OPSMGT 357 Project Management

Risk Management

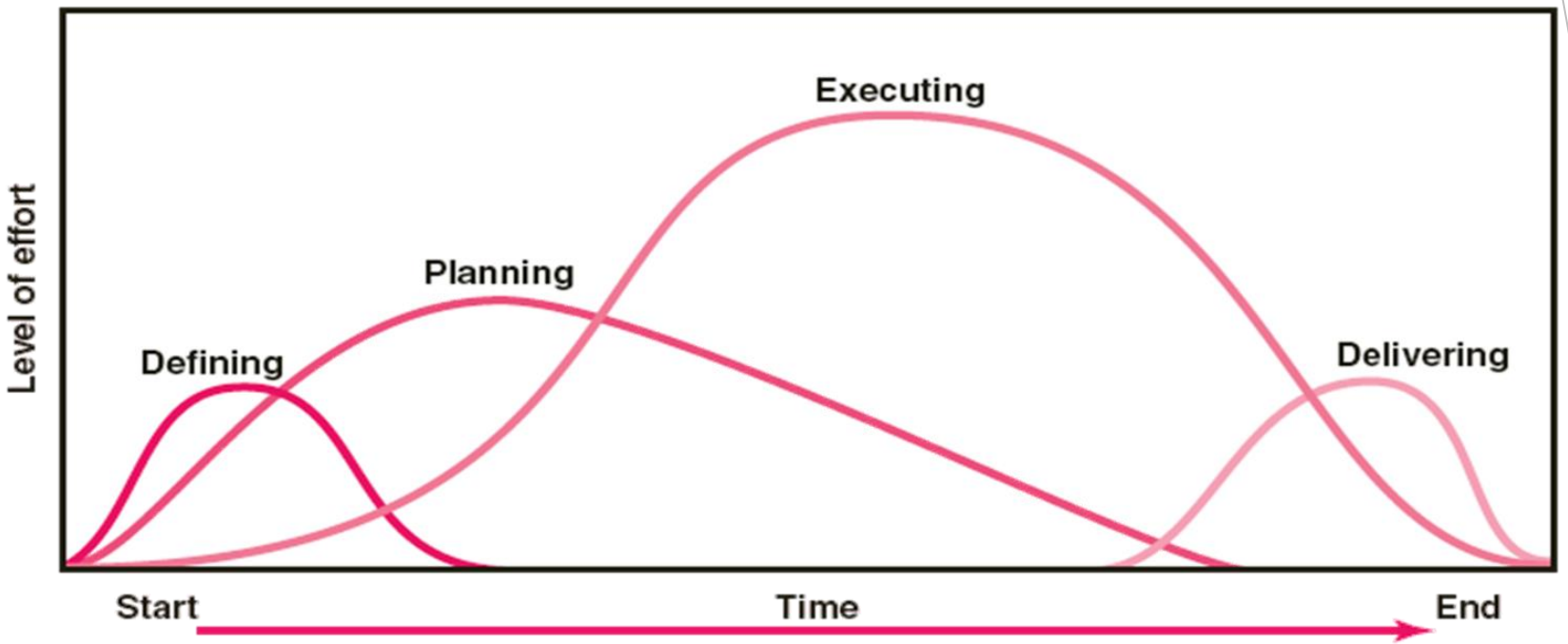
Mahsa Boroushaki
Operations and Supply Chain Management
Email: m.Boroushaki@Auckland.ac.nz

THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

What Is Risk?

Uncertain or chance events that planning can not overcome or control.

Project Life-cycle



Defining
1. Goals
2. Specifications
3. Tasks
4. Responsibilities

Planning
1. Schedules
2. Budgets
3. Resources
4. Risks
5. Staffing

Executing
1. Status reports
2. Changes
3. Quality
4. Forecasts

Delivering
1. Train customer
2. Transfer documents
3. Release resources
4. Release staff
5. Lessons learned

Threats Or Opportunities?

- Negative risks are threats to whether the project will achieve its objectives

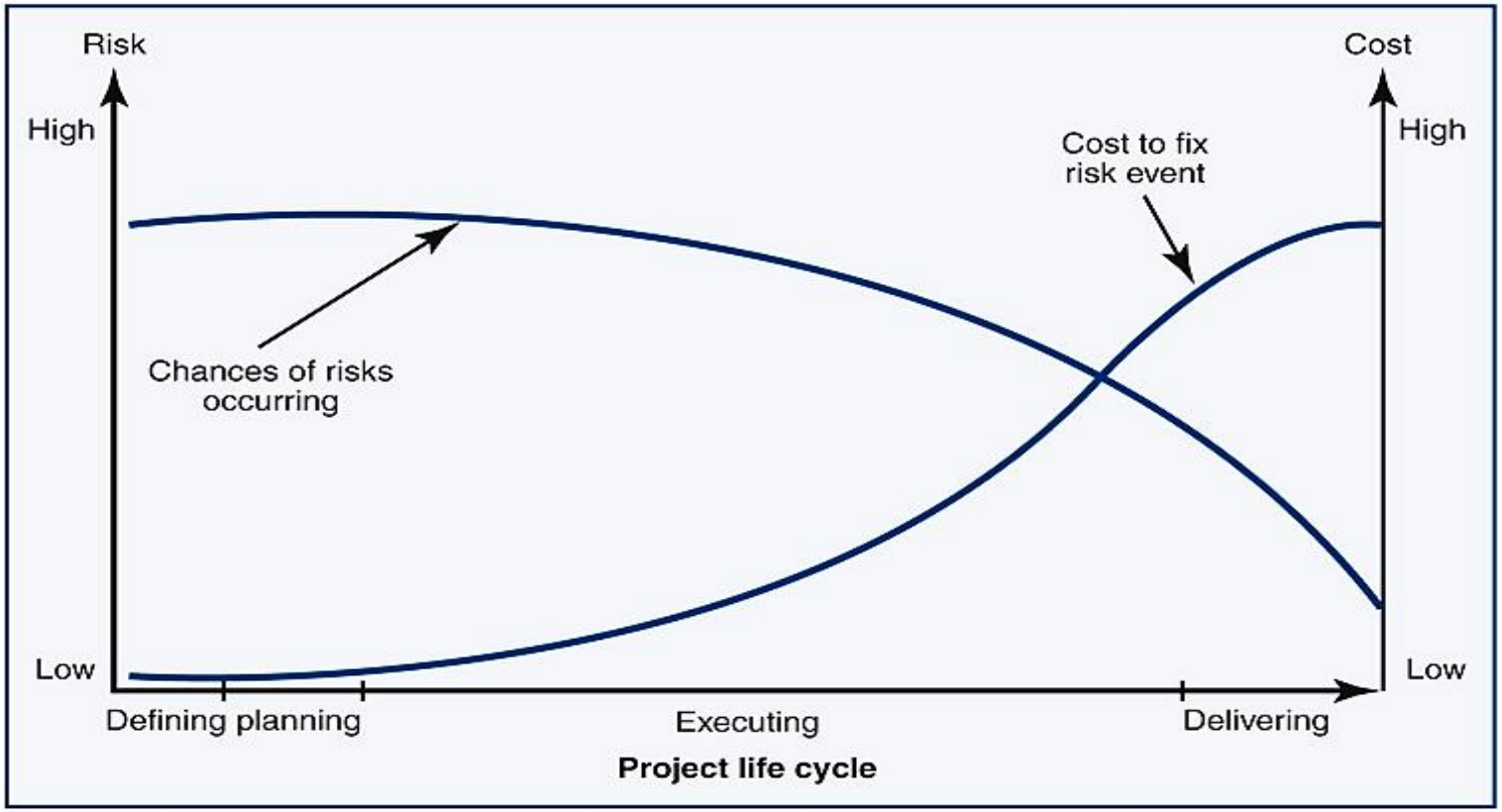
- Positive risks are opportunities to enhance the ability of the project to achieve its objectives
  - A delay in shipping might open up a potential window for better marketing opportunities.
  - A new product development project is “too successful.” It generates dramatically more demand than expected.
  - Unexpected price reduction in materials

