

Project Risk Management



"Yeah, the job's got great benefits, but mainly I like the safe work environment."

Risk Defined

Risk is uncertain condition of a project which may have a positive impact or may have a negative impact if the uncertain condition happens positively, it will become Opportunity for you, if the uncertain condition happens negatively then it becomes a threat for you

Risk management means anticipating risks and preparing plans to reduce their effect

A Risk Management Plan is a Document that the Project Manager Prepares to foresee risk, estimate impact & Define Responses to Risk

The Importance of Project Risk Management

- ❑ **Project risk management** is the art and science of identifying, assigning, and responding to risk throughout the life of a project and in the best interests of meeting project objectives
- ❑ **Risk management is often overlooked on projects**, but it can help improve project success by helping select good projects, determining project scope, and developing realistic estimates
- ❑ A study by **Ibbs and Kwak** show how risk management is neglected, especially on IT projects
- ❑ **KPMG study found that 55 percent** of runaway projects did no risk management at all

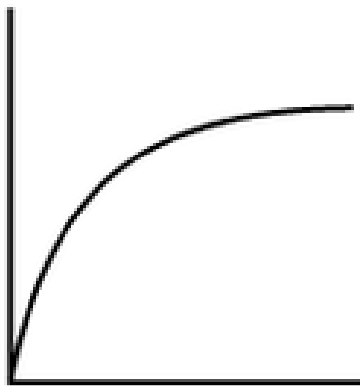
Risk Utility

- Risk utility or risk tolerance is the amount of satisfaction or pleasure received from a potential payoff
 - Utility rises at a decreasing rate for a person who is 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

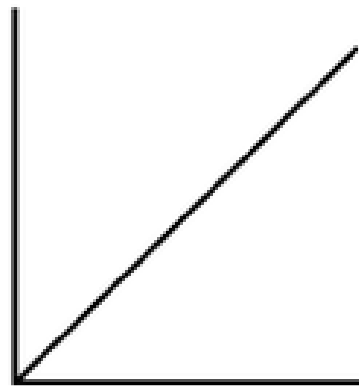
utility



potential payoff

Risk-Neutral

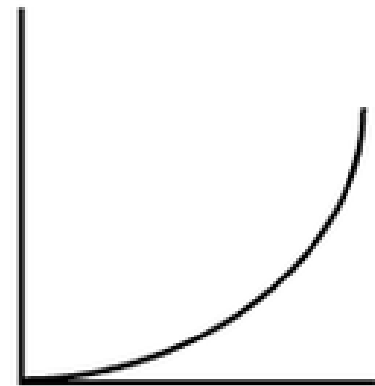
utility



potential payoff

Risk-Seeking

utility



potential payoff

What is Project Risk Management?

The goal of project risk management is to minimize potential risks while maximizing potential opportunities. Major processes include

- **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 their characteristics
- **Qualitative risk analysis:** characterizing and analyzing risks and prioritizing their effects on project objectives
- **Quantitative risk analysis:** measuring the probability and consequences of risks
- **Risk response planning:** taking steps to enhance opportunities and reduce threats to meeting project objectives
- **Risk monitoring and control:** monitoring known risks, identifying new risks, reducing risks, and evaluating the effectiveness of risk reduction

Risk Management Planning

- ❑ The main output of risk management planning is a **risk management plan**
- ❑ The project team should review project documents and understand the organization's and the sponsor's approach to risk
- ❑ The level of detail will vary with the needs of the project

Risk Management Plan

Inputs

Project Charter (**Assumptions, constraints**)

WBS

definition of **roles** and **responsibilities**

Org. document like Corporate **Risk management Policies** (templates: RiskAnal...)

Risk tolerance of various stakeholders

Includes

- **Procedures** of managing risks (throughout the project)
- Risk identification
- Qualitative analysis (factors, top ten tracking, expert Judgment)
- Quantitative analysis (decision trees expected monetary value)
- Response plan
- Monitoring and Control processes
- **Specific deliverables related to risk, resource** assignment to those, and **evaluate milestones** associated with **risk mitigation approach**
- Also: **roles & responsibility** for **activities involved in risk management**, **Budgets** and **schedules, reporting formats** for such activities etc.

