

# 11: Project Risk Management

IT4306 – IT Project Management

**Level II - Semester 4**

# Intended Learning Outcomes

- At the end of this lesson, you will be able to;
  - Describe what the risk is and the importance of managing it
  - List the elements involved in the project risk management and contents in risk management plan
  - Identify common sources of risks in information technology projects

# Intended Learning Outcomes

- At the end of this lesson, you will be able to;
  - Explain the qualitative risk analysis process and how to calculate risk factors
  - Create probability/impact matrixes, apply the Top Ten Risk Item Tracking technique, and use expert judgment to rank risks
  - Explain the quantitative risk analysis process and how to apply decision trees

# 11.1. The Importance of Project Risk Management

- Project risk management is the 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 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.

# Research Shows Need to Improve Project Risk Management

- Study by Ibbs and Kwak shows risk has the lowest maturity rating of all knowledge areas.
- KLCI study shows the benefits of following good software risk management practices.
- KPMG study found that 55 percent of **runaway projects**—projects that have significant cost or schedule overruns—did no risk management at all.\*

\*Cole, Andy, "Runaway Projects—Cause and Effects," Software World, Vol. 26, no. 3, pp. 3–5 (1995).

# Project Management Maturity by Industry Group and Knowledge Area\*

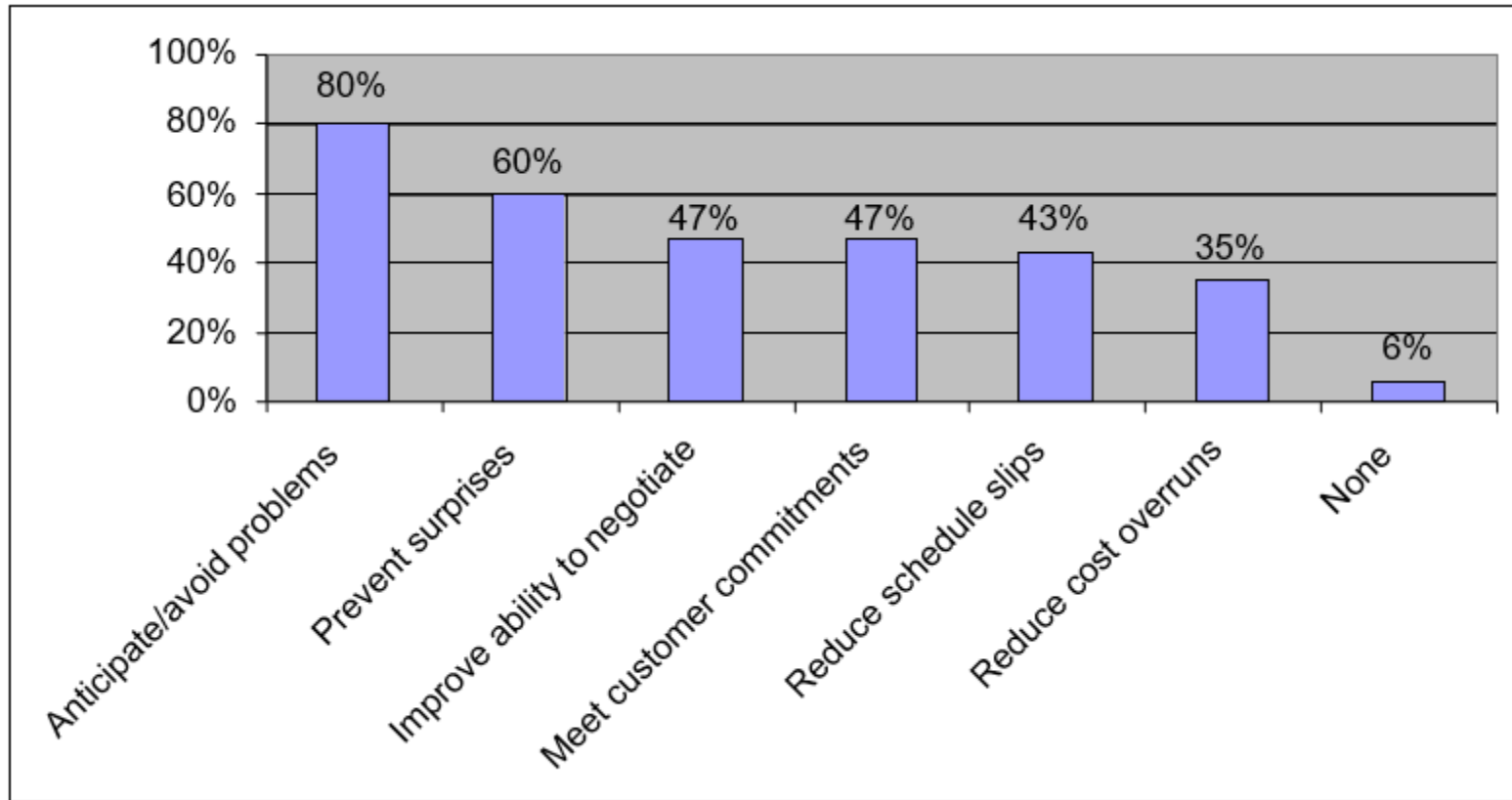
KEY: 1 = LOWEST MATURITY RATING

5 = HIGHEST MATURITY RATING