Risk During The Life-cycle Of the Project

Risk and its associated cost for projects varies over the project life cycle:

- In initial phase of the project life cycle (during definition and planning) the chance of risk events is high, but their associated cost is low.
- In the final phase of the project life cycle, there is low chance of risk events, but cost impact is high.

How will risk and its associated cost change during the project life-cycle?



What Is Risk Management?

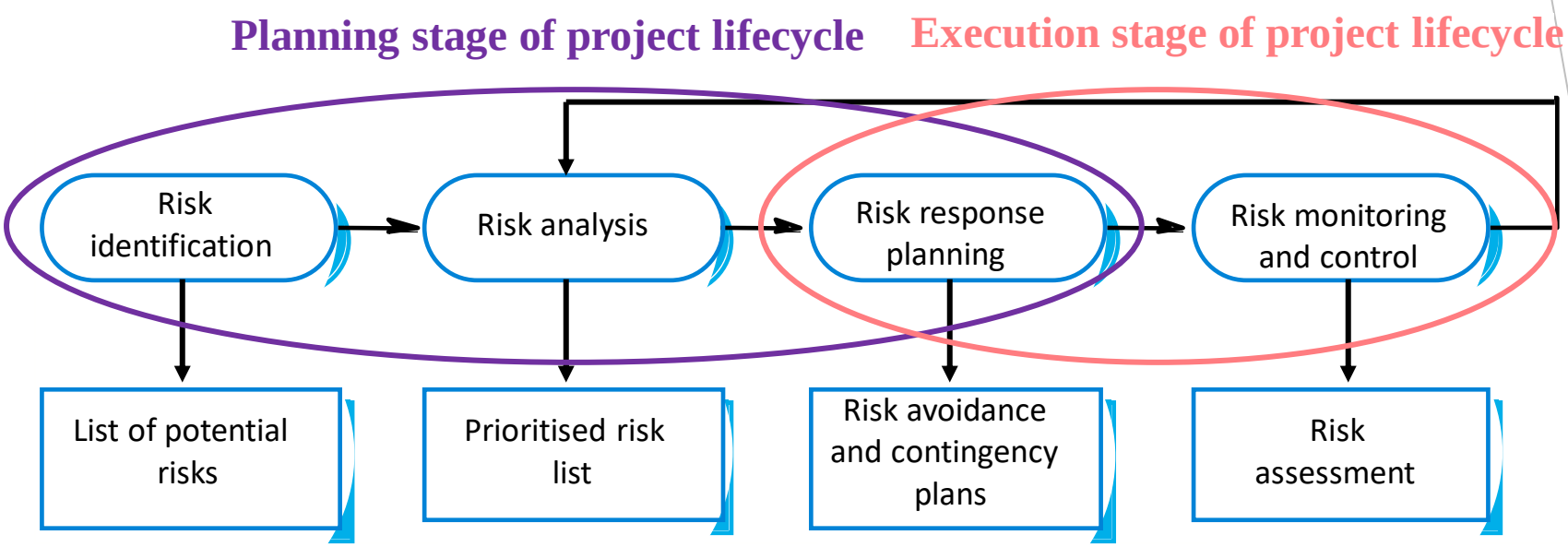
A proactive attempt to recognise and manage internal events and external threats that affect the likelihood of a project's success.

- What can go wrong (risk event)
- How to minimise the impact (consequences)
- What can be done before an event occurs (anticipation)
- What to do when an event occurs (contingency plans)

Typical examples of risks:

- Loss of key team member
- Weather emergencies
- Technical failure
- Poor suppliers

The Risk Management Process



The Risk Management Process

Risk Identification

What can go wrong?

Risk Analysis

How probable is it that each risk will become a reality?

If the risk becomes a reality, how badly will it damage the project?

