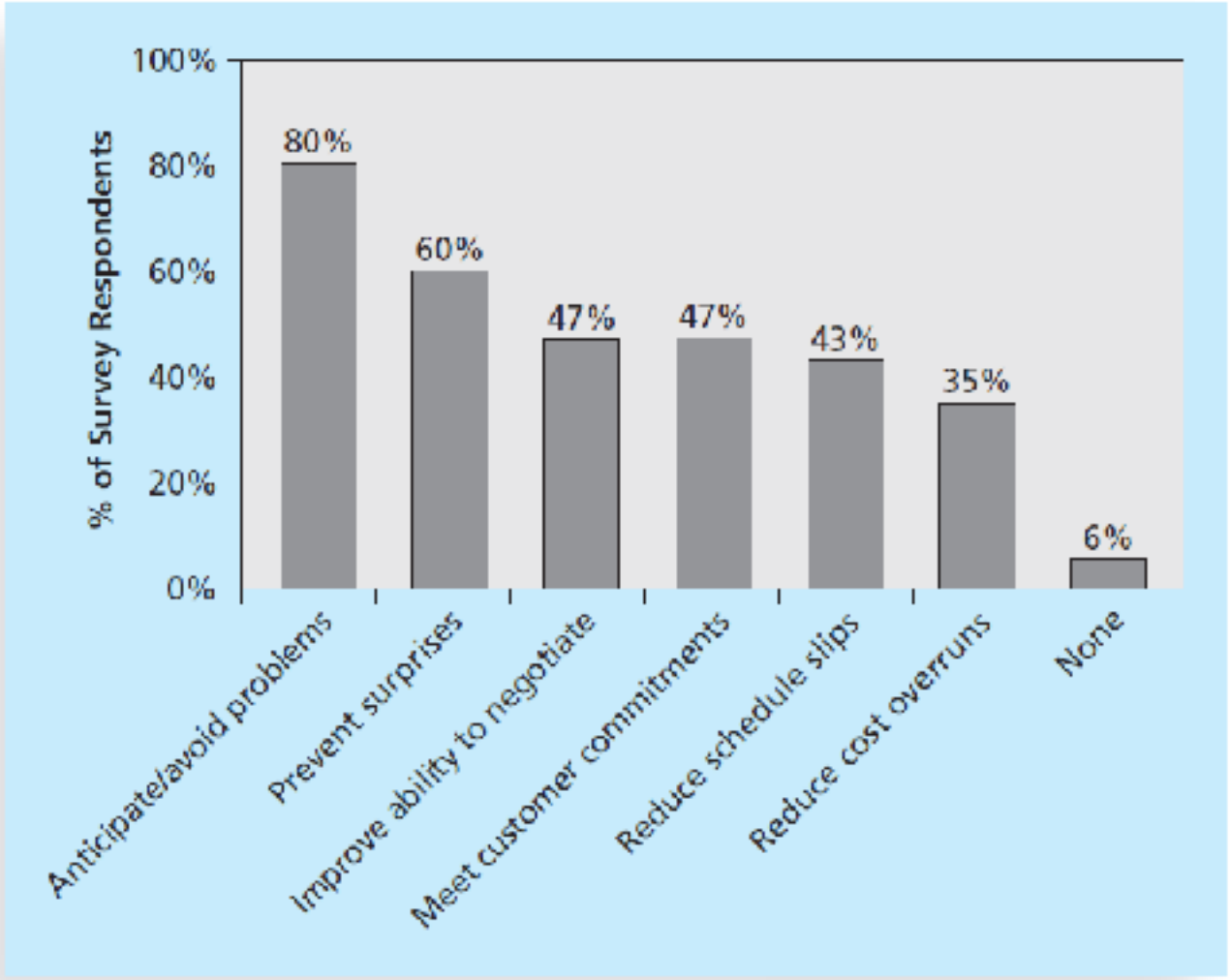
RISK MANAGEMENT

Risk Management

- art and science of identifying, analyzing, and responding to risk throughout the life of a project and in the best interests of meeting project objectives
- risk: a possibility of loss or injury
- risk: is an uncertainty that can have a negative or positive effect on meeting project objectives