<b>Knowledge Area</b>	<b>Engineering/ Construction</b>	<b>Telecommunications</b>	<b>Information Systems</b>	<b>Hi-Tech Manufacturing</b>
<i>Scope</i>	3.52	3.45	3.25	3.37
<i>Time</i>	3.55	3.41	3.03	3.50
<i>Cost</i>	3.74	3.22	3.20	3.97
<i>Quality</i>	2.91	3.22	2.88	3.26
<i>Human Resources</i>	3.18	3.20	2.93	3.18
<i>Communications</i>	3.53	3.53	3.21	3.48
<b><i>Risk</i></b>	<b>2.93</b>	<b>2.87</b>	<b>2.75</b>	<b>2.76</b>
<i>Procurement</i>	3.33	3.01	2.91	3.33

\*Ibbs, C. William and Young Hoon Kwak. "Assessing Project Management Maturity," *Project Management Journal* (March 2000).

# Benefits from Software Risk Management Practices\*



\*Kulik, Peter and Catherine Weber, "Software Risk Management Practices – 2001," KLCI Research Group (August 2001).

# 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.
- Negative risk management is like a form of insurance; it is an investment.



# Risk Can Be Positive

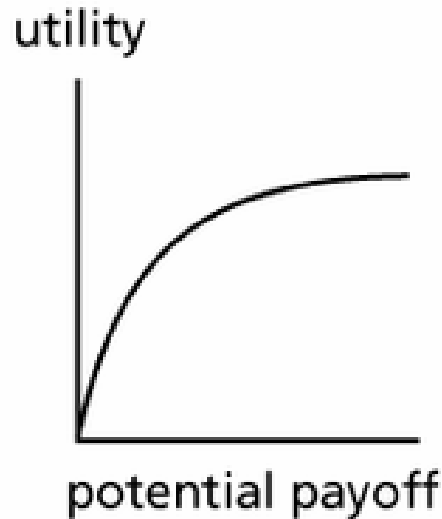
- Positive risks are risks that result in good things happening; sometimes called opportunities.
- A general definition of project risk is an uncertainty that can have a negative or positive effect on meeting project objectives.
- The goal of project risk management is to minimize potential negative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

# Risk Utility

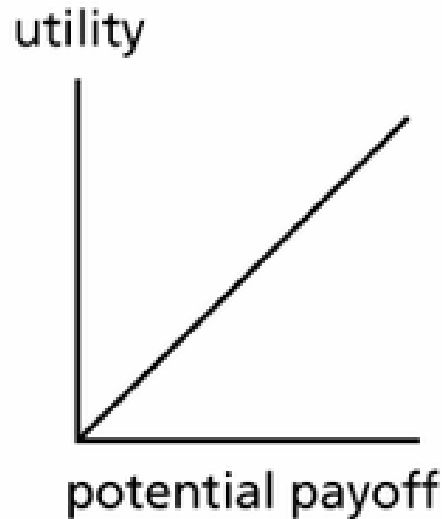
- **Risk utility** or **risk tolerance** is the amount of satisfaction or pleasure received from a potential payoff.
  - Utility rises at a decreasing rate for people who are risk-averse.
  - Those who are risk-seeking have a higher tolerance for risk and their satisfaction increases when more payoff is at stake.
  - The risk-neutral approach achieves a balance between risk and payoff.