Risk Response Plan

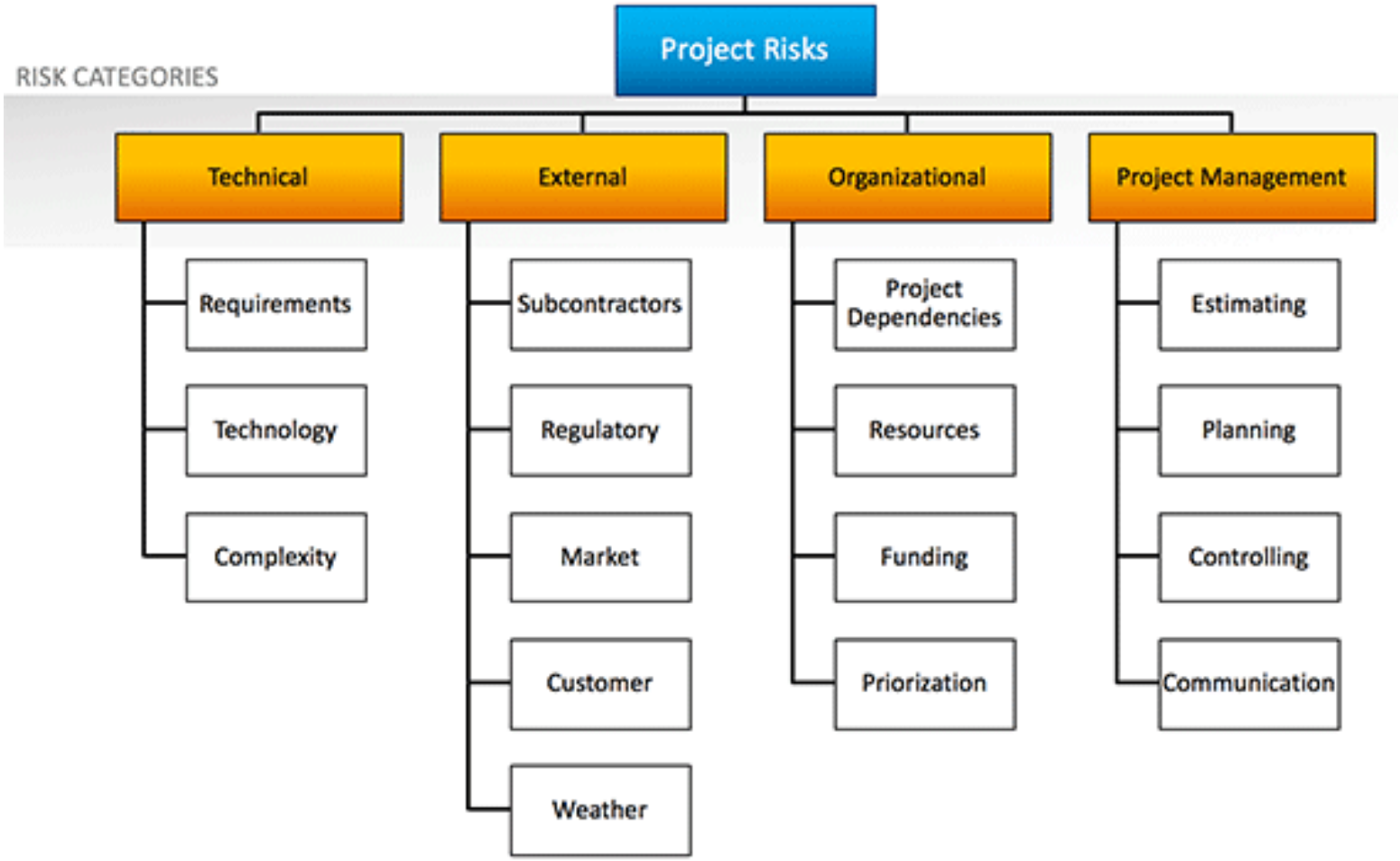
What can be done before an event occurs (anticipation) and
What to do when an event occurs (contingency plans)

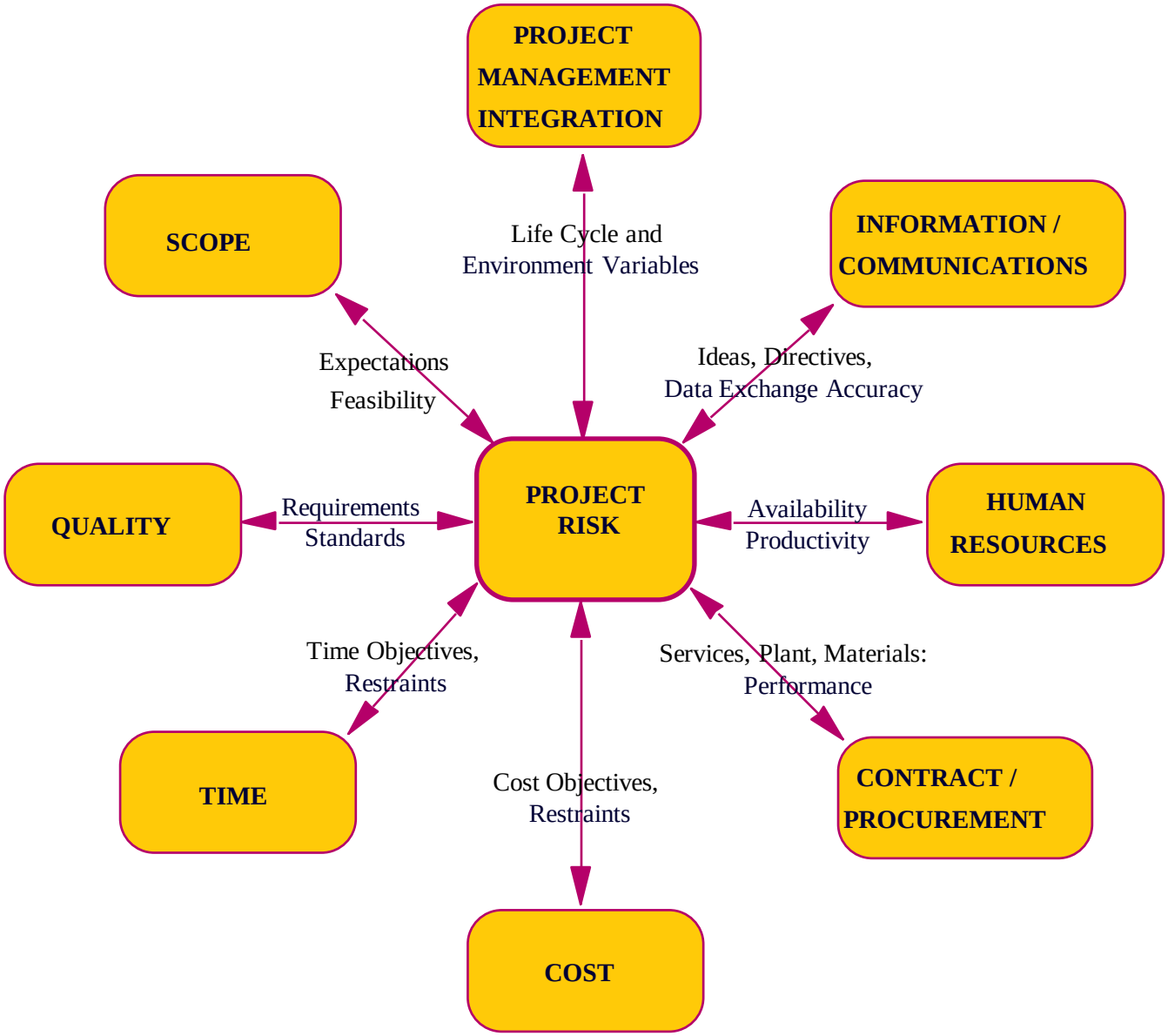
Risk Monitoring and Control

Step 1: Risk Identification

- Understanding what potential unsatisfactory outcomes are associated with a particular project and documenting their characteristics
  - Make a list of all possible risks through brainstorming
  - It is important that the entire team get involved in identifying threats and highlighting what can go wrong