Risk Mitigation: **reducing the impact** of **risk event** by reducing the probability of its occurrence

Questions Addressed in a Risk Management Plan

- *Why* is it important to take/not take this risk in relation to the project objectives?
- *What* is the specific risk, and what are the risk mitigation deliverables?
- *How* is the risk going to be mitigated? (What risk mitigation approach is to be used?)
- *Who* are the individuals responsible for implementing the risk management plan?
- *When* will the milestones associated with the mitigation approach occur?
- *How much* is required in terms of resources to mitigate risk?

Contingency and Fallback Plans, Contingency Reserves

- **Contingency plans** are predefined actions that the project team will take if an identified risk event occurs that might impact the project, such as technical challenges, scope changes, or resource availability issues. The project team develops plans to mitigate these risks.
- **Fallback plans** are developed for risks that have a high impact on meeting project objectives
- **Contingency reserves** or allowances are provisions held by the project sponsor that can be used to mitigate cost or schedule risk if changes in scope or quality occur

Sources of Risk

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
- ❑ McFarlan developed a risk questionnaire to help assess risks*
- ❑ Other broad categories of risk help identify potential risks

Information Technology **Success Potential Scoring** Sheet

Success Criterion	Points	DMV	CONFIRM	HYATT	ITAMARATI
User Involvement	19	NO (0)	NO (0)	YES (19)	YES (19)
Executive Management support	16	NO (0)	YES (16)	YES (16)	YES (16)
Clear Statement of Requirements	15	NO (0)	NO (0)	YES (15)	NO (0)
Proper Planning	11	NO (0)	NO (0)	YES (11)	YES (11)
Realistic Expectations	10	YES (10)	YES (10)	YES (10)	YES (10)
Smaller Project Milestones	9	NO (0)	NO (0)	YES (9)	YES (9)
Competent Staff	8	NO (0)	NO (0)	YES (8)	YES (8)
Ownership	6	NO (0)	NO (0)	YES (6)	YES (6)
Clear Visions and Objectives	3	NO (0)	NO (0)	YES (3)	YES (3)
Hard-Working, Focused Staff	3	NO (0)	YES (3)	YES (3)	YES (3)
Total	100	10	29	100	85

Standish Group provided specific questions for each success criterion to compute the points for a project. For example for “User Involvement”:

- ✓ Do I have the right user (s)?
- ✓ Did I involve the user (s) early and often?
- ✓ Do I have a quality user (s) relationship?
- ✓ Do I make involvement easy?
- ✓ Did I find out what the user (s) need (s) are?

Hence each questions will carry $(19/5) = 3.8$ points

Another risk questionnaire developed by F.W. McFarlan and Dayton Tire Co, can be used to identify the major sources of risk in the categories of people, structure, and technology:

Risks in People: inadequate skills (technical/managerial), inexperience in general and in specific application area or technology.

Structural Risk: degree of change project will introduce into user areas and business procedures, #of distinct user groups the project must satisfy, #of other systems the project must interact, experience of org with tech & project.

Technology risk: using new or untried technology.

Sample McFarlan's Risk Questionnaire

1. What is the project estimate in calendar (elapsed) time?

- | | |
|---|-------------------|
| <input type="checkbox"/> 12 months or less | Low = 1 point |
| <input type="checkbox"/> 13 months to 24 months | Medium = 2 points |
| <input type="checkbox"/> Over 24 months | High = 3 point |

2. What is the estimated number of person days for the system?

- | | |
|---------------------------------------|-------------------|
| <input type="checkbox"/> 12 to 375 | Low = 1 point |
| <input type="checkbox"/> 375 to 1875 | Medium = 2 points |
| <input type="checkbox"/> 1875 to 3750 | Medium = 3 points |
| <input type="checkbox"/> Over 3750 | High = 4 point |

