MONASH University

Information Technology

FIT2002
IT Project Management

Lecture 7
Project Risk Management

Video 1:
Learning Objectives

- Understand risk and the importance of good project risk management
- Discuss the elements of planning risk management and the contents of a risk management plan

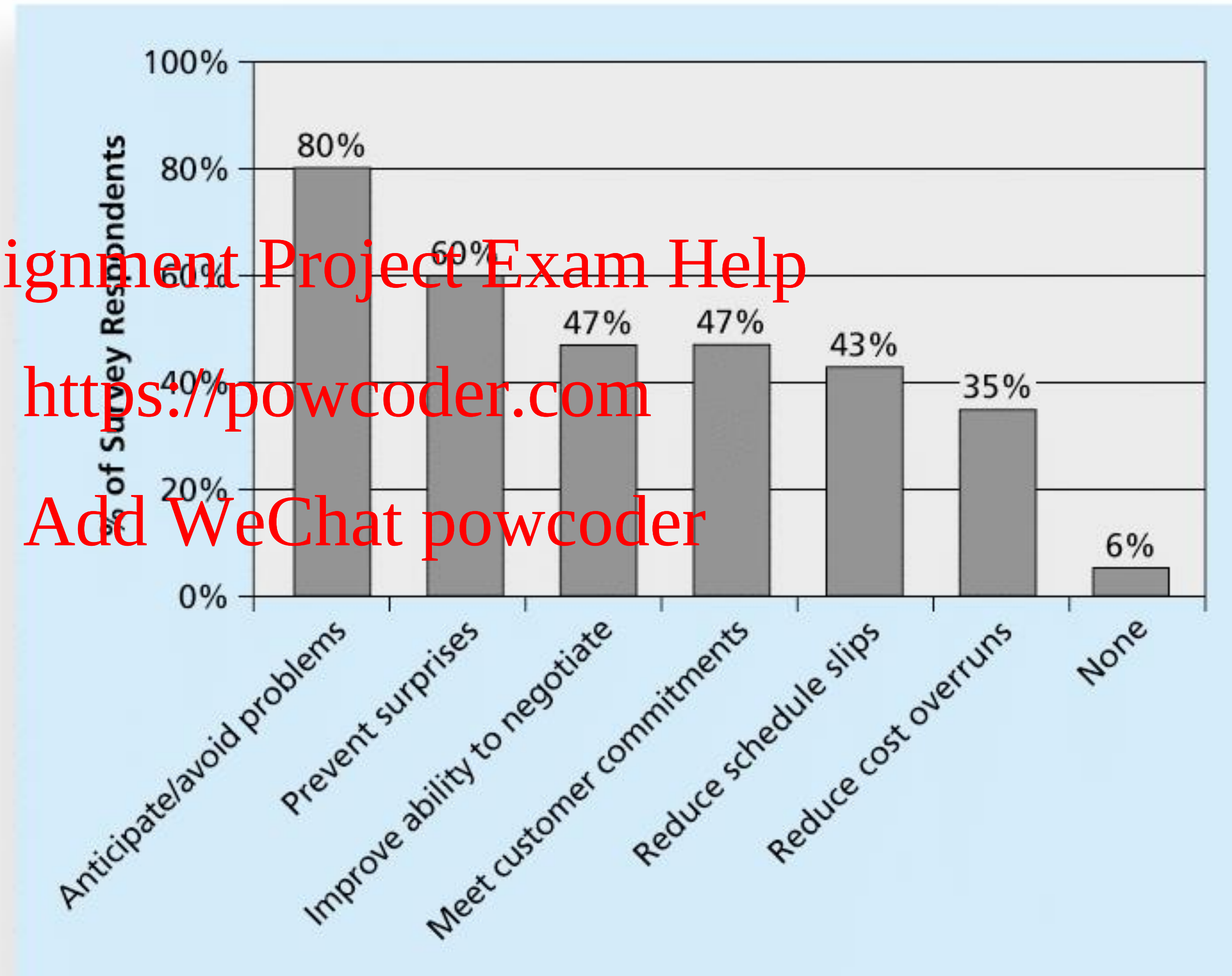
The Importance of Project Risk Management

- Project risk management is the art and science of identifying, analysing, and responding to risk throughout the life of a project and in the best interests of meeting project objectives

- Risk management is often overlooked in projects, but it can help improve project success by helping select good projects, determining project scope, and developing realistic estimates

- Helps project stakeholders understand the nature of the project, and helps to integrate other project management knowledge areas.