# Risk Utility Function and Risk Preference

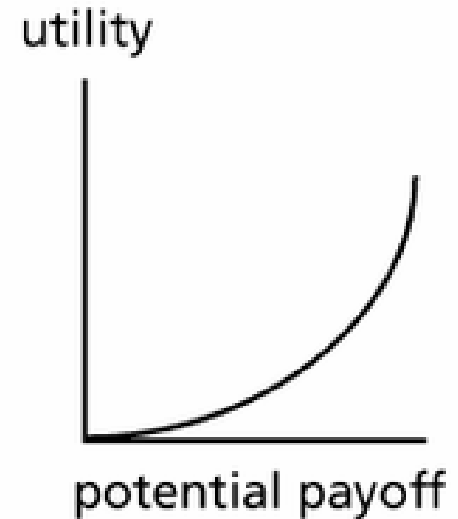
**Risk-Averse**



**Risk-Neutral**



**Risk-Seeking**



# Project Risk Management Processes

- **Risk management planning:** Deciding how to approach and plan the risk management activities for the project.
- **Risk identification:** Determining which risks are likely to affect a project and documenting the characteristics of each.
- **Qualitative risk analysis:** Prioritizing risks based on their probability and impact of occurrence.

# Project Risk Management Processes (cont'd)

- **Quantitative risk analysis:** Numerically estimating the effects of risks on project objectives.
- **Risk response planning:** Taking steps to enhance opportunities and reduce threats to meeting project objectives.
- **Risk monitoring and control:** 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.

## 11.2. Risk Management Planning

- The main output of risk management planning 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
- Risk documentation

# 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.



## 11.3. Familiar Sources of Risk on IT Projects

- Several studies show that IT projects share some common sources of risk.
- The Standish Group developed an IT success potential scoring sheet based on potential risks.
- Other broad categories of risk help identify potential risks.