Source: Kulik and Weber, KLCI Research Group

FIGURE 11-1 Benefits from software risk management practices

Risk Management

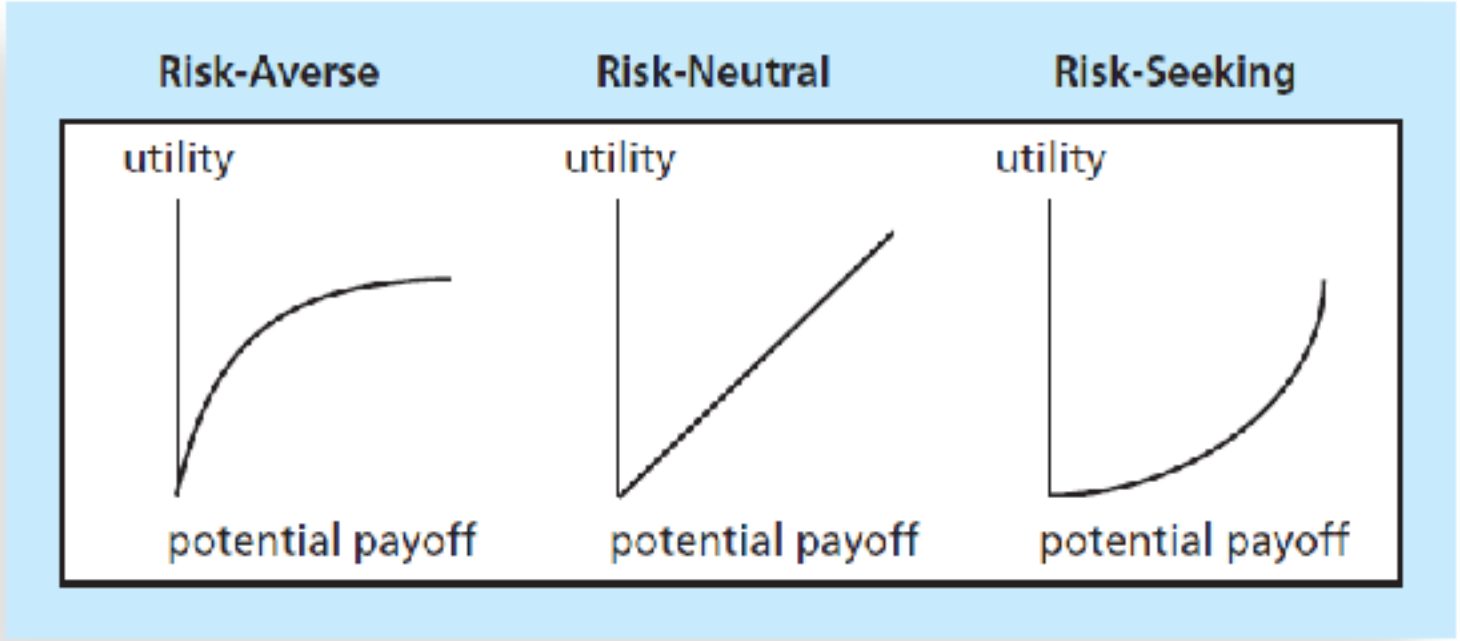
How to decide which projects to pursue?

How to identify and manage project risk throughout a project's life cycle?

Attitudes towards Risks

- Attitudes based on two themes
  - **Risk Appetite**: degree of uncertainty an entity is willing to take on, in anticipation of a reward
  - **Risk Tolerance**: maximum acceptable deviation an entity is willing to accept on the project or business objectives as the potential impact

Attitudes towards Risks



A **risk-averse** organization might not purchase hardware from a vendor who has not been in business for a specified period of time

A **risk-seeking** organization might deliberately choose start-up vendors for hardware purchases to gain new products with unusual features that provide an advantage.

A **risk-neutral** organization might perform a series of analyses to evaluate possible purchase decisions.

Risk utility is the amount of satisfaction or pleasure received from a potential payoff.

FIGURE 11-2 Risk utility function and risk preference

The goal of project risk management can be viewed as minimizing potential negative risks while maximizing potential positive risks.


Scoping
Planning
Execution
Monitoring and Controlling
Closing
Plan Risk Management
Identify Risks
Perform Qualitative Risk Analysis
Perform Quantitative Risk Analysis
Plan Risk Responses
Control Risk

Planning Risk Management

- process of deciding how to approach risk management activities and plan for them in a project
- **risk management plan** documents the procedures for managing risk throughout the project

Topic	Questions to Answer
Methodology	How will risk management be performed on this project? What tools and data sources are available and applicable?
Roles and Responsibilities	Which people are responsible for implementing specific tasks and providing deliverables related to risk management?
Budget and schedule	What are the estimated costs and schedules for performing risk-related activities?
Risk categories	What are the main categories of risks that should be addressed on this project? Is there a risk breakdown structure for the project?
Risk probability and impact	How will the probabilities and impacts of risk items be assessed? What scoring and interpretation methods will be used for the qualitative and quantitative analysis of risks? How will the probability and impact matrix be developed?
Revised stakeholders' tolerances	Have stakeholders' tolerances for risk changed? How will those changes affect the project?
Tracking	How will the team track risk management activities? How will lessons learned be documented and shared? How will risk management processes be audited?
Risk documentation	What reporting formats and processes will be used for risk management activities?

