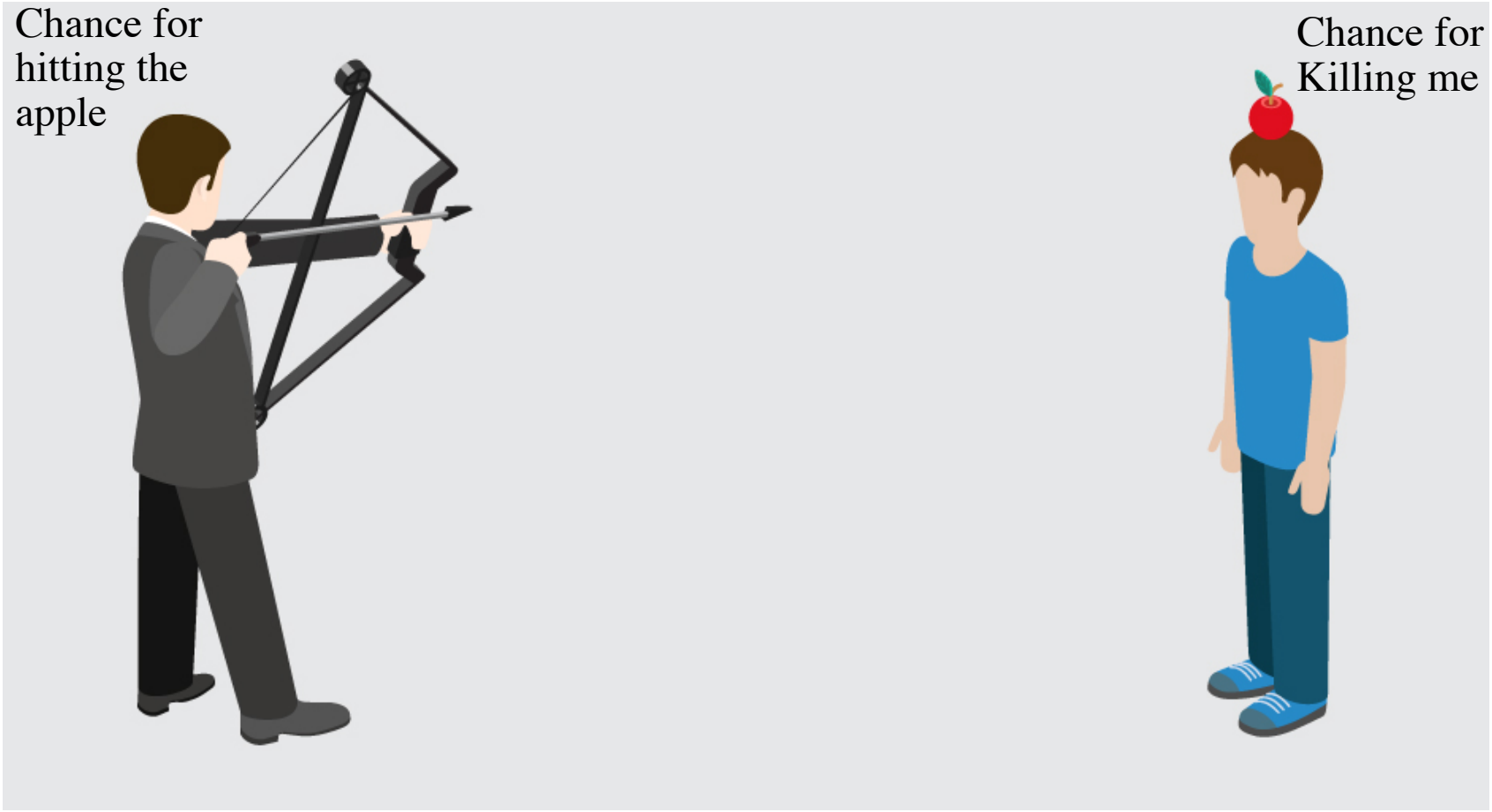
Course Outcome

Identify risks and possible solutions

What Is Risk?

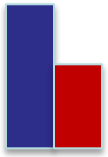


What Is Risk?