# Information Technology 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
<b>Total</b>	<b>100</b>

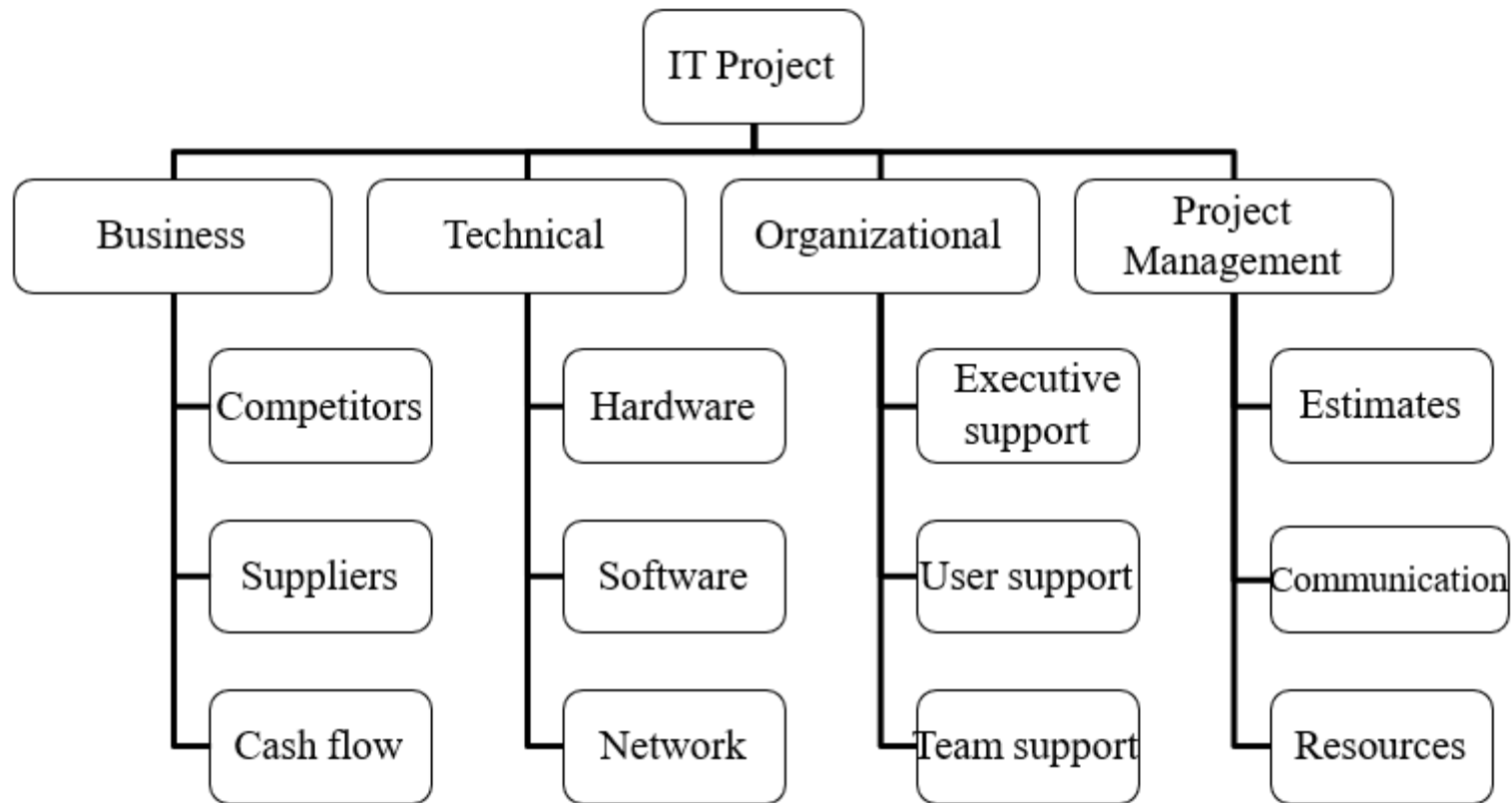
# Broad Categories of Risk

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

# 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



# 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 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

## 11.4. Identifying Risks

- **Risk identification** is the process of understanding what potential events might hurt or enhance a particular project.
- Risk identification tools and techniques include:
  - Brainstorming
  - The Delphi Technique
  - Interviewing
  - SWOT analysis

## 11.5. 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

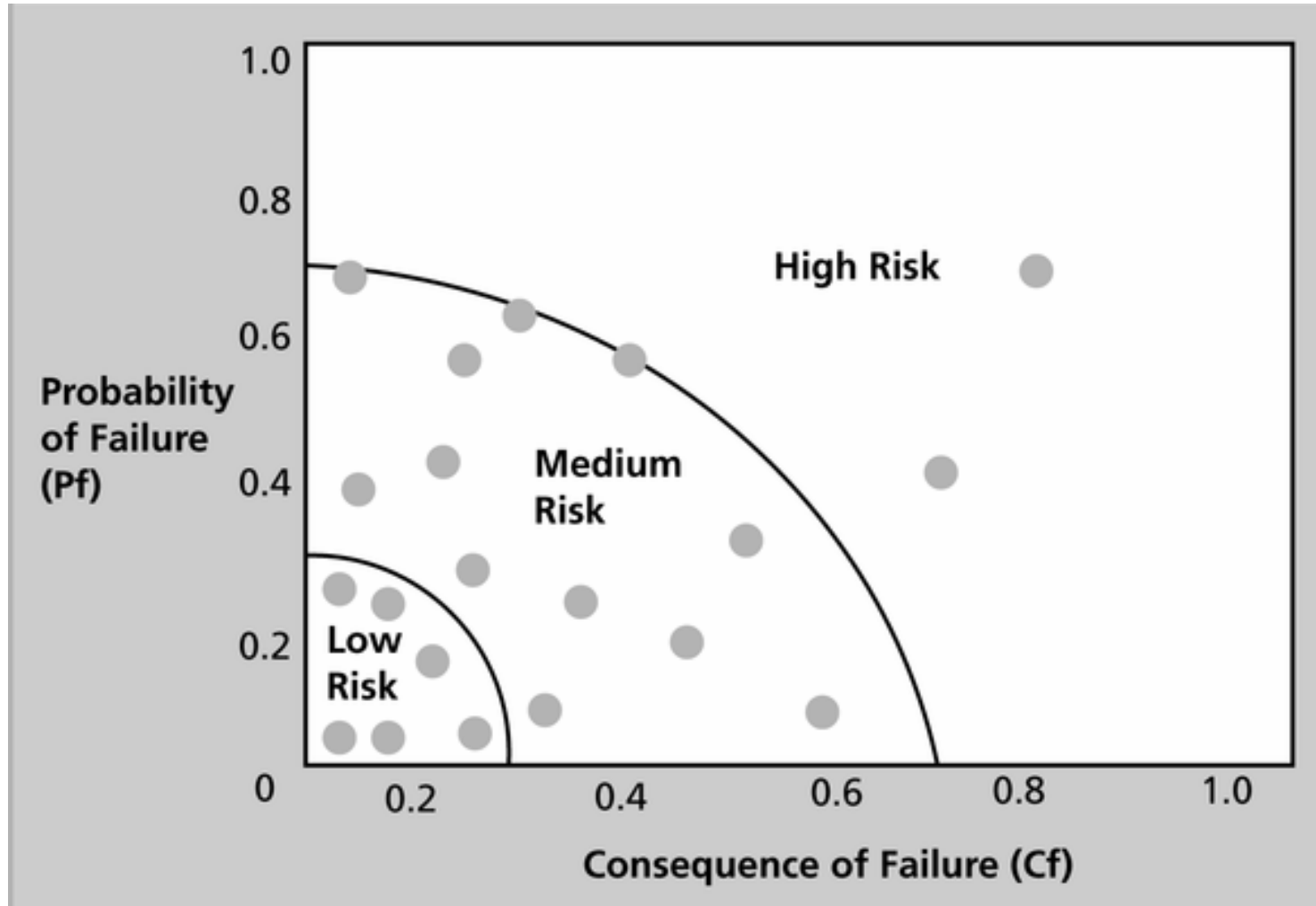
Probability	High	risk 6	risk 9	risk 1 risk 4
	Medium	risk 3 risk 7	risk 2 risk 5 risk 11	
	Low		risk 8 risk 10	risk 12
		Low	Medium	High
		Impact		