+ contingency plans, fallback plans, contingency reserves or allowances

- Contingency plans are predefined actions that the project team will take if an identified risk event occurs.
- Fallback plans are developed for risks that have a high impact on meeting project objectives, and are put into effect if attempts to reduce the risk do not work.
- Contingency reserves or allowances are provisions held by the project sponsor or organization to reduce the risk of cost or schedule overruns to an acceptable level.
  - Contingency reserves are for known risks
  - Management reserves are funds held for unknown risks

IDENTIFYING RISKS

Identifying Risks

- The process of understanding what potential events might hurt or enhance a particular project
- HOW?
  - Understanding the common sources of risks
  - Reviewing the project planning documents (cost, schedule, quality, hr)

Common Sources of Risks in IT Projects

TABLE 11-3 IT success potential scoring sheet

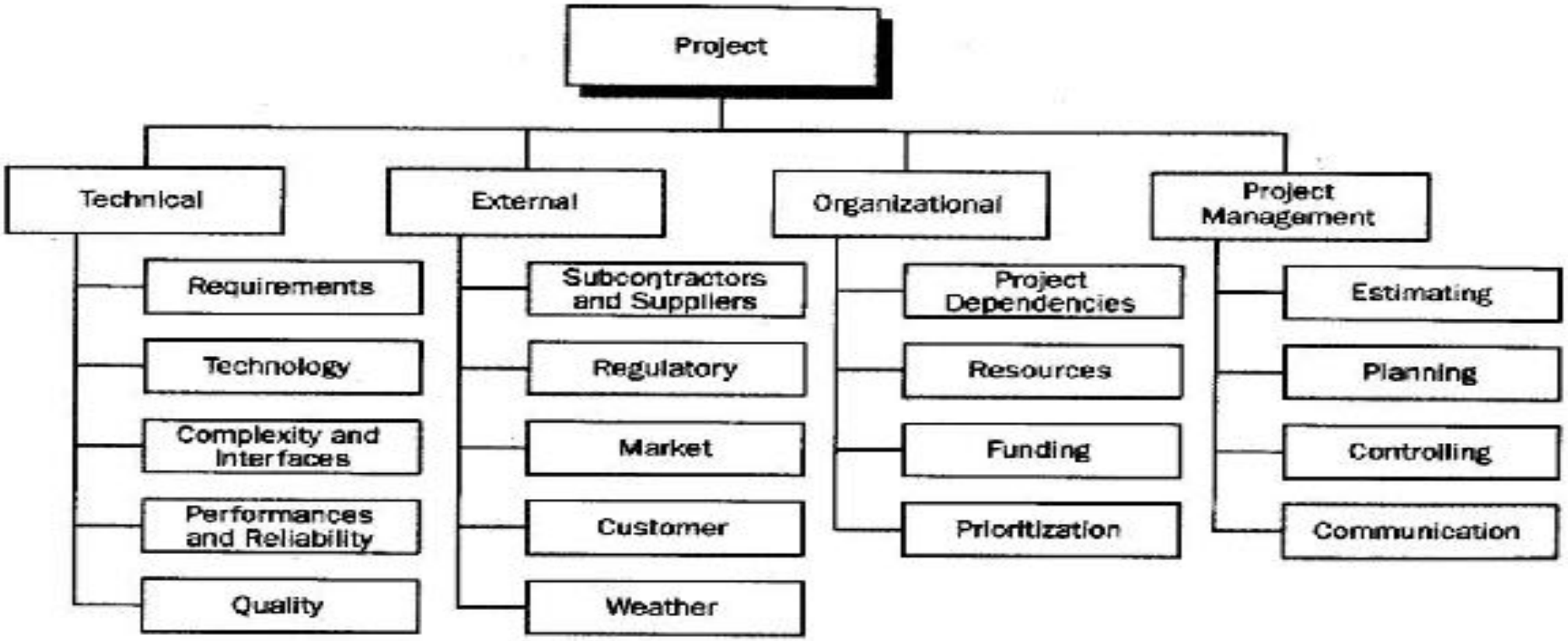
Success Criterion	Relative Importance
User involvement	19
Executive management support	16
Clear statement of requirements	15
Proper planning	11
Realistic expectations	10
Smaller project milestones	9
Competent staff	8
Ownership	6
Clear vision and objectives	3
Hard-working, focused staff	3
Total	100