Benefits from Software Risk Management Practices*



*Source: Kulik and Weber, KLCI Research Group

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Global Issues

- According to a global survey of 316 financial services executives, over 70 percent of respondents believed that the losses stemming from the credit crisis were largely due to failures to address risk management issues
- Worldwide banking and insurance sectors will spend about $78.6 billion on risk information technologies and services in 2015, growing to $96.3 billion by 2018

Negative Risk

- A dictionary definition of risk is "the possibility of loss or injury"
- **Negative risk** involves understanding potential problems that might occur in the project and how they might impede project success
- Managing negative risks involves a number of possible actions such as to **avoid**, **lessen**, **change**, or **accept** the potential effects of risks on projects

Risk Can Be Positive

- Positive risks are risks that result in good things happening; sometimes called **opportunities**
- A general definition of project risk is an **uncertainty** that can have a **negative** or **positive** effect on meeting project objectives
- The goal of project risk management is to minimize potential negative risks while maximizing potential positive risks

Risk Management

- Risk management is an investment—costs are associated with it
- Cost for risk management should not exceed the potential benefits
- Organisation should not only address tactical and negative risks
- David Hillson, (www.risk-doctor.com) suggests to as integrated risk management by widening the scope of risk management to encompass both strategic risks and upside opportunities

Some ‘Risk’ Terms

- **Risk appetite** – the degree of uncertainty an entity is willing to take on, in anticipation of a reward
- **Risk tolerance** – the maximum acceptable deviation an entity is willing to accept as the potential impact.
- **Risk utility** is the amount of satisfaction or pleasure received from a potential payoff
- **Known risks –** Risks that the project team has identified and analyzed and that can be managed proactively.
- **Unknown risks –** Risks that have not been identified and analysed and cannot be managed.

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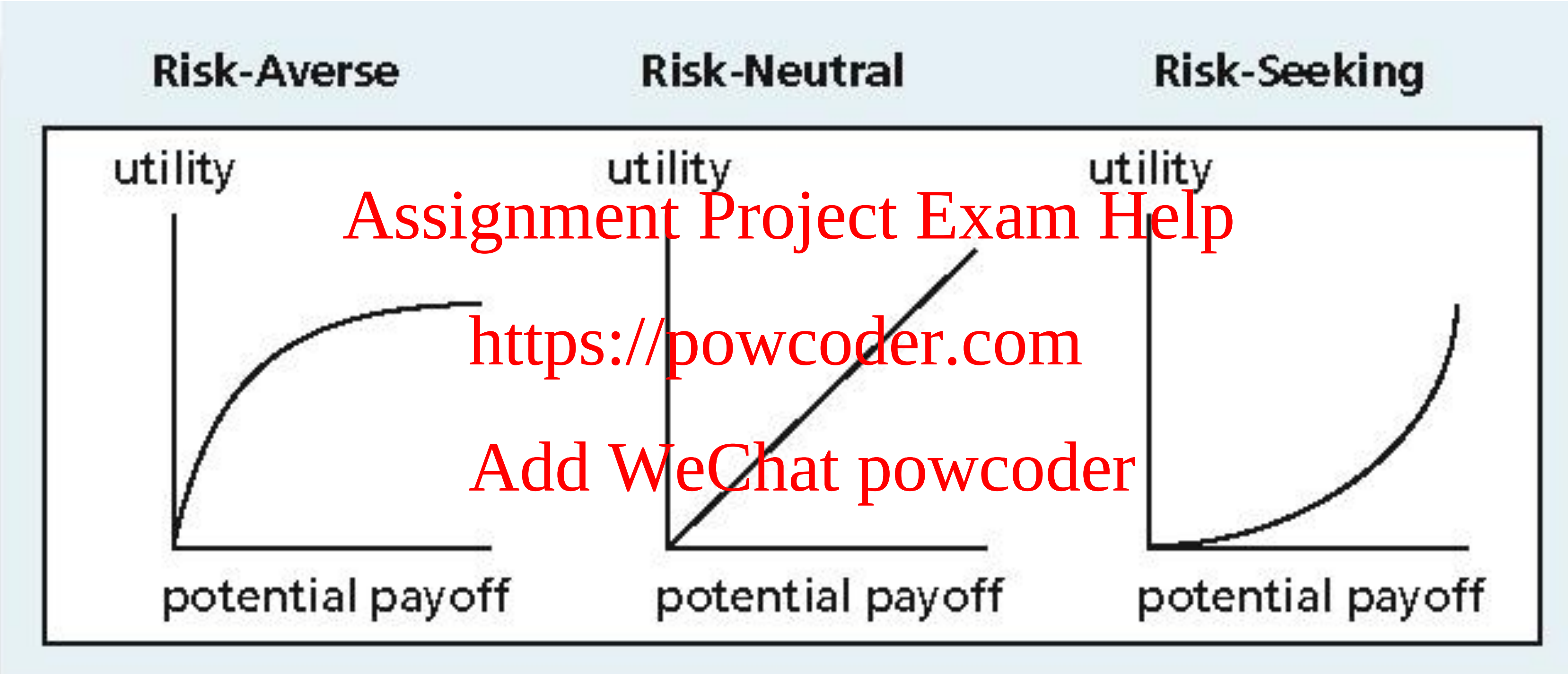
Risk Utility Function and Risk Preference