Risk Identification: Risk Breakdown Structure




PROJECT MANAGEMENT INTEGRATION
SCOPE
Life Cycle and Environment Variables
INFORMATION / COMMUNICATIONS
Expectations Feasibility
Ideas, Directives, Data Exchange Accuracy
QUALITY
Requirements Standards
PROJECT RISK
Availability Productivity
HUMAN RESOURCES
Time Objectives, Restraints
Services, Plant, Materials: Performance
TIME
Cost Objectives, Restraints
CONTRACT / PROCUREMENT
COST

Potential Risk Conditions Associated With Each Knowledge Area

Knowledge Area	Risk Conditions
Integration	Inadequate planning; poor resource allocation; poor integration management; lack of post-project review
Scope	Poor definition of scope or work packages; incomplete definition of quality requirements; inadequate scope control
Time	Errors in estimating time or resource availability; poor allocation and management of float; early release of competitive products
Cost	Estimating errors; inadequate productivity, cost, change, or contingency control; poor maintenance, security, purchasing, etc.
Quality	Poor attitude toward quality; substandard design/materials/workmanship; inadequate quality assurance program
Human Resources	Poor conflict management; poor project organization and definition of responsibilities; absence of leadership
Communications	Carelessness in planning or communicating; lack of consultation with key stakeholders
Risk	Ignoring risk; unclear assignment of risk; poor insurance management
Procurement	Unenforceable conditions or contract clauses; adversarial relations

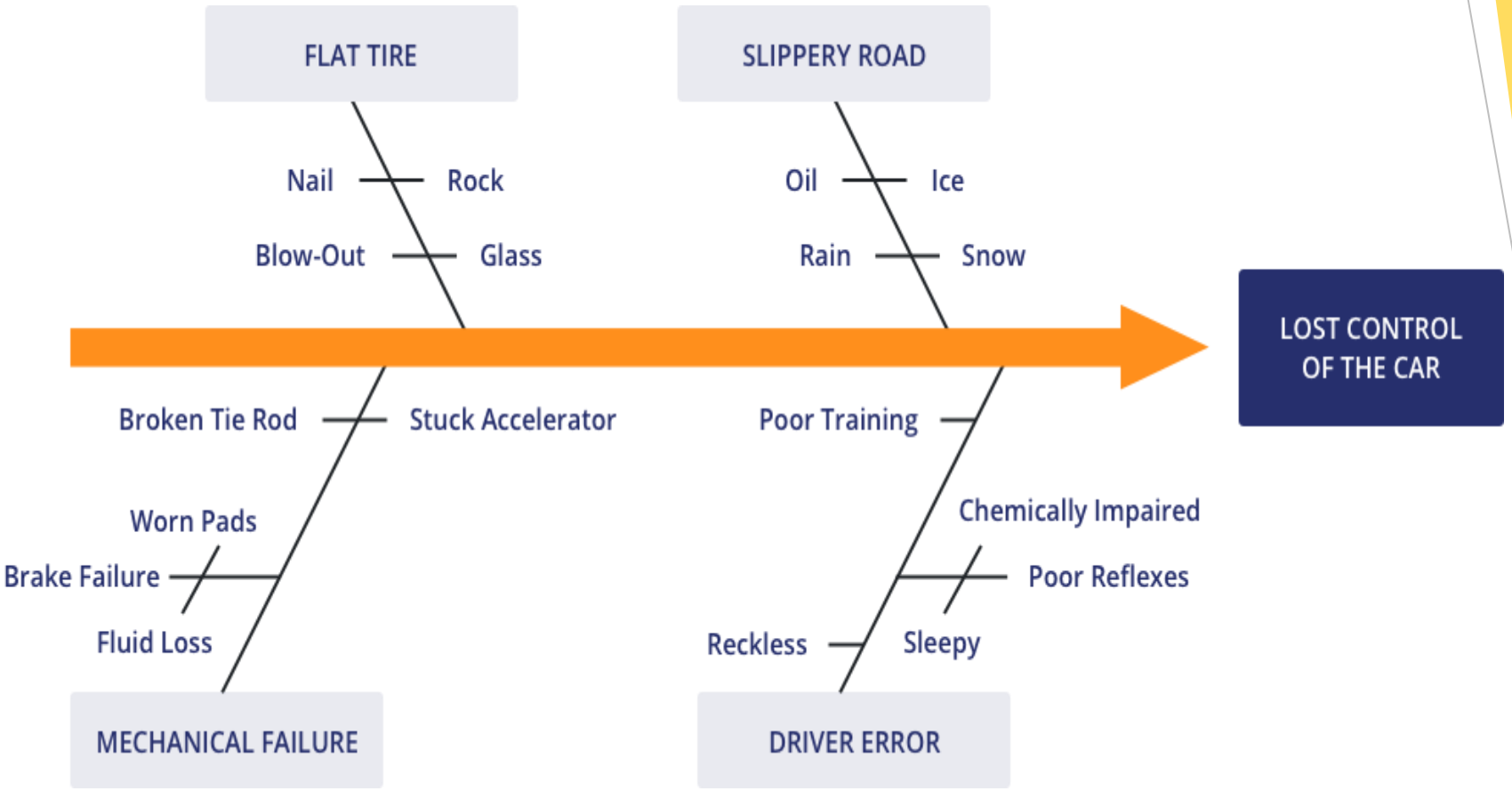
Risk Identification Tools & Techniques

- Brainstorming
- Interviewing
- Cause and effect diagram
- SWOT analysis

Specific tips:

- Use Risk Breakdown Structure (RBS) in conjunction with Work Breakdown Structure (WBS) to identify and analyze risks
- Macro risks first, then specific events