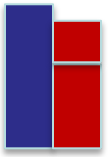
1. Why do you buy health insurance? Car insurance?
2. Is it possible to achieve all project objectives?
3. Why some companies work on a product and other not?

What Is Risk?

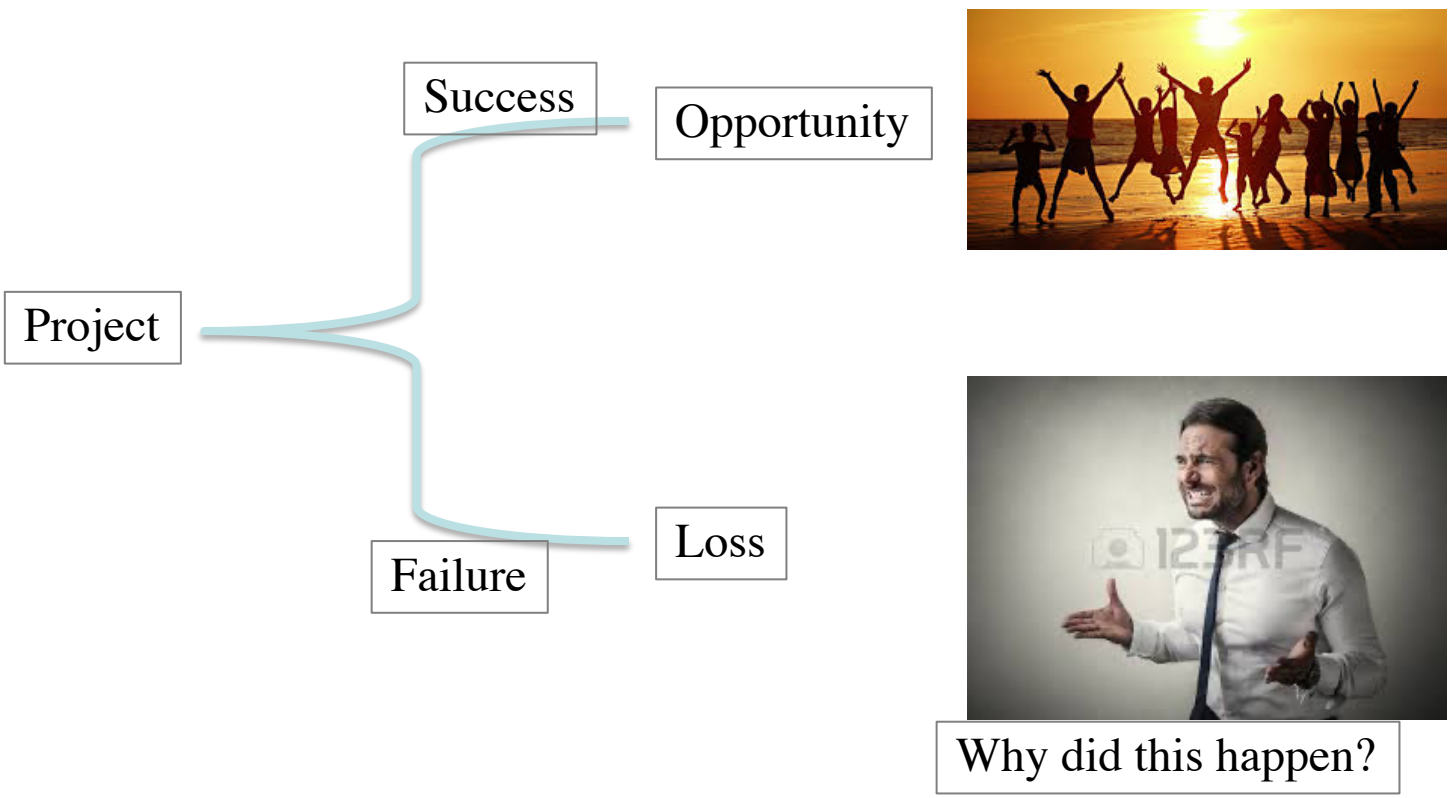
- Production Criteria: **Benefit >= Cost**



- Factor-in cost of risk: **Benefit >= Cost + Risks**



What Is Risk?