Utility rises at a decreasing rate for people who are risk-averse

Risk-neutral approach achieves a balance between risk and payoff

Risk-seekers have a higher tolerance for risk & satisfaction increases with higher payoffs

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Project Risk Management Processes

- **Planning risk management** : Deciding how to approach and plan the risk management activities for the project
- **Identifying risks:** Determining which risks are likely to affect a project and documenting the characteristics of each
- **Performing qualitative risk analysis**: Prioritizing risks based on their probability and impact of occurrence

Project Risk Management Processes (cont'd)

- **Performing quantitative risk analysis**: Numerically estimating the effects of risks on project objectives
- **Planning risk responses**: Taking steps to enhance opportunities and reduce threats to meeting project objectives
- **Controlling risk**: Monitoring identified and residual risks, identifying new risks, carrying out risk response plans, and evaluating the effectiveness of risk strategies throughout the life of the project

Project Risk Management Summary

Planning
Process: **Plan risk management**
Outputs: Risk management plan
Process: **Identify risks**
Outputs: Risk register
Process: **Perform qualitative risk analysis**
Outputs: Project documents updates
Process: **Perform quantitative risk analysis**
Outputs: Project documents updates
Process: **Plan risk responses**
Outputs: Project management plan updates, project documents updates

Monitoring and Controlling
Process: **Control risks**
Outputs: Work performance information, change requests, project management plan updates, project documents updates, organizational process assets updates

Project Start **Project Finish**

Planning Risk Management

- The main output of this process is a **risk management plan**—a plan that documents the procedures for managing risk throughout a project
- The project team should review project documents and understand the organization's and the sponsor's approaches to risk
- The level of detail will vary with the needs of the project

Topics Addressed in a Risk Management Plan

- Methodology
- Roles and responsibilities
- Budget and schedule
- Risk categories
- Risk probability and impact
- Revised stakeholders’ tolerances
- Tracking
- Risk documentation

Video 2:
Learning Objectives

- Discuss the different categories of risk
- Describe a risk breakdown structure
- Describe the process of identifying risks and create a risk register (in supplementary video)

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 Visions and Objectives	3
Hard-Working, Focused Staff	3
Total	**100**

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Broad Categories of Risk

- Market risk
- Financial risk
- Technology risk
- People risk
- Structure/process risk