Cause and Effect Diagram



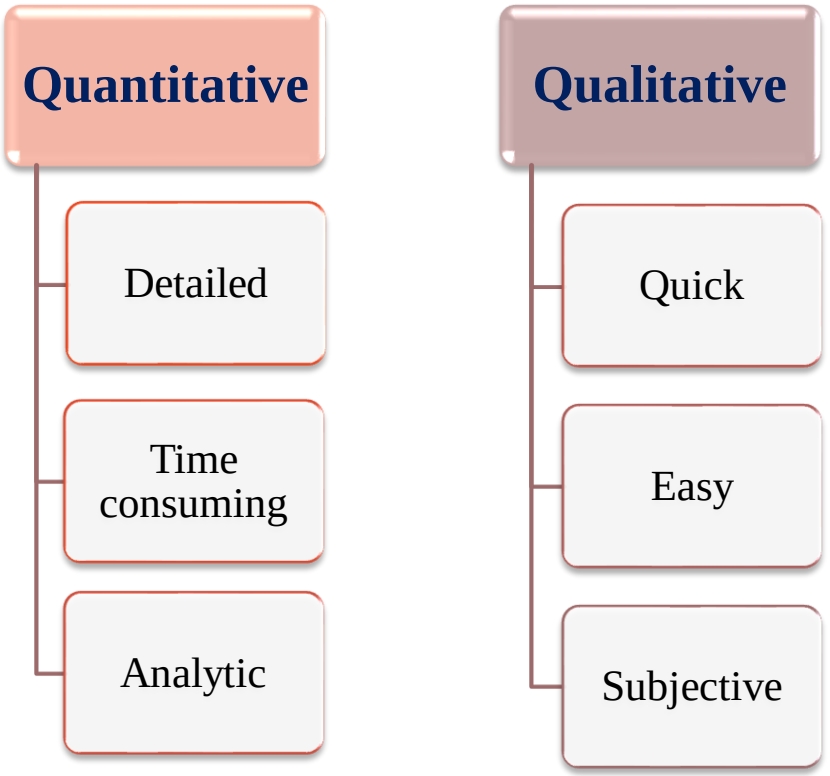
SWOT Diagram

Step 2: Risk Analysis

- How probable is it that each risk will become a reality?
- If the risk becomes a reality, how badly will it damage the project?

- Risk is a function of its **likelihood** and **impact**

Approaches to Analyze Risks



Tools	Expected Monitory Value Analysis Monte Carlo Analysis Decision Tree	Probability and Impact Analysis

Probability and Impact Analysis

It evaluates:

- Likelihood (Probability) that a particular risk will occur
- What is its potential impact on our objective

Tools:

- Risk Assessment Matrix
- Failure Mode and Effects Analysis (FMEA)

Risk Assessment Matrix

Severity is the amount of damage or harm a hazard could create. For example, a four-point scale of severity is as follows:

- **Catastrophic** - 4 Operating conditions are such that human error, environment, design deficiencies, element, subsystem or component failure, or procedural deficiencies may commonly cause death or major system loss, thereby requiring immediate cessation of the unsafe activity or operation.
- **Critical** - 3 Operating conditions are such that human error, environment, design deficiencies, element, subsystem or component failure or procedural deficiencies may commonly cause severe injury or illness or major system damage thereby requiring immediate corrective action.
- **Marginal** - 2 Operating conditions may commonly cause minor injury or illness or minor systems damage such that human error, environment, design deficiencies, subsystem or component failure or procedural deficiencies can be counteracted or controlled without severe injury, illness or major system damage.
- **Negligible** - 1 Operating conditions are such that personnel error, environment, design deficiencies, subsystem or component failure or procedural deficiencies will result in no, or less than minor, illness, injury or system damage.

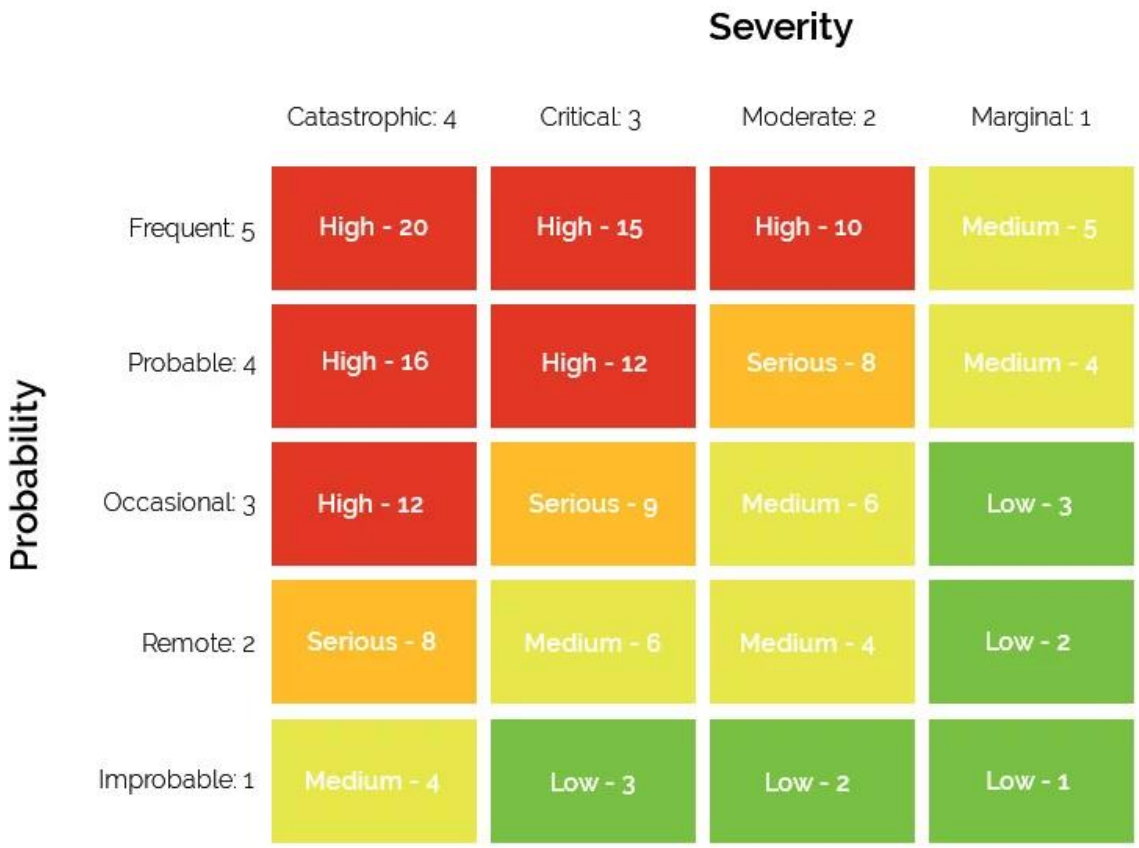
Risk Assessment Matrix

Probability is the likelihood of the hazard occurring.