Success
Opportunity
Project
Failure
Loss
Why did this happen?

What Is Risk?

- Risk is the potential of gaining or losing something of value.

- Values (such as physical health, social status, emotional wellbeing or financial wealth) can be gained or lost when taking risk resulting from a given action or inaction, foreseen or unforeseen.

- Risk can also be defined as the intentional interaction with uncertainty.

What Is Risk?

It is about

- Unwanted event
- The chance they occur
- Cost when occur

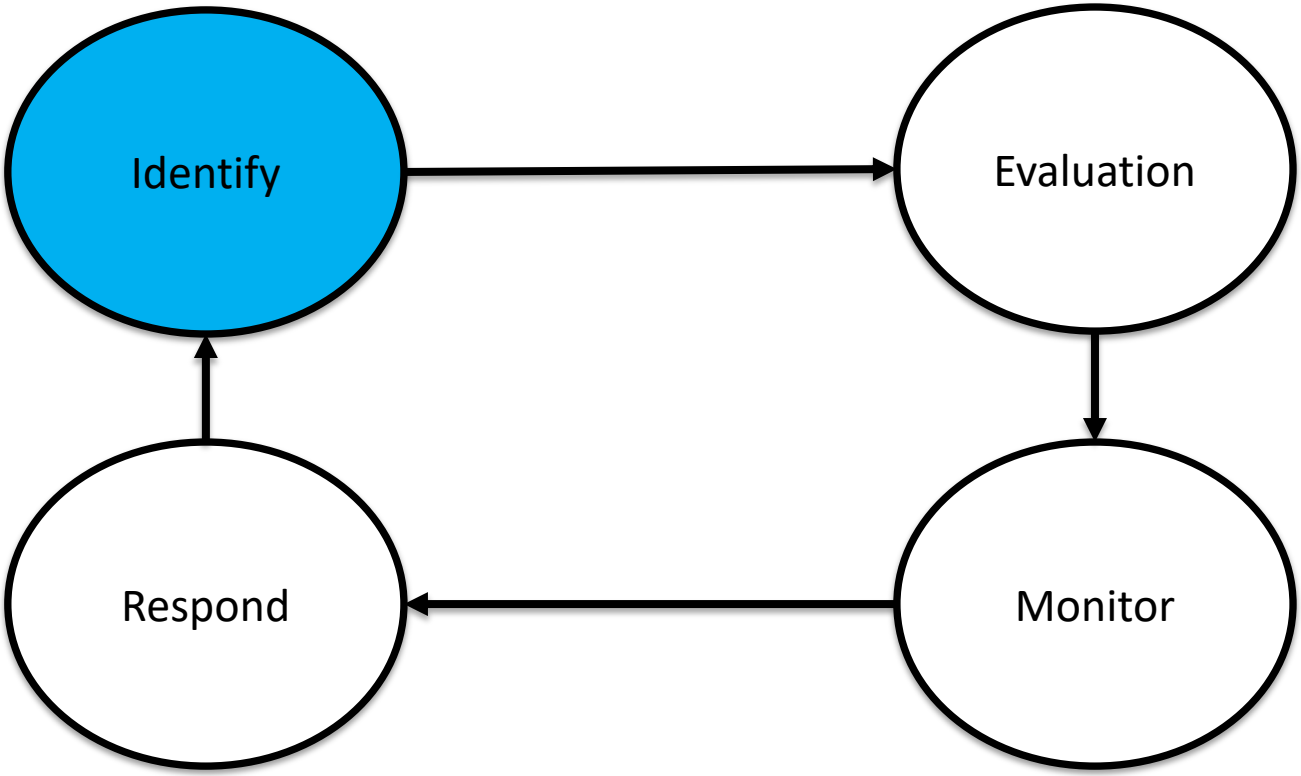
But also

- Cost to address them
- Opportunity if they do not occur

Risk Categories

- Technical risk
- Cost risk
- Scheduling risk
- Contractual risk

Risk Management Process



Example of Risk – Covid-19?