3. Number of departments involved (excluding IT)

- | | |
|--|-------------------|
| <input type="checkbox"/> One | Low = 1 point |
| <input type="checkbox"/> Two | Medium = 2 points |
| <input type="checkbox"/> Three or more | High = 3 points |

4. Is additional hardware required for the project?

- | | |
|--|---------------|
| <input type="checkbox"/> None | Low = 0 point |
| <input type="checkbox"/> Central processor type change | Low = 1 point |
| <input type="checkbox"/> Peripheral/storage device changes | Low = 1 |
| <input type="checkbox"/> Terminals | Med = 2 |
| <input type="checkbox"/> Change of platform, for example
PCs replacing mainframes | High = 3 |

Top 10 Risk Item Tracking

- ❑ Top 10 Risk Item Tracking is a tool for maintaining an awareness of risk throughout the life of a project
- ❑ Establish a periodic review of the top 10 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 10 Risk Item Tracking

	Monthly Ranking			
Risk Item	This Month	Last Month	Number of Months	Risk Resolution Progress
Inadequate planning	1	2	4	Working on revising 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	4	4	3	Revising cost 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.

Other Categories of Risk

- ❑ **Market risk:** Will the new product be useful to the organization or marketable to others? Will users accept and use the product or service?
- ❑ **Financial risk:** Can the organization afford to undertake the project? Is this project the best way to use the company's financial resources?
- ❑ **Technology risk:** Is the project technically feasible? Could the technology be obsolete before a useful product can be produced?

What Went Wrong?

Many information technology projects fail because of technology risk. One project manager learned an important lesson on a large IT project: focus on business needs first, not technology. David Anderson, a project manager for Kaman Sciences Corp., shared his experience from a project failure in an article for CIO Enterprise Magazine. After spending two years and several hundred thousand dollars on a project to provide new client/server-based financial and human resources information systems for their company, Anderson and his team finally admitted they had a failure on their hands. Anderson revealed that he had been too enamored of the use of cutting-edge technology and had taken a high-risk approach on the project. He "ramrodded through" what the project team was going to do and then admitted that he was wrong. The company finally decided to switch to a more stable technology to meet the business needs of the company.

Potential Risk Conditions with Each Knowledge Area

Integartion: Inadequate Planning; Poor resource allocation; Poor integration management; Lack of Post-Project Review

Scope: Poor Definition of Scope or work Package; Incomplete Definition of Quality requiremnets; Inadequate Scope Control

Time: Errors in estimating Time or Resource availability; Poor allocation & Management of Float; early release of competitive products

Cost: Estimating Errors; Inadequate productivity; cost of changes or contingency Control; Poor Maintainance, Purchasing etc

Quality: Poor attitude towards quality substandard design/ materials/ workmanship; inadequate quality assurance program

Human Resources: Poor conflict managmnet; Poor project organization & definition of responsibilities, absence of leadership


Communication: Carelessness in Planning or communicating; Lack of consultation with key stakeholders

Risk: Ignoring risk, unclear assignment of Risk, poor insurance management₂₀

Risk Identification (4 Methods)

- Risk identification is the process of understanding what potential unsatisfactory outcomes are associated with a particular project
- Several risk identification tools and techniques include
 - Brainstorming
 - The Delphi technique
 - Interviewing
 - SWOT analysis

The **Delphi method** (/ˈdɛlfai/ *DEL*-fy) is a structured communication technique or method, originally developed as a systematic, interactive forecasting method which relies on a panel of experts.^{[1][2][3][4]} The experts **answer questionnaires** in two or more rounds. After each round, a facilitator or change agent ^[5] provides an anonymised summary of the experts' forecasts from the previous round as well as the reasons they provided for their judgments. Thus, **experts are encouraged to revise their earlier answers in light of the replies of other members of their panel**. It is believed that during this process the range of the answers will decrease and the group will converge towards the "correct" answer. Finally, the process is stopped after a predefined stop criterion (e.g. number of rounds, achievement of consensus, stability of results) and the mean or median scores of the final rounds determine the **results**.