Here is an example of five-point scale:

- **Frequent** - 5 Likely to occur often in the life of an item
- **Probable** - 4 Will occur several times in the life of an item
- **Occasional** - 3 Likely to occur some time in the life of an item.
- **Remote** - 2 Unlikely but possible to occur in the life of an item.
- **Improbable** - 1 So unlikely

Risk Assessment Matrix

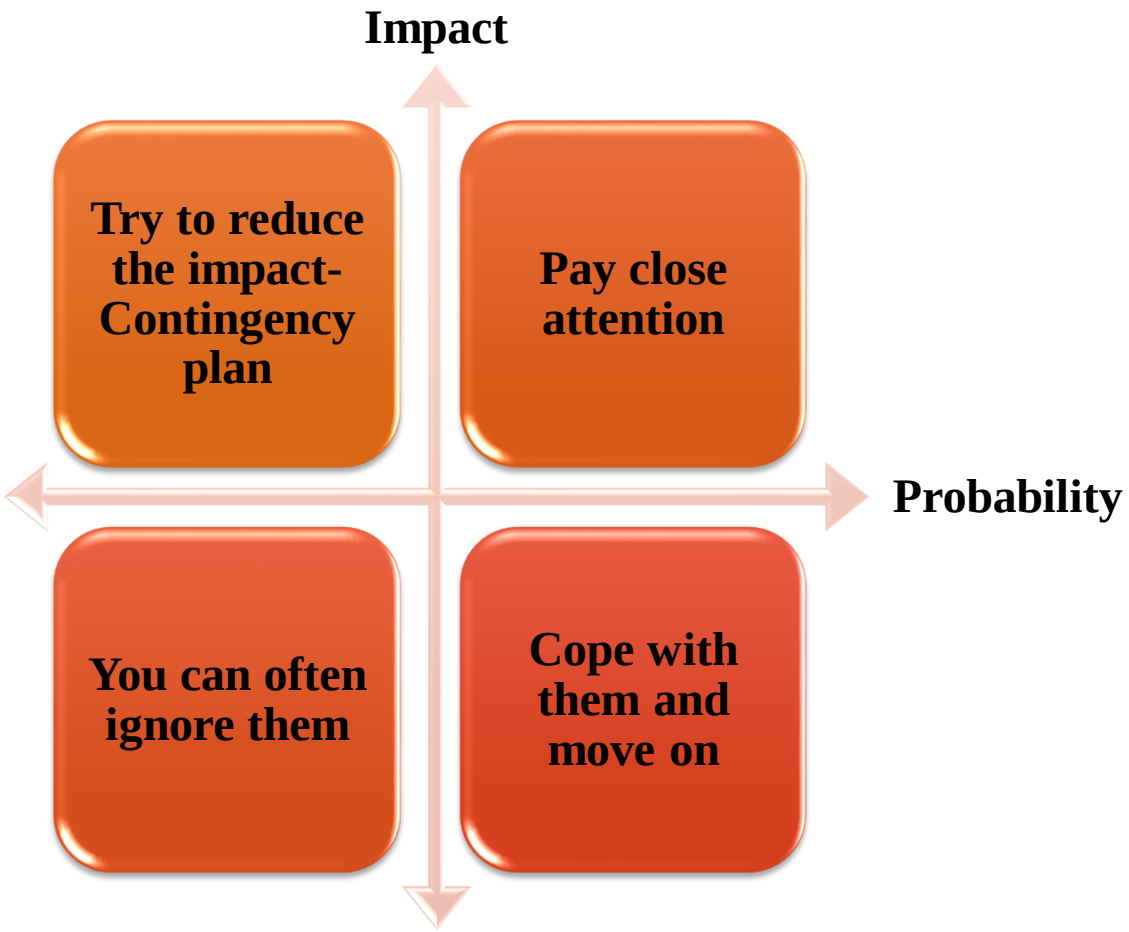


Failure Mode and Effects Analysis (FMEA)

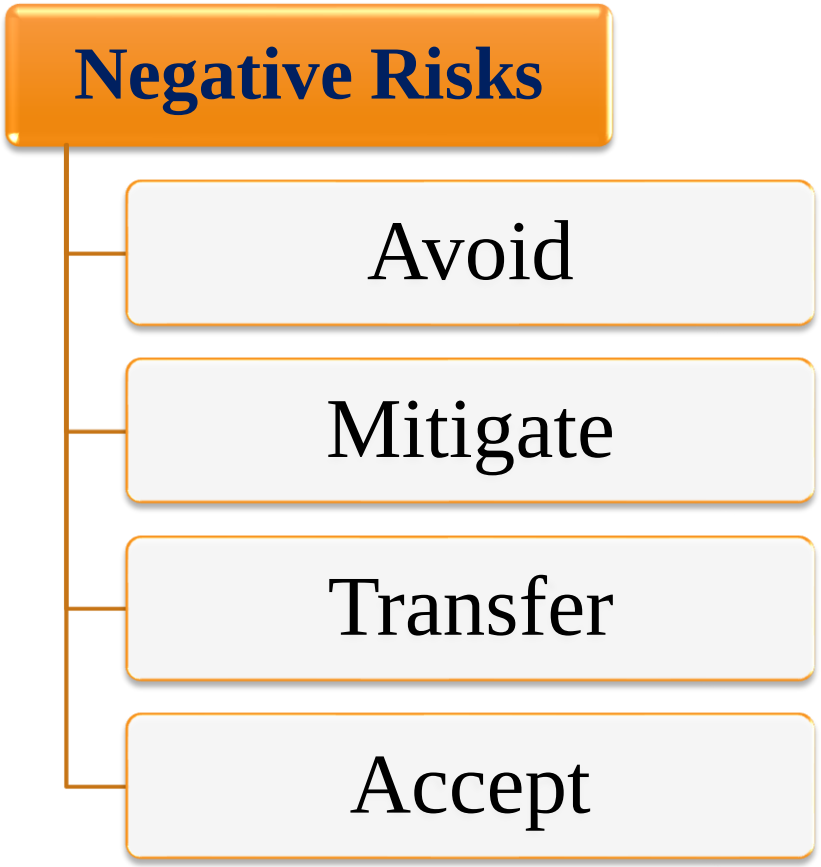
Impact × Probability × Detection = Risk Value

Risk Event	Likelihood	Impact	Detection Difficulty	When
Interface problems	4	4	4	Conversion
System freezing	2	5	5	Start-up
User backlash	4	3	3	Postinstallation
Hardware malfunctioning	1	5	5	Installation