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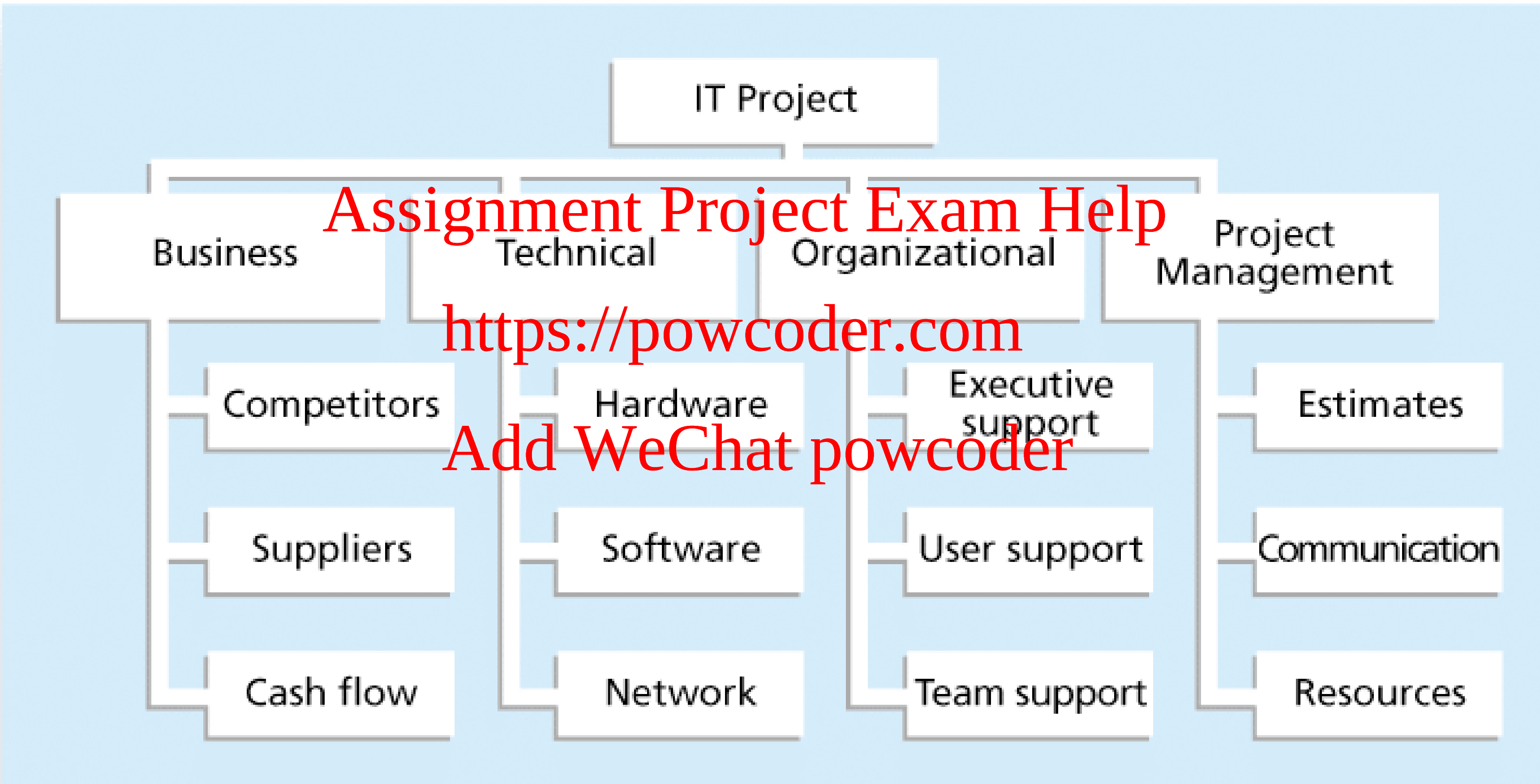
Risk Breakdown Structure

- A **risk breakdown structure** is a hierarchy of potential risk categories for a project

- Similar to a work breakdown structure but used to identify and categorize risks

Sample Risk Breakdown Structure



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Potential Negative 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
Time	Errors in estimating time or resource availability; errors in determining the critical path; poor allocation and management of float; early release of competitive products
Cost	Estimating errors; inadequate productivity, cost, change, or contingency
Quality	Poor attitude toward quality; substandard design, materials, and workmanship; inadequate quality assurance program
Human resource	Poor conflict management; poor project organization and definition of responsibilities; absence of leadership
Communications	Carelessness in planning or communicating
Risk	Ignoring risk; unclear analysis of risk; poor insurance management
Procurement	Unenforceable conditions or contract clauses; adversarial relations
Stakeholders	Lack of consultation with key stakeholder

Identifying Risks

- Identifying risks is the process of understanding what potential events might hurt or enhance a particular project
- Another consideration is the likelihood of advanced discovery
- Risk identification tools and techniques include:
  - Brainstorming
  - The Delphi Technique
  - Interviewing
  - SWOT analysis

Brainstorming

- **Brainstorming** is a technique by which a group attempts to generate ideas or find a solution for a specific problem by amassing ideas spontaneously and without judgment
- An experienced facilitator should run the brainstorming session
- Be careful not to overuse or misuse brainstorming.
  - Psychology literature shows that individuals produce a greater number of ideas working alone than they do through brainstorming in small, face-to-face groups
  - Group effects often inhibit idea generation

Delphi Technique

- The **Delphi Technique** is used to derive a consensus among a panel of experts
- It is a **systematic, interactive** procedure based on independent and **anonymous** input from project risk experts.
- Facilitator uses repeated rounds of questioning and written responses and consensus may be reached in a few rounds of this process
- It avoids the biasing effects possible in oral methods, such as brainstorming

Interviewing

- **Interviewing** is a fact-finding technique for collecting information in face-to-face, phone, e-mail, or instant-messaging discussions

- Interviewing people with similar project experience or stakeholders and subject matter experts is an important tool for identifying potential risks

Root Cause Analysis and SWOT Analysis

- **Root cause analysis** – a technique used to identify a problem, discover the underlying causes and then develop preventive measures