SWOT Analysis is a useful technique for understanding your Strengths and Weaknesses, and for identifying both the Opportunities open to you and the Threats you face.

Strengths

•What advantages does your organization have? What do you do better than anyone else? What unique or lowest-cost resources can you draw upon that others can't? What do people in your market see as your strengths? What factors mean that you "get the sale"? What is your organization's Unique Selling Proposition (USP)?

Weaknesses:

What could you improve? What should you avoid? What are people in your market likely to see as weaknesses? What factors lose you sales? Again, consider this from an internal and external perspective: Do other people seem to perceive weaknesses that you don't see? Are your competitors doing any better than you?



Opportunities

What good opportunities can you spot? What interesting trends are you aware of? Useful opportunities can come from such things as : Changes in technology and markets on both a broad and narrow scale. Changes in government policy related to your field. Changes in social patterns, population profiles, lifestyle changes, and so on.

Threats

What obstacles do you face? What are your competitors doing?

Are quality standards or specifications for your job, products or services changing? Is changing technology threatening your position? Do you have bad debt or cash-flow problems? Could any of your weaknesses seriously threaten your business?



For prioritizing Risk we have two ways of analyzing

- Quantitative Risk Analysis
- Qualitative Risk Analysis

Qualitative Risk Analysis

- Assessing the likelihood and impact of identified risks
- To Determine their priority and magnitude

Risk Factor , Risk Exposure, Top 10 Risk Item Tracking, Expert Judgment

1. RISK FACTOR

- To quantify risk probability and consequence, Defense Systems Management College (DSMC) developed a technique to calculate risk factor ---
- That is, numbers that represent the overall risk of a specific event based on their:
Probability of occurring and consequences to the project (if they occur)

Probability/Impact Matrix shows probability (or likelihood) of occurring and Impact (or consequences) of the risk.

Probability (likelihood) of occurring can be estimated based on unique nature of project and type of risk (e.g. Factor evaluated for H/W S/W technology include (1) Technology; not being matured (2) too complex (3) inadequate support base

Impact (consequences) of the risk could include factors (1) availability of fallback solution (2) or consequence of not meeting cost, schedule, performance....

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.

Risk Management Matrix Showing Probability and Impact and High Low Risk

Risk Management Matrix		Impact				
		Negligible	Marginal	Moderate	Critical	Catastrophic
Probability	Almost Certain	Low Risk	Moderate Risk	High Risk	Extreme Risk	Extreme Risk
	Likely	Minimum Risk	Low Risk	Moderate Risk	High Risk	Extreme Risk
	Possible	Minimum Risk	Low Risk	Moderate Risk	High Risk	High Risk
	Unlikely	Minimum Risk	Low Risk	Low Risk	Moderate Risk	High Risk
	Rare	Minimum Risk	Minimum Risk	Low Risk	Moderate Risk	High Risk

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5x5 Risk Matrix Sample

Impact

How severe would the outcomes be if the risk occurred?