By Mario Trentim

As I am writing this article, the COVID-19 crisis is reaching a global scale, impacting projects and portfolios at different levels. Unfortunately, there's a lot of noise and misinformation out there—people panicking and organizations reacting without deliberate rational thinking. Here are my thoughts from a project risk management perspective:

Should Project Risk Management Take the Pandemic into Consideration?

Considering we've endured pandemics before, this is, in theory, a known risk. But you likely did not include it in your project risk register, as it is very unlikely. In this case, the risk is unknown to you, because you and your team didn't identify this risk.

Whether you agree or not, I believe that no one in the world was able to accurately assess the impact of COVID-19 before it happened—and there is still uncertainty about its impact moving forward. Consequently, in my opinion, this shouldn't be part of project risk management. So what can we do?

Risk Identification Techniques

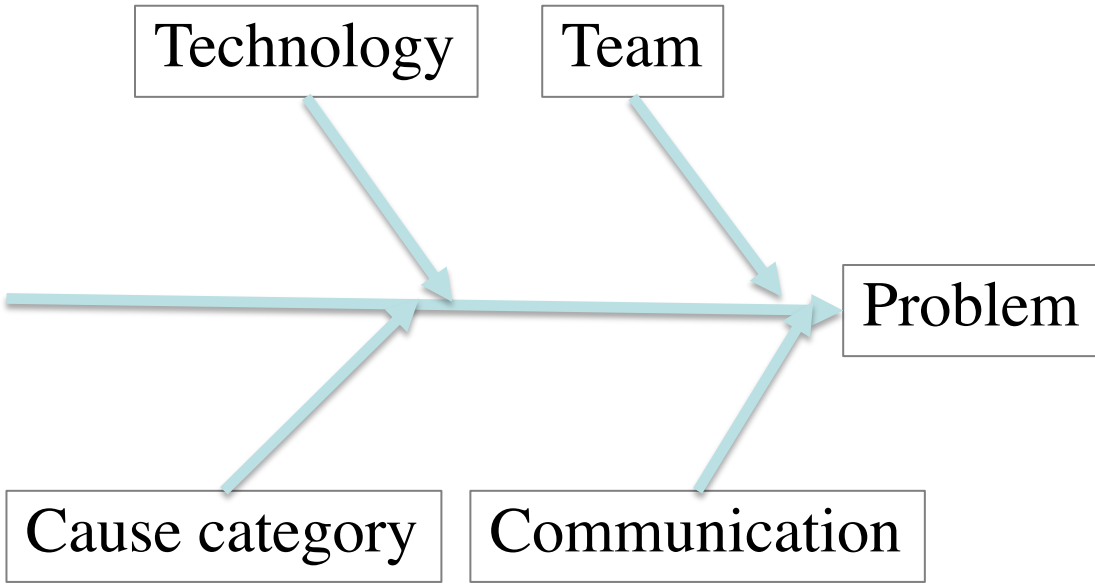
1. Expert judgment
2. Documentation review
3. Diagraming techniques
4. SWOT analysis
5. Checklist analysis
6. Brainstorming

Documentation Review

1. This includes the analysis of previous project files
2. Review of the contract
3. Analysis of the consistency between the project documents
4. Analysis of the validity of the assumptions

Diagraming Techniques

Use diagrams such as cause and effect diagram or process flow diagram to identify weaknesses



SWOT Analysis

- SWOT is for strength, weaknesses, opportunities, and threats
- Analyze the impact of organization strength, weaknesses, opportunities and threats on the project