- **SWOT analysis** (strengths, weaknesses, opportunities, and threats) can also be used during risk identification

- SWOT analysis helps identify the broad negative and positive risks that apply to a project

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Diagramming Techniques

- **Cause and effect diagrams** – also known as Ishikawa or fishbone diagram
- **Systems or process flowchart** – show how various elements of a system interrelate
- **Influence diagram** – showing causal influences and relationships among variables and outcomes

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Risk Register

- The main output of the risk identification process is a list of identified risks and other information needed to begin creating a risk register

- A **risk register** is:

  – A document that contains the results of various risk management processes often presented in a table

  – A tool for documenting potential risk events and related information

- **Risk events** refer to specific, uncertain events that may occur
  – to the detriment (due to negative risk event) or
  – enhancement (due to positive risk event) of the project

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Sample Risk Register

No.	Rank	Risk	Description	Category	Root Cause	Triggers	Potential Responses	Risk Owner	Probability	Impact	Status
R44	1										
R21	2										
R7	3										

- No.: R44
- Rank: 1
- Risk: New customer
- Description: 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.
- Category: People risk
- Etc.

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Risk Register Contents

- An identification number for each risk event
- A rank for each risk event
- The name of each risk event
- A description of each risk event
- The category under which each risk event falls
- The root cause of each risk

Risk Register Contents (cont'd)

- Triggers for each risk; **triggers** are indicators or symptoms of actual risk events
- Potential responses to each risk
- The **risk owner** or person who will own or take responsibility for each risk
- The probability and impact of each risk occurring.
- The status of each risk

Video 3:
Learning Objectives

- Discuss qualitative risk analysis
- Explain how to calculate risk factors, create probability/impact matrixes and apply the Top Ten Risk Item Tracking technique to rank risks

Performing Qualitative Risk Analysis

- Assess the likelihood and impact of identified risks to determine their magnitude and priority
- Risk quantification tools and techniques include:
  - Probability/impact matrixes
  - The Top Ten Risk Item Tracking
  - Expert judgment

Probability/Impact Matrix

- A **probability/impact matrix** or **chart** lists the relative probability of a risk occurring on one side of a matrix or axis on a chart and the relative impact of the risk occurring on the other
- List the risks and then label each one as high, medium, or low in terms of its probability of occurrence and its impact if it did occur
- Can also calculate **risk factors**:
  - Numbers that represent the overall risk of specific events based on their probability of occurring and the consequences to the project if they do occur

Sample Probability/Impact Matrix

Probability \ Impact	Low	Medium	High
High	risk 6	risk 9	risk 1 risk 4
Medium	risk 3 risk 7	risk 2 risk 5 risk 11	
Low		risk 8 risk 10	risk 12