Source: The Standish Group

Common Sources of Risks in IT Projects

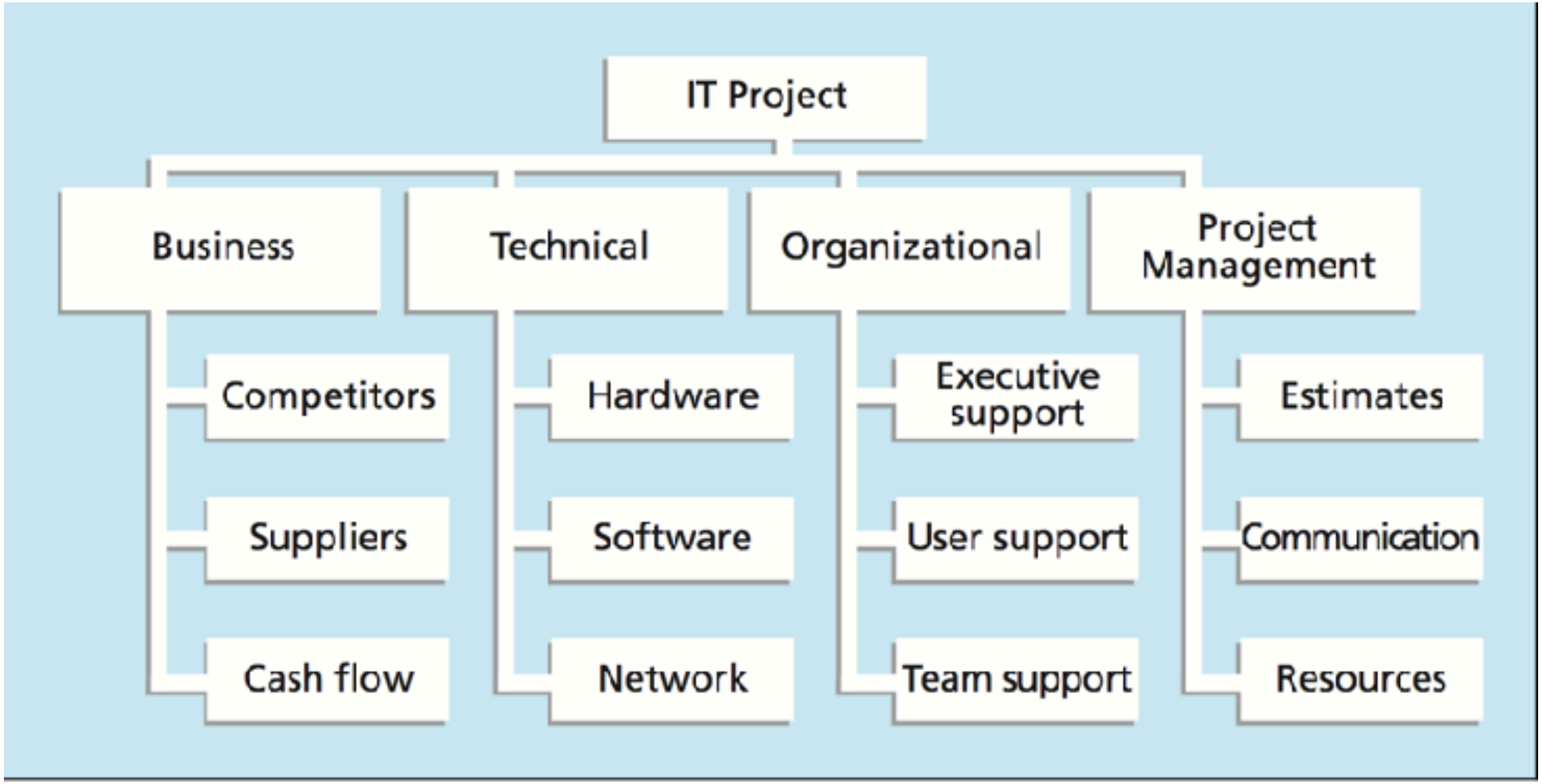
- **Market Risk**: Will the product be useful? Will someone come up with a better product?
- **Financial Risk**: Can the organization afford to undertake the project? Can the organization afford to continue the project?
- **Technology Risk**: Will the technology be available in time to meet project objectives?
- **People Risk**: Does the organization have people with appropriate skills to complete the project successfully?
- **Structure/Process Risk**: What degree of change will the new project introduce into user areas and business procedures? Does the organization have processes in place to complete the project successfully?

Risk Breakdown Structure



The Risk Breakdown Structure (RBS) lists the categories and sub-categories within which risks may arise for a typical project. Different RBSs will be appropriate for different types of projects and different types of organizations. One benefit of this approach is to remind participants in a risk identification exercise of the many sources from which project risk may arise.

Risk Breakdown Structure



Risk Register

- A risk register is a tool for documenting potential risk events and related information
- Risk events refer to specific, uncertain events that may occur to the detriment or enhancement of the project

No.	Risk	Description	Category	Root Cause	Triggers	Risk Owner
R44	New Customer	We have never done a project for this organization before and don't know too much about them. One of our company's strengths is building good customer relationships, which often leads to further projects with that customer. We might have trouble working with this customer because they are new to us.	People Risk	We won a contract to work on a project without really getting to know the customer.	The project manager and other senior managers realize that we don't know much about this customer and could easily misunderstand their needs or expectations.	Manager
R45	No Test Hardware	The project tests to be done on actual hardware but both our company and the client does not have the hardware yet.	Technical - Hardware	We accepted a project even without existing hardware resources	SE will need to run unit tests on hardware.	QA

Elements of a Risk Register

- An identification number for each risk event: The project team may want to sort by risk events or quickly search for specific risk events, so they need to identify each risk with a unique descriptor, such as an identification number.
- A rank for each risk event: The rank is usually a number, with 1 representing the highest risk.
- The name of the risk event: Example names include defective server, late completion of testing, reduced consulting costs, and good publicity.
- A description of the risk event: Because the name of a risk event is often abbreviated, it helps to provide a more detailed description

Elements of a Risk Register

- The category under which the risk event falls: For example, defective server might fall under the broader category of technology or hardware technology.
- The root cause of the risk: The root cause of the defective server might be a defective power supply.
- Triggers for each risk: Triggers are indicators or symptoms of actual risk events
- Potential responses to each risk: A potential response to the defective server might be to include a clause in the supplier's contract to replace the server within a certain time period at a negotiated cost.
- The risk owner or person who will take responsibility for the risk: For example, a certain person might be in charge of any server-related risk events and managing response strategies.