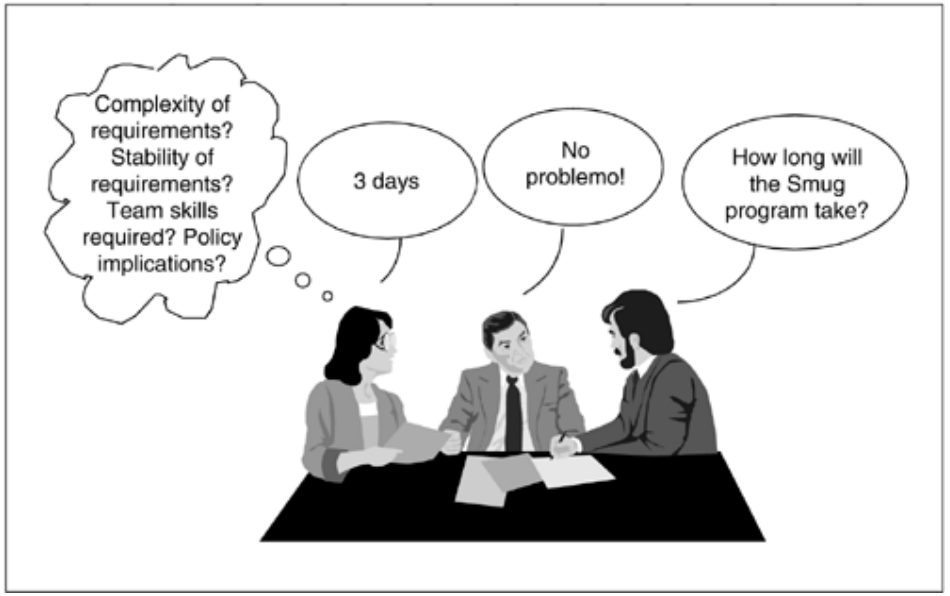
Checklist Analysis

Examples:

- Limited experience of project managers
- Dependency on new contractors
- Use of immature technology
- No specialized developers in the technology
- Limited participation of customers in Req. elicitation
- Inexperience with big projects
- Limited knowledge of the technology
- No previous local experience with geographically distributed system

Brainstorming

- What may go wrong?
- What would prevent us from achieving the objectives?
- What assumptions did we make ?(which may be wrong)
- You may use the WBS to brainstorm