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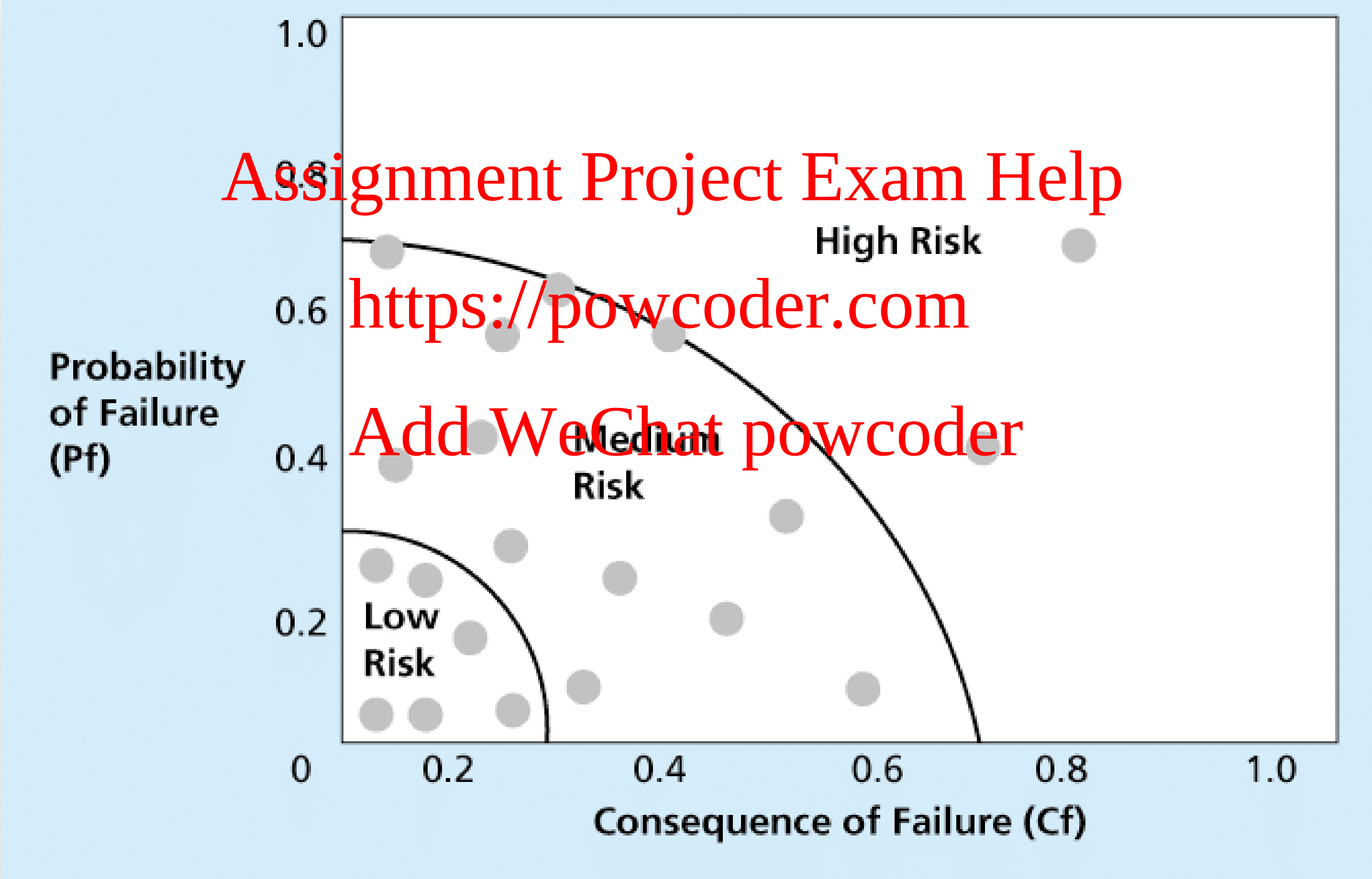
Chart Showing High-, Medium-, and Low-Risk Technologies



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Top Ten Risk Item Tracking

- **Top Ten Risk Item Tracking** is a qualitative risk analysis tool that helps to identify risks and maintain an awareness of risks throughout the life of a project

- Establish a periodic review of the top ten project risk items

- List the current ranking, previous ranking, number of times the risk appears on the list over a period of time, and a summary of progress made in resolving the risk item

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Example of Top Ten Risk Item Tracking

	Monthly Ranking			
Risk Event	Rank This Month	Rank Last Month	Number of Months in Top Ten	Risk Resolution Progress
Inadequate planning	1	2	4	Working on revising the entire project management plan
Poor definition	2	3	3	Holding meetings with project customer and sponsor to clarify scope
Absence of leadership	3	1	2	After previous project manager quit, assigned a new one to lead the project
Poor cost estimates	4	4	3	Revising cost estimates
Poor time estimates	5	5	3	Revising schedule estimates

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Risk Management Review

- **Objectives** of risk management review:
  - keeps management (and probably customer) aware of major influences that could prevent or enhance the project's success;
  - to consider alternative strategies for addressing the risks;
  - promotes confidence in the project team by demonstrating that the team is aware of significant risks, has a strategy in place and is effectively carrying out that strategy
- A **watch list** is a list of risks that are low priority, but are still identified as potential risks
- Qualitative analysis can also identify risks that should be evaluated on a quantitative basis

Video 4:
Learning Objectives

- Explain quantitative risk analysis and
- How to apply decision trees, simulation, and sensitivity analysis to quantify risks