# Sample Probability/Impact Matrix for Qualitative Risk Assessment

PROBABILITY OF FAILURE (Pf) ATTRIBUTES OF SUGGESTED TECHNOLOGY			
VALUE	MATURITY HARDWARE/SOFTWARE	COMPLEXITY HARDWARE/SOFTWARE	SUPPORT BASE
0.1	Existing	Simple Design	Multiple Programs And Services
0.3	Minor Redesign	Somewhat Complex	Multiple Programs
0.5	Major Change Feasible	Fairly Complex	Several Parallel Programs
0.7	Complex HW Design/ New SW Similar to Existing	Very Complex	At Least One Other Program
0.9	Some Research Completed/ Never Done Before	Extremely Complex	No Additional Programs

CONSEQUENCE OF FAILURE (Cf) ATTRIBUTES OF SUGGESTED TECHNOLOGY				
VALUE	FALLBACK SOLUTIONS	LIFE CYCLE COST (LCC) FACTOR	SCHEDULE FACTOR (INITIAL OPERATIONAL CAPABILITY = IOC)	DOWNTIME (DT) FACTOR
0.1	Several Acceptable Alternatives	Highly Confident Will Reduce LCC	90—100% Confident Will Meet IOC Significantly	Highly Confident Will Reduce DT
0.3	A Few Known Alternatives	Fairly Confident Will Reduce LCC	75—90% Confident Will Meet IOC	Fairly Confident Will Reduce DT Significantly
0.5	Single Acceptable Alternative	LCC Will Not Change Much	50—75% Confident Will Meet IOC	Highly Confident Will Reduce DT Somewhat
0.7	Some Possible Alternatives	Fairly Confident Will Increase LCC	25—50% Confident Will Meet IOC	Fairly Confident Will Reduce DT Somewhat
0.9	No Acceptable Alternatives	Highly Confident Will Increase LCC	0—25% Confident Will Meet IOC	DT May Not Be Reduced Much

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



# 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.

# Example of Top Ten Risk Item Tracking

	Monthly Ranking			
<b>Risk Item</b>	<b>This Month</b>	<b>Last Month</b>	<b>Number of Months</b>	<b>Risk Resolution Progress</b>
Inadequate planning	1	2	4	Working on revising the entire project plan
Poor definition of scope	2	3	3	Holding meetings with project customer and sponsor to clarify scope
Absence of leadership	3	1	2	Just assigned a new project manager to lead the project after old one quit
Poor cost estimates	4	4	3	Revising cost estimates
Poor time estimates	5	5	3	Revising schedule estimates

# Expert Judgment

- Many organizations rely on the intuitive feelings and past experience of experts to help identify potential project risks.
- Experts can categorize risks as high, medium, or low with or without more sophisticated techniques.
- Can also help create and monitor a **watch list**, a list of risks that are low priority, but are still identified as potential risks.