Elements of a Risk Register

- The probability of the risk occurring: There might be a high, medium, or low probability of a certain risk event.
- The impact to the project if the risk occurs: There might be a high, medium, or low impact to project success if the risk event actually occurs
- The status of the risk: Did the risk event occur? Was the response strategy completed? Is the risk no longer relevant to the project?

Exercise

- Create a Risk Breakdown Structure for your Web Engineering Project
- For each category or sub-category, identify the specific risks create a Risk Register.
- Submit on Monday.

RISK ANALYSIS AND RISK RESPONSE

Performing Qualitative Risk Analysis

- Qualitative risk analysis involves assessing the likelihood and impact of identified risks to determine their **magnitude** and **priority**

Probability/Impact Matrix

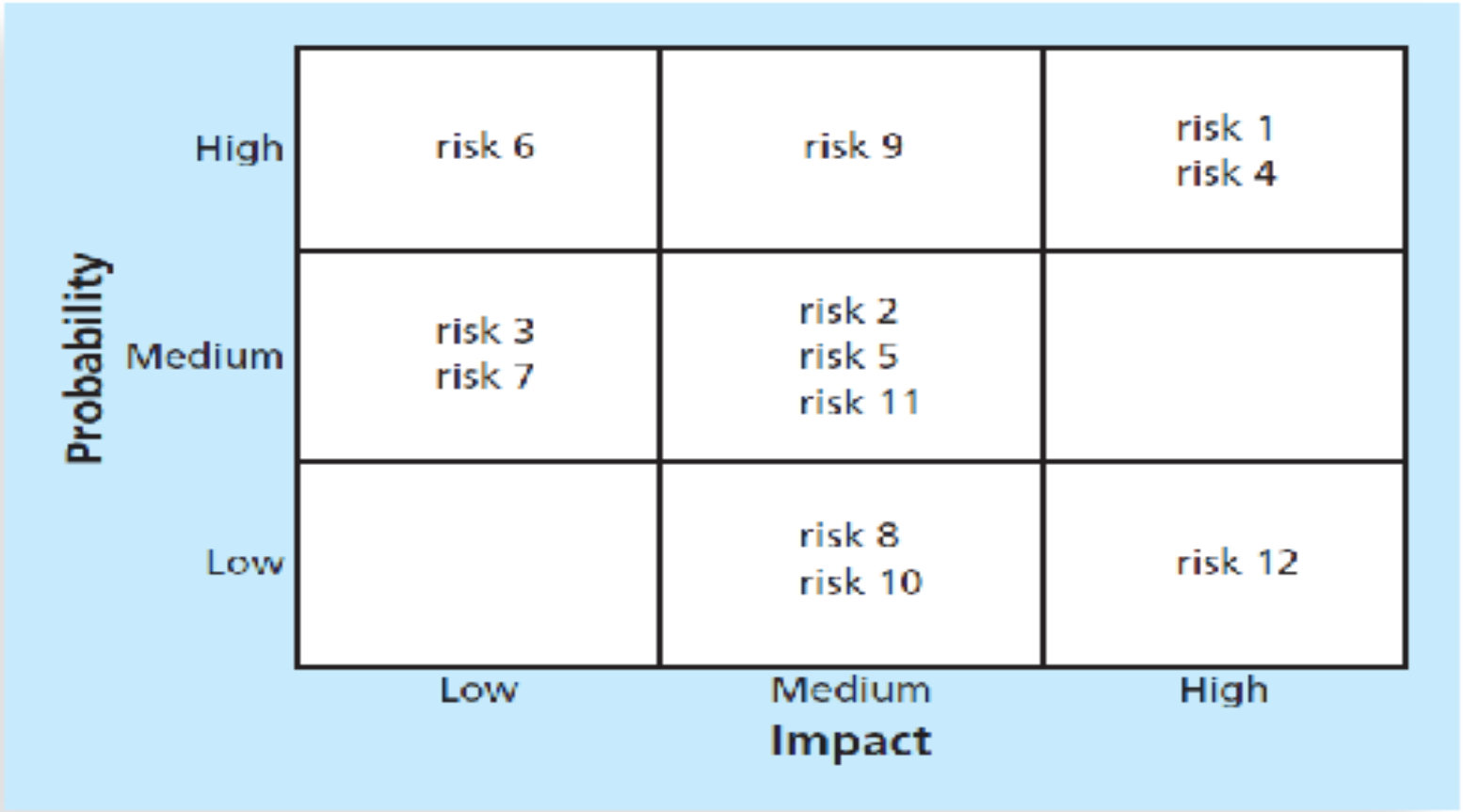


FIGURE 11-5 Sample probability/impact matrix

- ✓lists the risks that might occurs on the project
- ✓label each risk as high, medium or low based on probability of occurring and impact