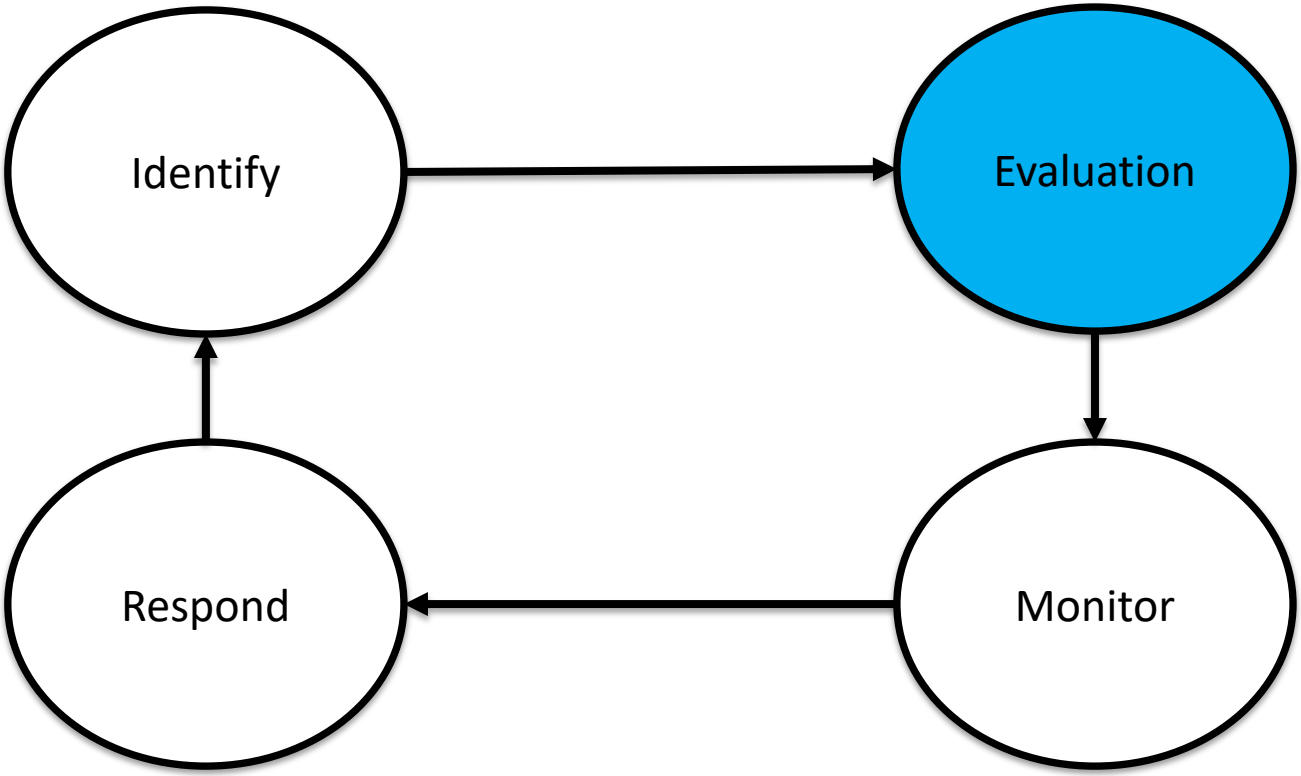
Practice – Brainstorm Project Risks

Project goal: The goal of the project is to develop a low-cost fleet monitoring system. It includes a device installed in a bus that collects data from their in-vehicle network and sends them to a remote server along with the the locations.

Deliverables

1. Data collection component: A device that collects data from the car and sends them to a remote server along with the location of the vehicle
2. Data visualization: A web application that visualizes the position of each vehicles along with information collected from its network
3. Data analysis: A web application to run ad-hoc statistics using the data

Risk Management Process



Risk Evaluation Approaches

1. Qualitative approach
2. Quantitative approach

Qualitative Risk Evaluation

- The risk exposure combines the probability of occurrence and impact of risk
- Goal is to rank and prioritize the risks
- Allows to control the level of certainty

Probability of Occurrence

Use scales to measuring probability

1. improbably: unlikely to happen – probability close to zero
2. Remote: unlikely but possible - probability 0.01
3. Occasional: could happen sometimes - probability 0.05 – 0.1
4. Probable: is expected to happen - probability 0.1 – 0.3
5. Frequent: will occur several times in the year

Impact of Risk

- Identify the dimensions of the impact: schedule, budget, health, reputation, etc.

Levels:

1. Negligible
2. Minor – e.g., late one month with no penalty
3. Serious – e.g., late less than 3 months with 10% penalty
4. Critical – e.g., late less than 6 months with 20% penalty
5. Catastrophic – e.g., late more than 6 months with more than 20% penalty

Risk Exposure Matrix Example

Probability of Failure (POF)	Consequence of Failure (COF) 1	2	3	4	5
1	Very Low	Very Low	Low	Medium	High
2	Very Low	Low	Medium	High	High
3	Low	Medium	High	High	Very High
4	Medium	High	High	Very High	Very High
5	High	High	Very High	Very High	Very High

Practice –Risk Exposure

Project goal: The goal of the project is to develop a low-cost fleet monitoring system. It includes a device installed in a bus that collects data from their in-vehicle networks and sends them to a remote server along with the the locations.

Evaluate the risk exposure of the following risks

Risk	Occurrence	Impact	Exposure
Limited participation of customers in Req. Elicitation			
Change of scope			
Team change			
Limited experience of project managers			