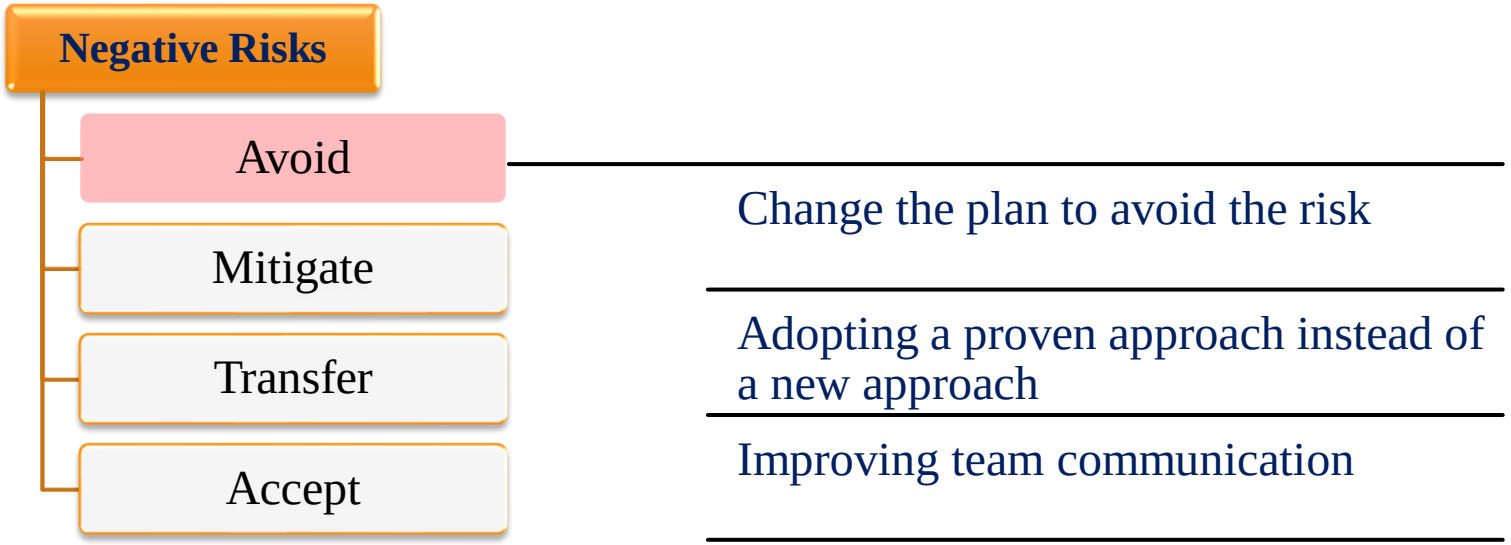
Step 3: Risk Response Plan



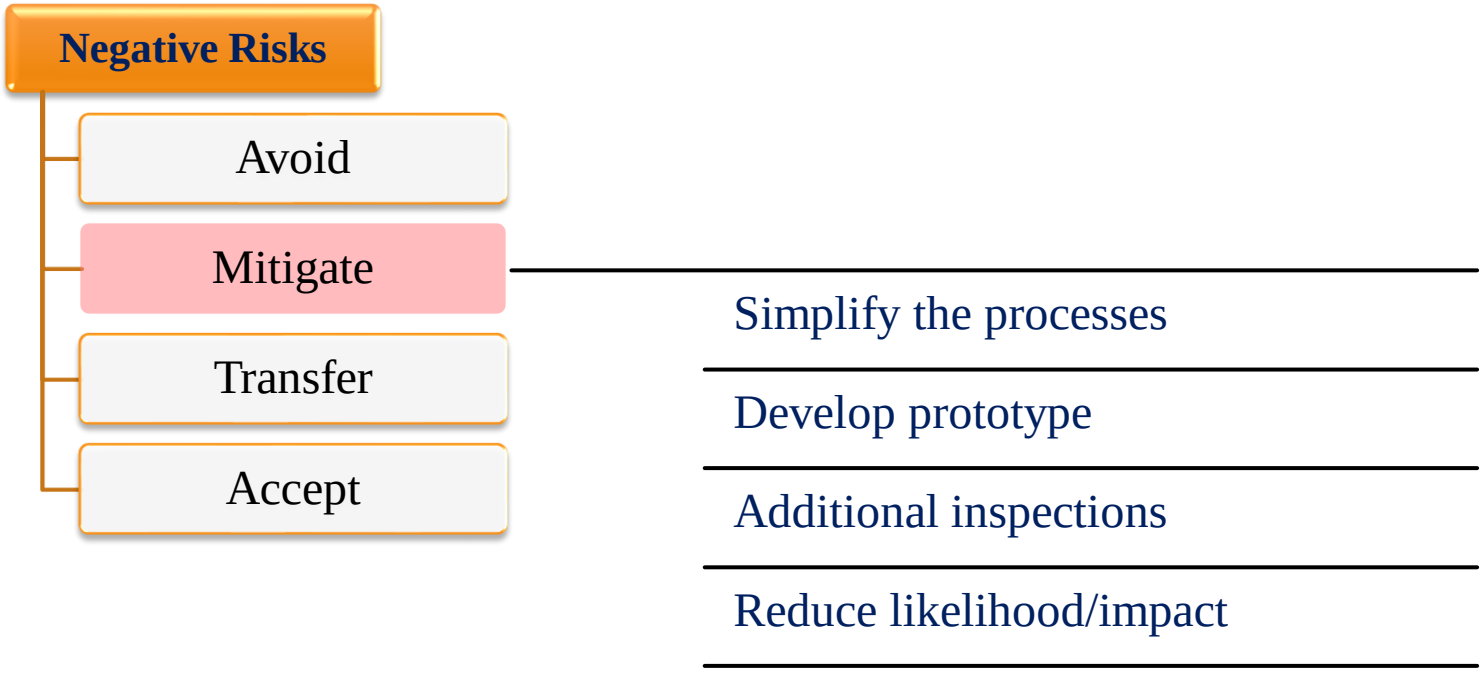
Step 3: Risk Response Plan



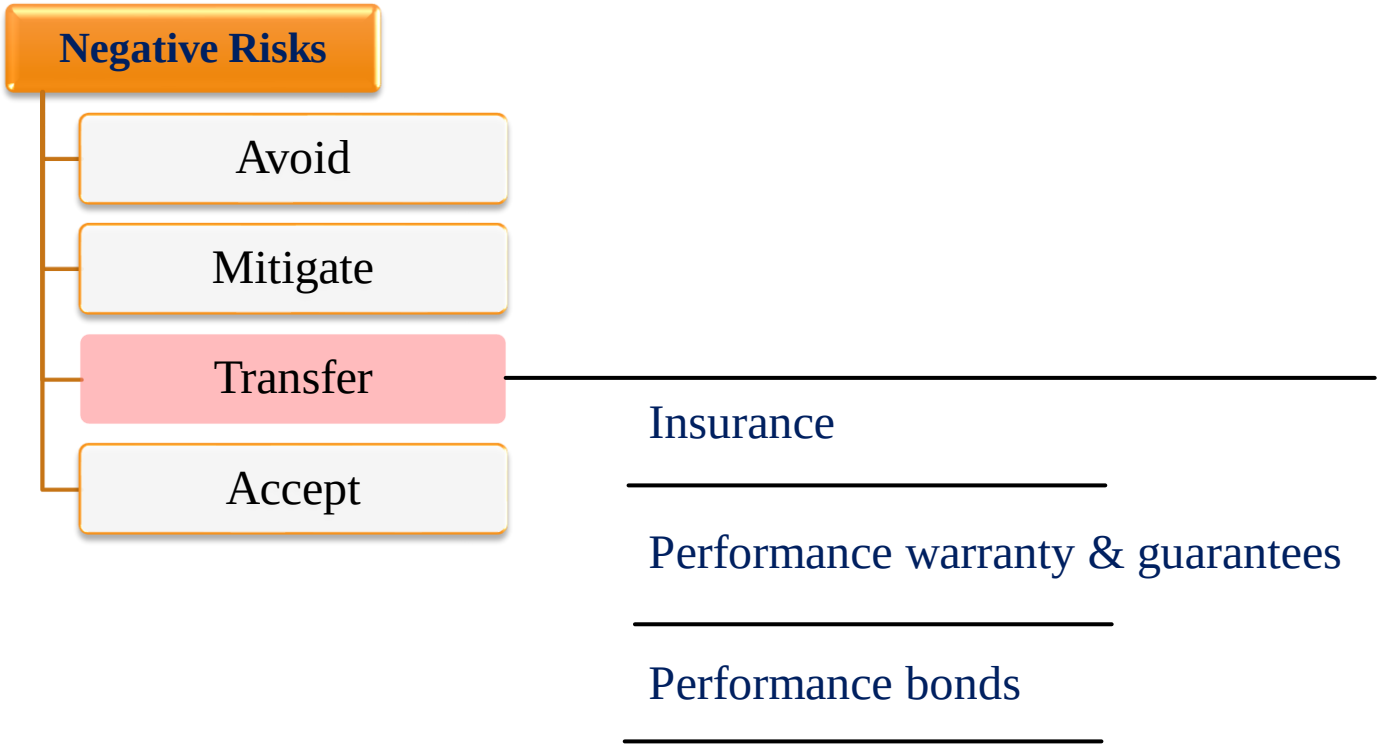
Step 3: Risk Response Plan



Step 3: Risk Response Plan



Step 3: Risk Response Plan



Step 3: Risk Response Plan

We have two types of risk acceptance:

- **Passive acceptance**: It means No plan created to deal with these
- **Active acceptance**: Contingency plan is created and we monitor risks

Step 4: Risk Monitoring and Control

- Identification of new risks
- Monitoring of previously identified risks
- Updating Risk management plan
- Maintaining communication between project team and risk management team
- Comprehensive project documentation
- Initiating contingency plans which represent the specific actions that will be taken if the risk occurs.
- Contingencies are directly linked to prioritization factors.
  - If the risk is a high priority you will want to identify multiple contingences,
  - If the risk falls in the middle range, you should stablish at least one contingency,
  - Those risks that fall in the lower level should not require much attention

Risk Management Example

Risk Event	Response	Contingency Plan	Trigger	Who Is Responsible
Interface problems	Mitigate: Test prototype	Work around until help comes	Not solved within 24 hours	Nils
System freezing	Mitigate: Test prototype	Reinstall OS	Still frozen after one hour	Emmylou
User backlash	Mitigate: Prototype demonstration	Increase staff support	Call from top management	Eddie
Equipment malfunctions	Mitigate: Select reliable vendor Transfer: Warranty	Order replacement	Equipment fails	Jim

Risks or Problems – What's the Difference?

- A risk is an uncertain future event that could have a negative effect (threat) or a positive effect (opportunity) on the project objectives.
- A problem statement describes a 100% certain condition that exists now and threatens achieving the project objectives.
- Problems are always negative, but risks can be positive (opportunities) or negative.
- Understanding the difference between a project risk (threat) and a problem is important because they are treated differently in project planning and execution.

Example: Problem vs. Risk

- We have insufficient resources to conduct the beta tests which will delay the project by one week

- We may have insufficient resources to conduct the beta tests which would delay the project by one week

Exercise 1: Mt Everest Climb

How would you apply the steps of risk management to this project?

Exercise 1: Practise Risk Management Process

Project: Mt Everest Climb

How would you apply the steps of risk management to this project?