- ◉create separate matrix for positive and negative risks

Probability/Impact Matrix

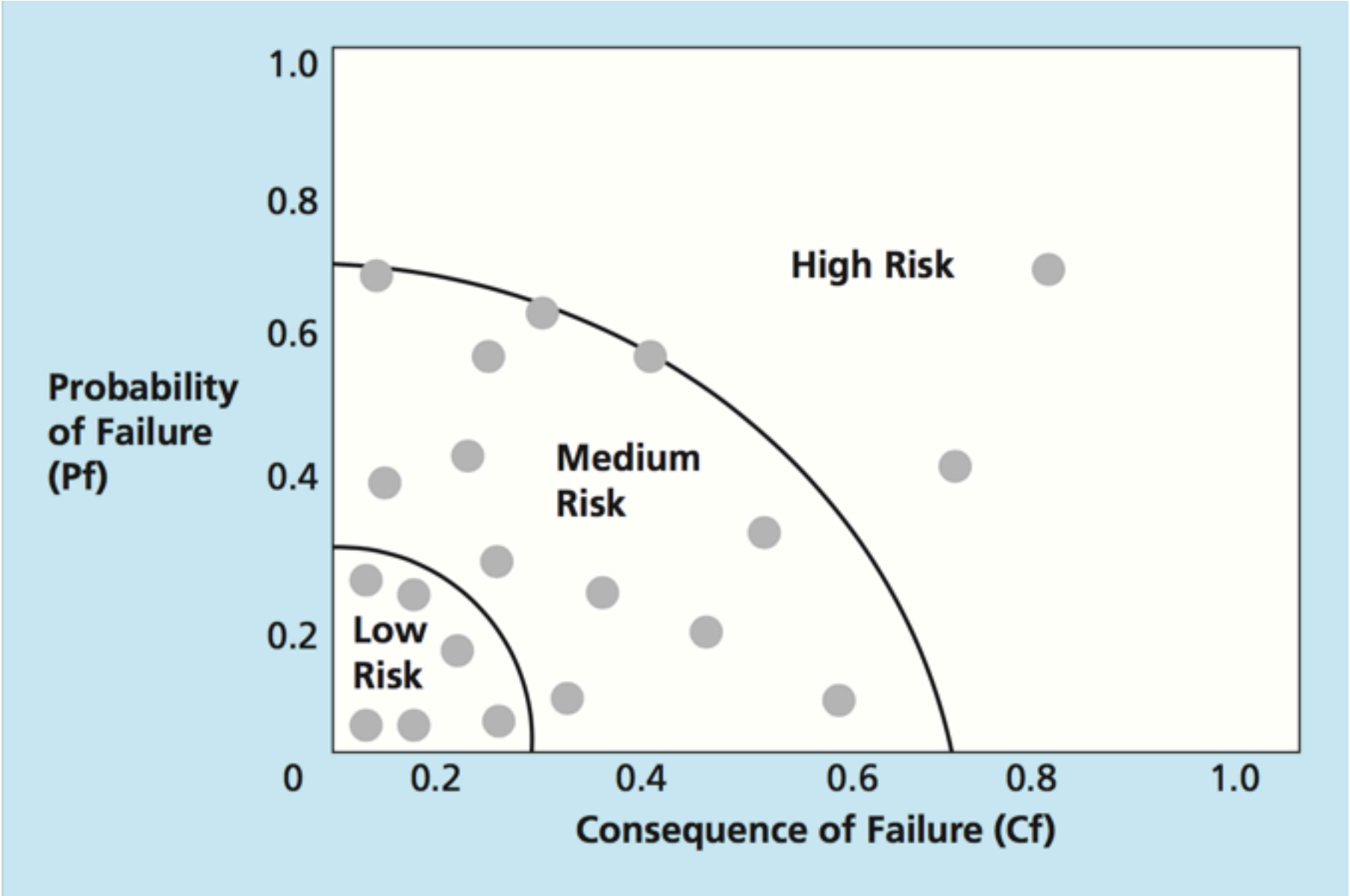
Probability and Impact Matrix

Probability	Threats					Opportunities				
0.90	0.05	0.09	0.18	0.36	0.72	0.72	0.36	0.18	0.09	0.05
0.70	0.04	0.07	0.14	0.28	0.56	0.56	0.28	0.14	0.07	0.04
0.50	0.03	0.05	0.10	0.20	0.40	0.40	0.20	0.10	0.05	0.03
0.30	0.02	0.03	0.06	0.12	0.24	0.24	0.12	0.06	0.03	0.02
0.10	0.01	0.01	0.02	0.04	0.08	0.08	0.04	0.02	0.01	0.01
	0.05/ Very Low	0.10/ Low	0.20/ Moderate	0.40/ High	0.80/ Very High	0.80/ Very High	0.40/ High	0.20/ Moderate	0.10/ Low	0.05/ Very Low

Impact (numerical scale) on an objective (e.g., cost, time, scope or quality)

Each risk is rated on its probability of occurring and impact on an objective if it does occur. The organization's thresholds for low, moderate or high risks are shown in the matrix and determine whether the risk is scored as high, moderate or low for that objective.