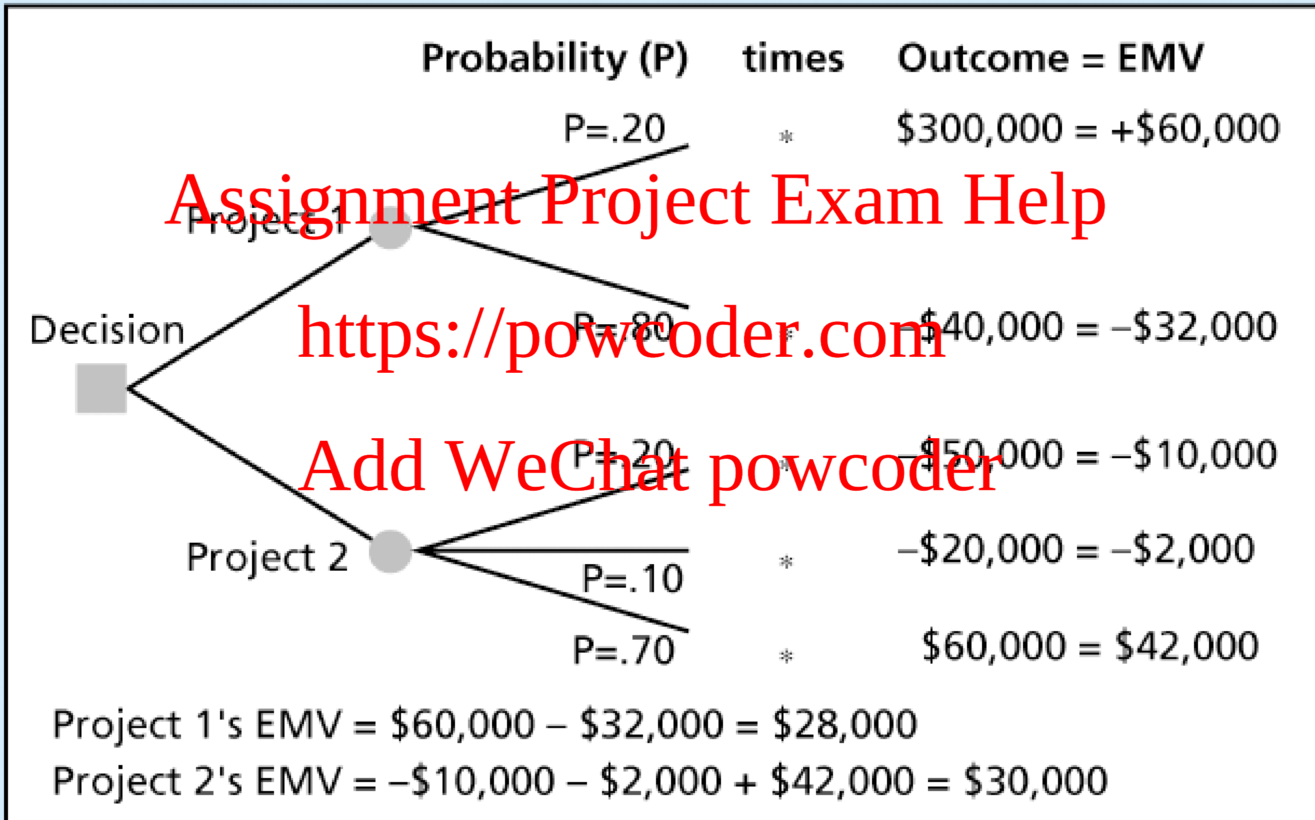
Performing Quantitative Risk Analysis

- Often follows qualitative risk analysis, but both can be done together
- Large, complex projects involving leading edge technologies often require extensive quantitative risk analysis
- Main techniques include:
  - Data gathering
    - Interviewing experts
    - collecting probability distribution information
  - Analysis and modelling techniques:
    - Decision tree analysis
    - Simulation
    - Sensitivity analysis

Decision Trees and Expected Monetary Value (EMV)

- A **decision tree** is a diagramming analysis technique used to help select the best course of action in situations in which future outcomes are uncertain
- **Estimated monetary value (EMV)** is the product of a risk event probability and the risk event's monetary value
- You can draw a decision tree to help find the EMV

Expected Monetary Value (EMV) Example



Simulation

- Simulation uses a representation or model of a system to analyze the expected behavior or performance of the system
- **Monte Carlo analysis** simulates a model's outcome many times to provide a statistical distribution of the calculated results
- To use a Monte Carlo simulation, you must have three estimates (most likely, pessimistic, and optimistic) plus an estimate of the likelihood of the estimate being between the most likely and optimistic values

Steps of a Monte Carlo Analysis

1. Assess the range for the variables being considered
2. Determine the probability distribution of each variable
3. For each variable, select a random value based on the probability distribution
4. Run a deterministic analysis or one pass through the model
5. Repeat steps 3 and 4 many times to obtain the probability distribution of the model's results