Step 1 – Risk Identification
Generate a **list** of possible risks through brainstorming, problem identification and risk profiling.

- Macro risks first, then specific events

Example:

1. **Macro risk**–
   - **Risk events** –
     - _____
     - _____
2. _____
   - **Risk events** –
     - _____
     - _____
3. _____
   - **Risk events** –
     - _____
     - _____

Step 2& 3 – Risk Assessment
Scenario analysis for event probability and impact:
For this quick exercise, choose only your three TOP risk events from Step 2 for the following analysis.

Failure Mode and Effects Analysis (FMEA)

Risk Event	Likelihood	Impact	Detection Difficulty	Risk Value	Project Stage (When)
#1.					
#2.					
#3.					
#4.					

For table, use the Weights: 1 = 'low' to 10 = 'high' Write your risk events into the corresponding box.
Failure Mode and Effects Analysis (FMEA) → Likelihood × Impact × Detection = **Risk Value**

Step 4– Risk Treatment

Risk Event	Response*	Contingency Plan	Trigger	Who is Responsible
#1.				
#2.				
#3.				
#4.				

NOTE: Response can be either one of: Avoid, Mitigate, Transfer, or Accept

Exercise 2: OPSMGT 357-Group Project

Step 1 – Risk Identification
Generate a **list** of possible risks through brainstorming, problem identification and risk profiling.

- Macro risks first, then specific events

Example:

1. **Macro risk**–
   - **Risk events** –
     - _____
     - _____
2. _____
   - **Risk events** –
     - _____
     - _____
3. _____
   - **Risk events** –
     - _____
     - _____

Step 2& 3 – Risk Assessment
Scenario analysis for event probability and impact:
For this quick exercise, choose only your three TOP risk events from Step 2 for the following analysis.

Failure Mode and Effects Analysis (FMEA)

Risk Event	Likelihood	Impact	Detection Difficulty	Risk Value	Project Stage (When)
#1.					
#2.					
#3.					
#4.					

For table, use the Weights: 1 = 'low' to 10 = 'high' Write your risk events into the corresponding box.
Failure Mode and Effects Analysis (FMEA) → Likelihood × Impact × Detection = **Risk Value**

Step 4– Risk Treatment

Risk Event	Response*	Contingency Plan	Trigger	Who is Responsible
#1.				
#2.				
#3.				
#4.				

NOTE: Response can be either one of: Avoid, Mitigate, Transfer, or Accept

Today's Learning Objectives

- Discuss the importance of risk in a project and how it can be managed
- Explain the process of risk planning, risk assessment and risk control
- Determine quantitative or qualitative value of project risks and prioritize them in a risk management plan
- Describe tools used in risk management and how to use the effectively
- Explain the process of contingency planning in project management