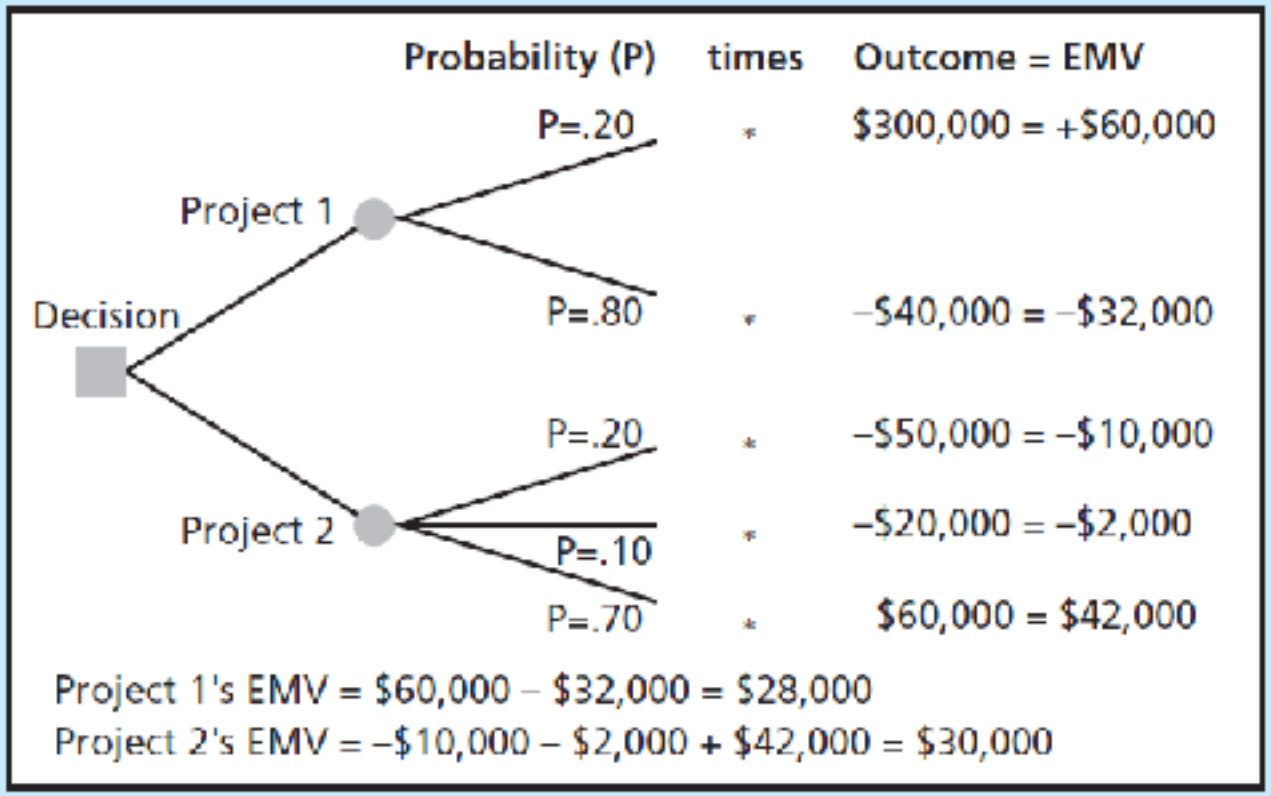
Risk factor


1.0
0.8
0.6
0.4
0.2
0
0.2
0.4
0.6
0.8
1.0
Probability of Failure (Pf)
Consequence of Failure (Cf)
High Risk
Medium Risk
Low Risk

Performing Quantitative Risk Analysis

- Quantitative risk analysis often follows qualitative risk analysis, yet both processes can be done together or separately
- Quantify in terms of money

Decision Trees and Expected Monetary Value (EVM)



A decision tree is a diagramming analysis technique used to help select the best course of action when future outcomes are uncertain.

Probabilities are normally determined based on expert judgment

Expected monetary value (EMV) is the product of a risk event probability and the risk event's monetary value

Planning Risk Responses

- develop options and defining strategies for reducing negative risks and enhancing positive risks

Planning Risk Responses

Risk avoidance or eliminating a specific threat, usually by eliminating its causes.

Risk acceptance or accepting the consequences if a risk occurs.

Risk transference or shifting the consequence of a risk and responsibility for its management to a third party.

Risk mitigation or reducing the impact of a risk event by reducing the probability of its occurrence.