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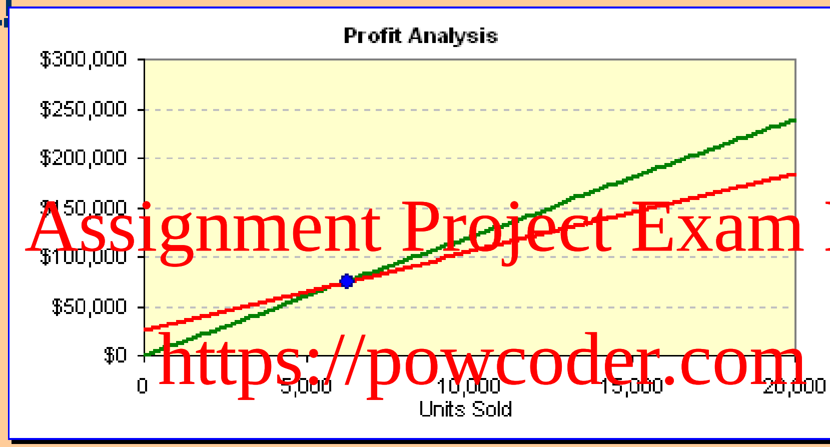
Sensitivity Analysis

- **Sensitivity analysis** is a technique used to show the effects of changing one or more variables on an outcome
- For example, sensitivity analysis may be used to determine the monthly payments for a loan at different interest rates or periods of the loan, or for determining break-even points based on different assumptions
- Spreadsheet software, such as Excel, is a common tool for performing sensitivity analysis

Sample Sensitivity Analysis for Determining Break-Even Point



Sales Price per Unit:	$12
Manufacturing Cost per Unit:	$8
Fixed Monthly Expense:	$25,000
Break-Even Point (Units Sold):	6,250
Revenue at Break-Even Point:	$75,000

Units Sold	Revenue	Expense
0	$0	$25,000
500	6,000	29,000
1,000	12,000	33,000
1,500	18,000	37,000
2,000	24,000	41,000
2,500	30,000	45,000
3,000	36,000	49,000
3,500	42,000	53,000
4,000	48,000	57,000
4,500	54,000	61,000
5,000	60,000	65,000
5,500	66,000	69,000
6,000	72,000	73,000
6,500	78,000	77,000
7,000	84,000	81,000
7,500	90,000	85,000
8,000	96,000	89,000
8,500	102,000	93,000
9,000	108,000	97,000
9,500	114,000	101,000
10,000	120,000	105,000
10,500	126,000	109,000
11,000	132,000	113,000
11,500	138,000	117,000
12,000	144,000	121,000
12,500	150,000	125,000
13,000	156,000	129,000
13,500	162,000	133,000
14,000	168,000	137,000
14,500	174,000	141,000

Video 5:
Learning Objectives

- Provide examples of using different risk response planning strategies to address both negative and positive risks
- Discuss how to control risks

Planning Risk Responses

- After identifying and quantifying risks, you must decide how to respond to them
- Developing options and defining strategies for reducing negative risks and enhancing positive risks
- Four main response strategies for negative risks (**TARA**)
  - Risk **T**ransference
  - Risk **A**voidance
  - Risk Mitigation (**R**eduction)
  - Risk **A**cceptance

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, project goals understanding, and team support	Select the most experienced project manager
Increase the frequency of project monitoring	Increase project manager authority	
Use WBS and CPM		

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Response Strategies for Positive Risks

- Risk exploitation
- Risk sharing
- Risk enhancement
- Risk acceptance

Residual and Secondary Risks

- It's also important to identify residual and secondary risks
- **Residual risks** are risks that remain after all of the response strategies have been implemented
- **Secondary risks** are a direct result of implementing a risk response

Controlling Risks

- Involves executing the risk management process to respond to risk events and ensuring that risk awareness is an ongoing activity performed by the entire project team throughout the entire project
- A redistribution of resources devoted to risk management may be necessary because of changes in risk exposure
- Monitoring risks based on defined milestones and making decisions regarding risks and their response strategies
- **Workarounds** are unplanned responses to risk events that must be done when there are no contingency plans

Contingency and Fallback Plans, Contingency Reserves

- **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 are not effective
- **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;
- **Management reserves** are funds held for unknown risks that are NOT part of the cost baseline but ARE part of the budget and funding requirements

Controlling Risks – Outputs, Tools & Techniques

- Main outputs of risk control are:
  - Work performance information
  - change requests
  - updates to the project management plan, other project documents, and organisational process assets
- Tools and Techniques:
  - risk reassessment or audits
  - variance and trend analysis
  - technical performance measurements
  - reserve analysis
  - status meetings/periodic risk reviews – Top Ten Risk Item Tracking

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Results of Good Project Risk Management

- Unlike crisis management, good project risk management often goes unnoticed
- Well-run projects appear to be almost effortless, but a lot of work goes into running a project well
- Managing project risks requires dedicated and talented professionals