Quantitative Risk Evaluation

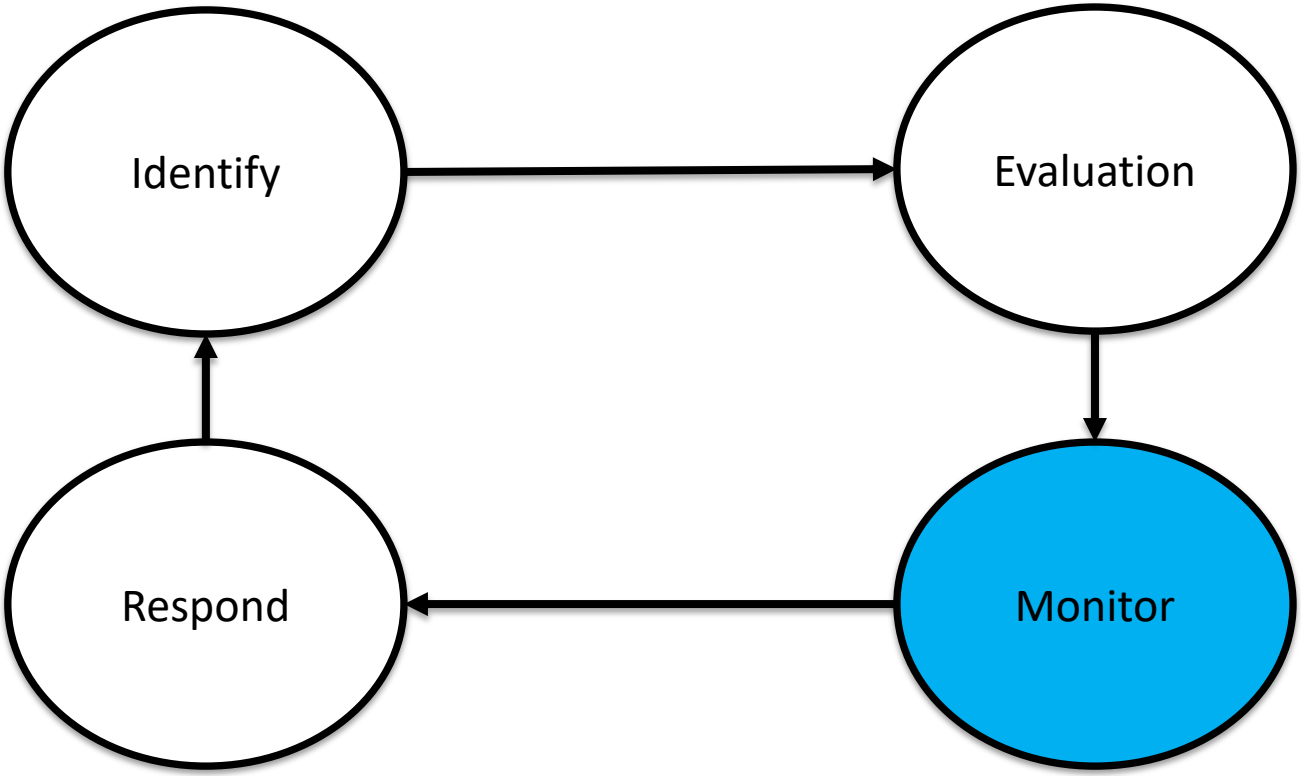
- Use historical data to get quantitative information about the occurrence and impact of risk
- Use probability distribution (e.g., beta distribution) to differentiate risks

- Support the study of the cumulative impacts of dependent risks
- Support the analysis of the sensitivity of project objectives to risk uncertainty

Risk Tolerance Matrix Example

Probability / Severity	Frequent	Probable	Occasional	Remote	Improbable
Catastrophic	IN	IN	IN	H	M
Critical	IN	IN	H	M	L
Serious	H	H	M	L	T
Minor	M	M	L	T	T
Negligible	M	L	T	T	T
LEGEND	T = Tolerable	L = Low	M = Medium	H = High	IN = Intolerable