+ contingency and fallback plans
+ secondary and residual risks

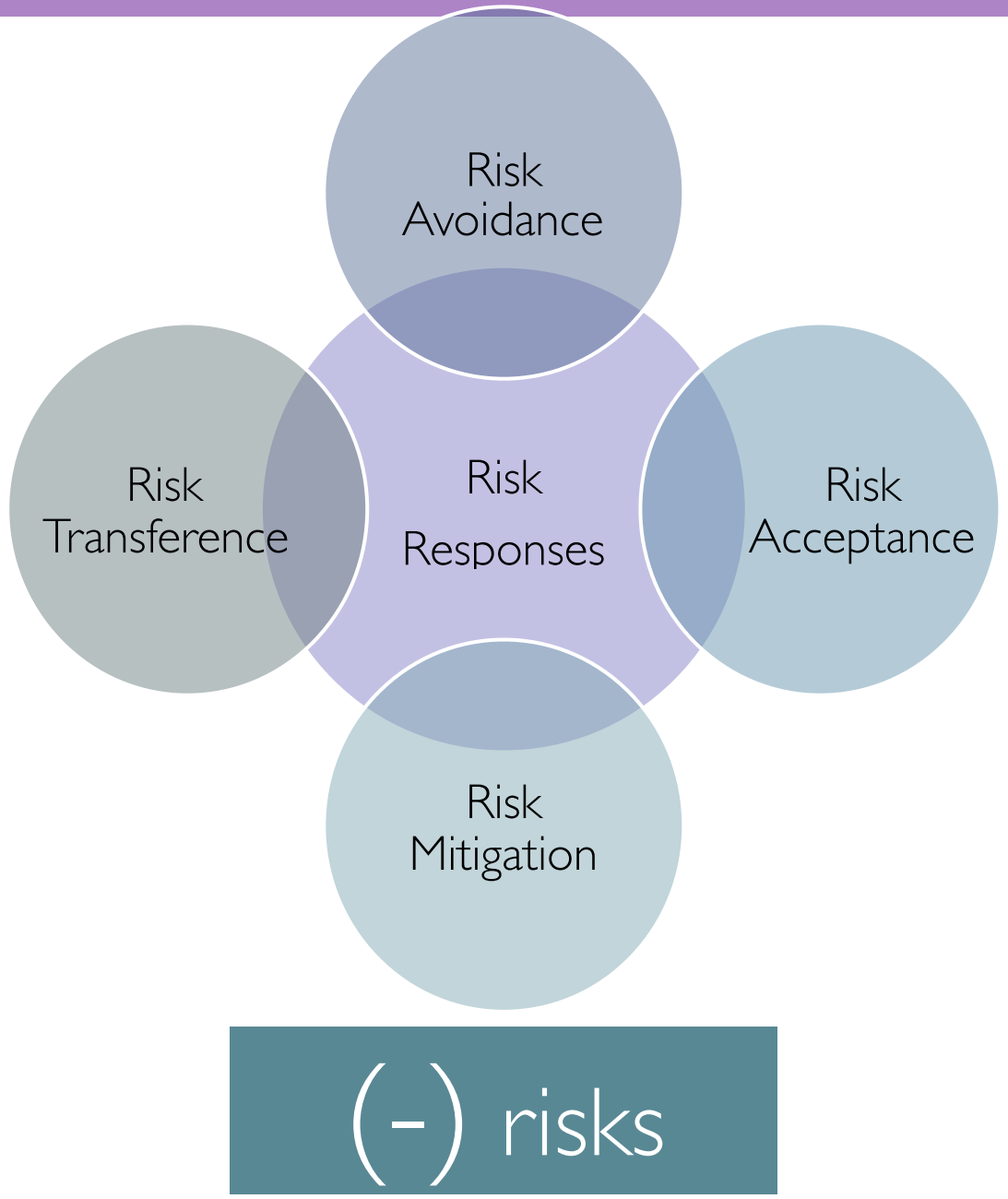


TABLE 11-7 General risk mitigation strategies for technical, cost, and schedule risks

Technical Risks	Cost Risks	Schedule Risks
Emphasize team support and avoid stand-alone project structure	Increase the frequency of project monitoring	Increase the frequency of project monitoring
Increase project manager authority	Use WBS and CPM	Use WBS and CPM
Improve problem handling and communication	Improve communication, understanding of project goals, and team support	Select the most experienced project manager
Increase the frequency of project monitoring	Increase project manager authority	
Use WBS and CPM		

Source: J. Couillard

Planning Risk Responses

Risk exploitation or doing whatever you can to make sure the positive risk happens.

Risk sharing or allocating ownership of the risk to another party.

Risk enhancement or changing the size of the opportunity by identifying and maximizing key drivers of the positive risk.

Risk acceptance also applies to positive risks when the project team does not take any actions toward a risk.

(+) risks

Controlling Risks

- executing the risk management processes to respond to risk events and ensuring that risk awareness is an ongoing activity performed by the entire project team throughout the entire project
  - Identified risks may not materialize
  - probabilities of occurrence or loss may diminish
  - Previously identified risks may be determined to have a greater probability of occurrence or a higher estimated loss value
  - new risks will be identified as the project progresses