## 11.6. Quantitative Risk Analysis

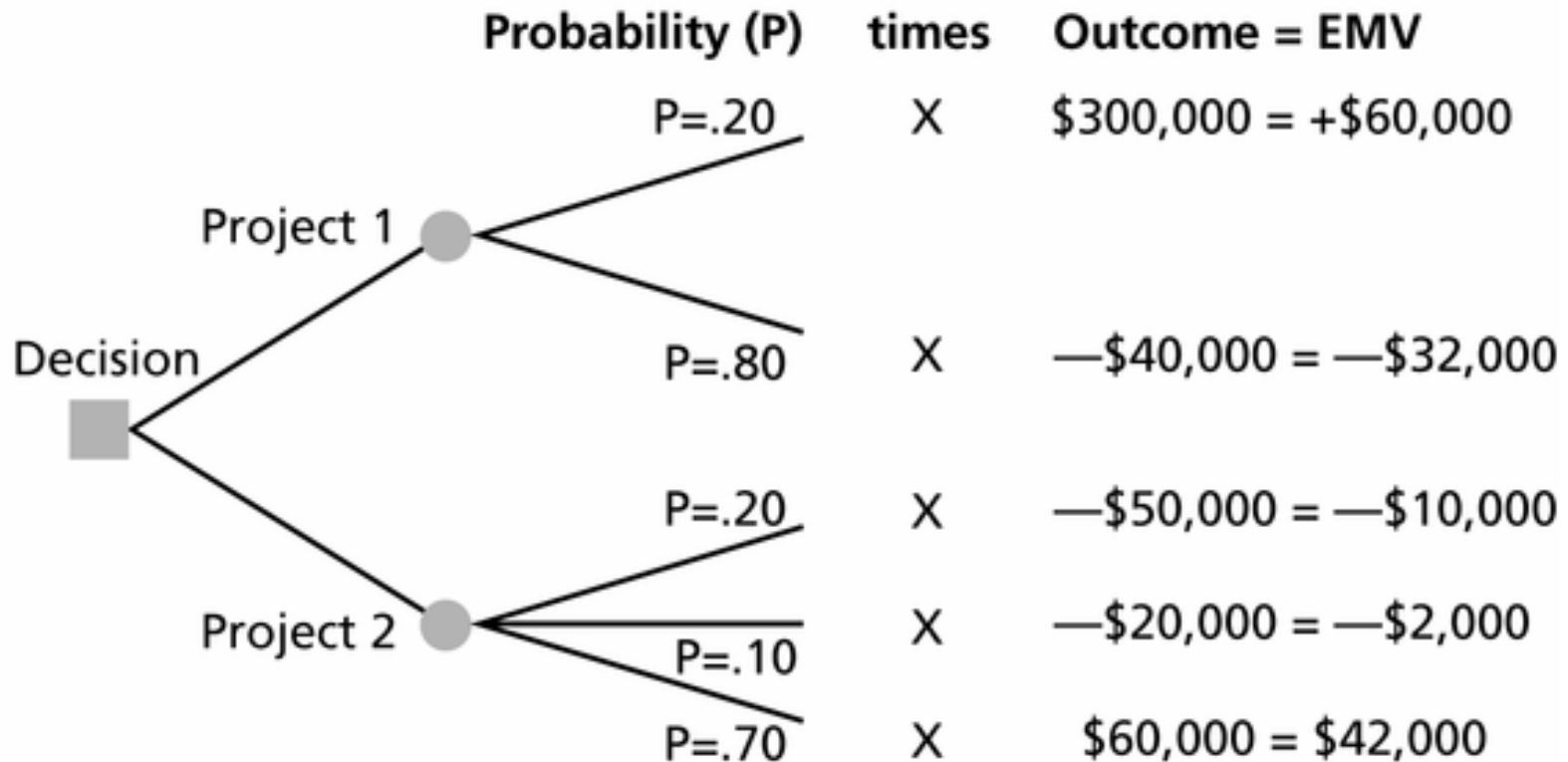
- Often follows qualitative risk analysis, but both can be done together.
- Large, complex projects involving leading edge technologies often require extensive quantitative risk analysis.
- Main techniques include:
  - Decision tree analysis
  - Simulation
  - Sensitivity analysis



# 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



Project 1's EMV = \$60,000 — 32,000 = \$28,000

Project 2's EMV = —\$10,000 — 2,000 + 42,000 = \$30,000

# Using Software to Assist in Project Risk Management

- Risk registers can be created in a simple Word or Excel file or as part of a database.
- More sophisticated risk management software, such as Monte Carlo simulation tools, help in analyzing project risks.
- The PMI Risk Specific Interest Group's Web site at [www.risksig.com](http://www.risksig.com) has a detailed list of software products to assist in risk management.

# 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.
- Project managers should strive to make their jobs look easy to reflect the results of well-run projects.

# Summary

- Project risk management is the 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.
- Main processes include:
  - Risk management planning
  - Risk identification
  - Qualitative risk analysis
  - Quantitative risk analysis
  - Risk response planning
  - Risk monitoring and control