Risk Management Process



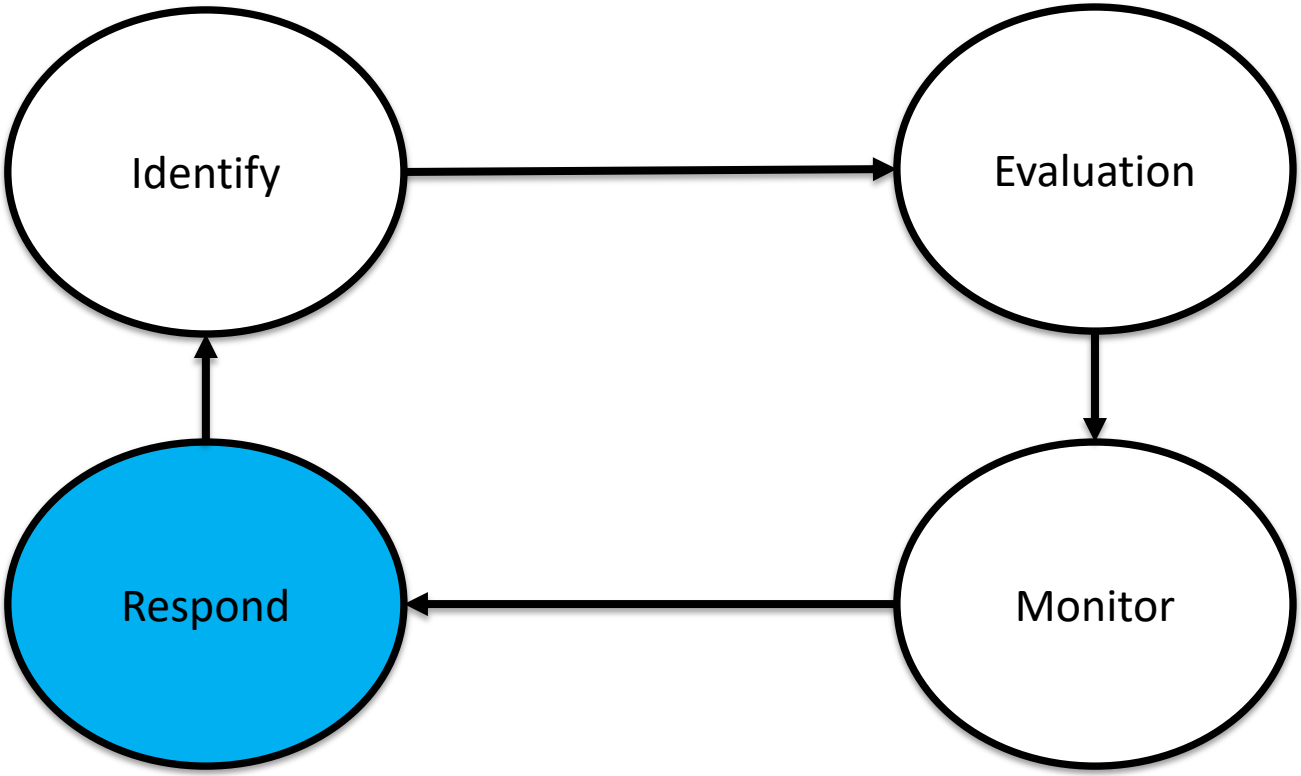
Risk Monitoring

- The main job of a project manager is to control the risk
- Monitoring risks implies constant communication with stakeholders ➔ identify problems early

- Techniques for monitoring include:
  - Use charts to monitor budget and schedule
  - Organize regular update meetings
  - Have regular reports

- So,
  - Exceeding estimated time implies a problem
  - Complaints hint of problems, etc.

Risk Management Process



Risk Response Strategies

- Risk escalation
- Risk Acceptance – accept the threat if it happens
- Risk Avoidance – avoid exposure to the risk
- Risk reduction – take actions to control the event
- Risk Transfer – have a third party assume the risk
  (e.g., contractor or insurance)

Risk Response

How to control the risk? Plan what to do if the identified event occur?

=> Have plan B and C ……

Examples:

- Plan for alternate technologies
- Use extra resources to mitigate frequent staff change
- Increase frequency of coordination meetings

Risk Mitigation

Risk mitigation is taking steps to reduce adverse effects

Risk Register

A document that records the results of the risk analysis and response planning. It includes among other information:

1. List of identified risks
2. Ratings of the identified risks
3. Indicators of the occurrence of the risks – to monitor
4. Potential responses of the identified risks

We have a template for risk register in Canvas.

Practice – Risk Register

Project goal: The goal of the project is to develop a low-cost fleet monitoring system. It includes a device installed in a bus collects data from their in-vehicle networks and sends them to a remote server along with the the locations.

Develop risk response strategies for the following risks

1. Use of immature technology
2. Limited participation of customers in Req. Elicitation
3. Team change
4. Limited experience of project managers

Templates

See https://www2a.cdc.gov/cdcup/library/templates/

Summary

- Risk events are “what may go wrong?”
- The main job of a project manager is to control the risk
- Monitoring risks implies constant communication with stakeholders ➔ identify problems early on
- Risk mitigation strategies are: escalate, accept, avoid, reduce, and transfer

Any Question?