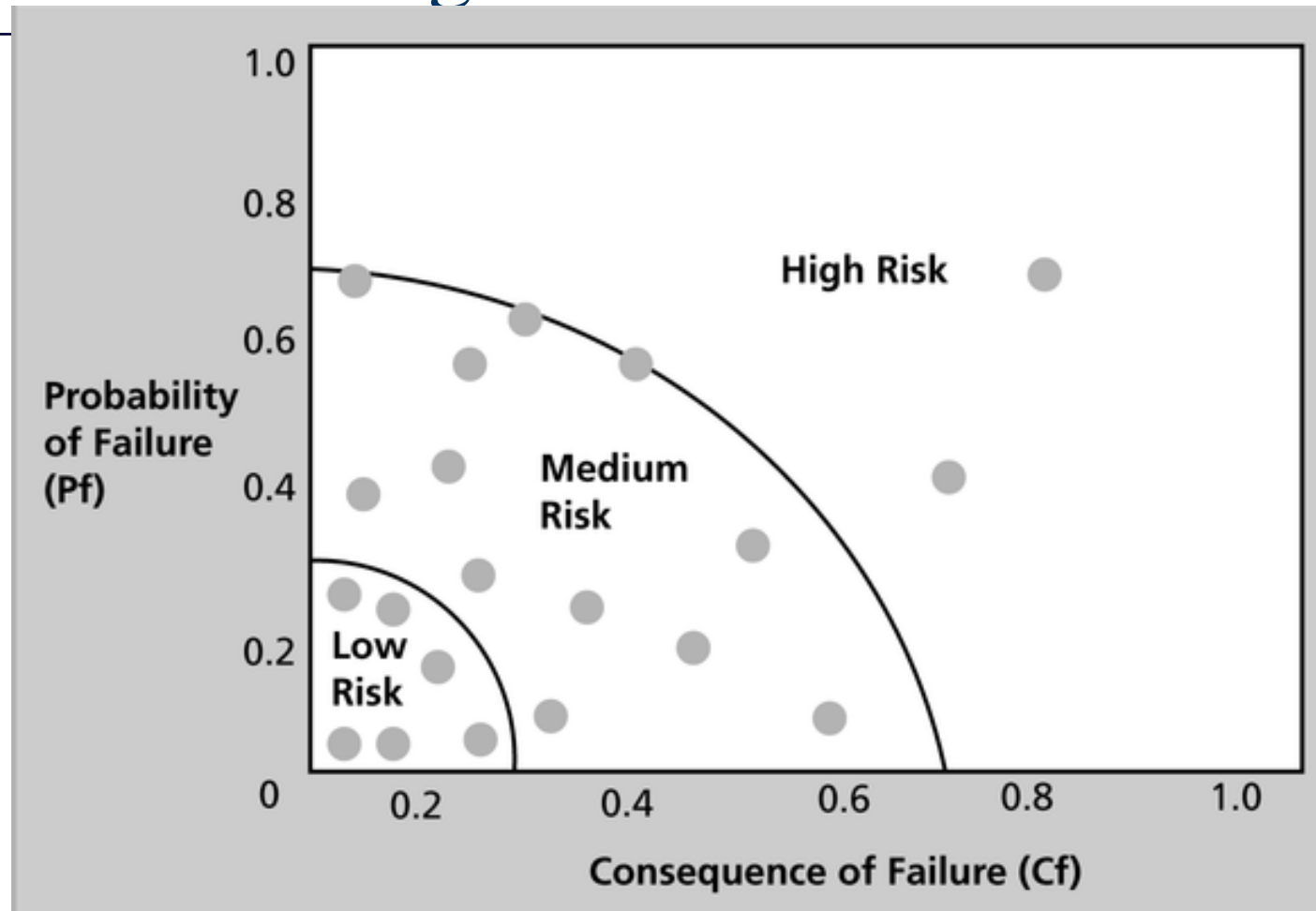
Probability
What is the probability the risk will happen?

	Insignificant 1	Minor 2	Significant 3	Major 4	Severe 5
5 Almost Certain	Medium 5	High 10	Very high 15	Extreme 20	Extreme 25
4 Likely	Medium 4	Medium 8	High 12	Very high 16	Extreme 20
3 Moderate	Low 3	Medium 6	Medium 9	High 12	Very high 15
2 Unlikely	Very low 2	Low 4	Medium 6	Medium 8	High 10
1 Rare	Very low 1	Very low 2	Low 3	Medium 4	Medium 5

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		

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



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) quantitative analysis

- 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.
- You can draw a decision tree to help find the EMV.



Expected Monetary Value (EMV)

It's a way of **quantifying** the **expected loss or gain** from undertaking a project, given the probability of different outcomes. The expected monetary value equation is as follows: $EMV = Probability \times Impact$.

The risk is uncertain for this an estimated amount is considered that this might be impact

But alone impact cannot be an considered here, it should relate to probability to make more meaning

Expected Monetary Value (EMV) Formula

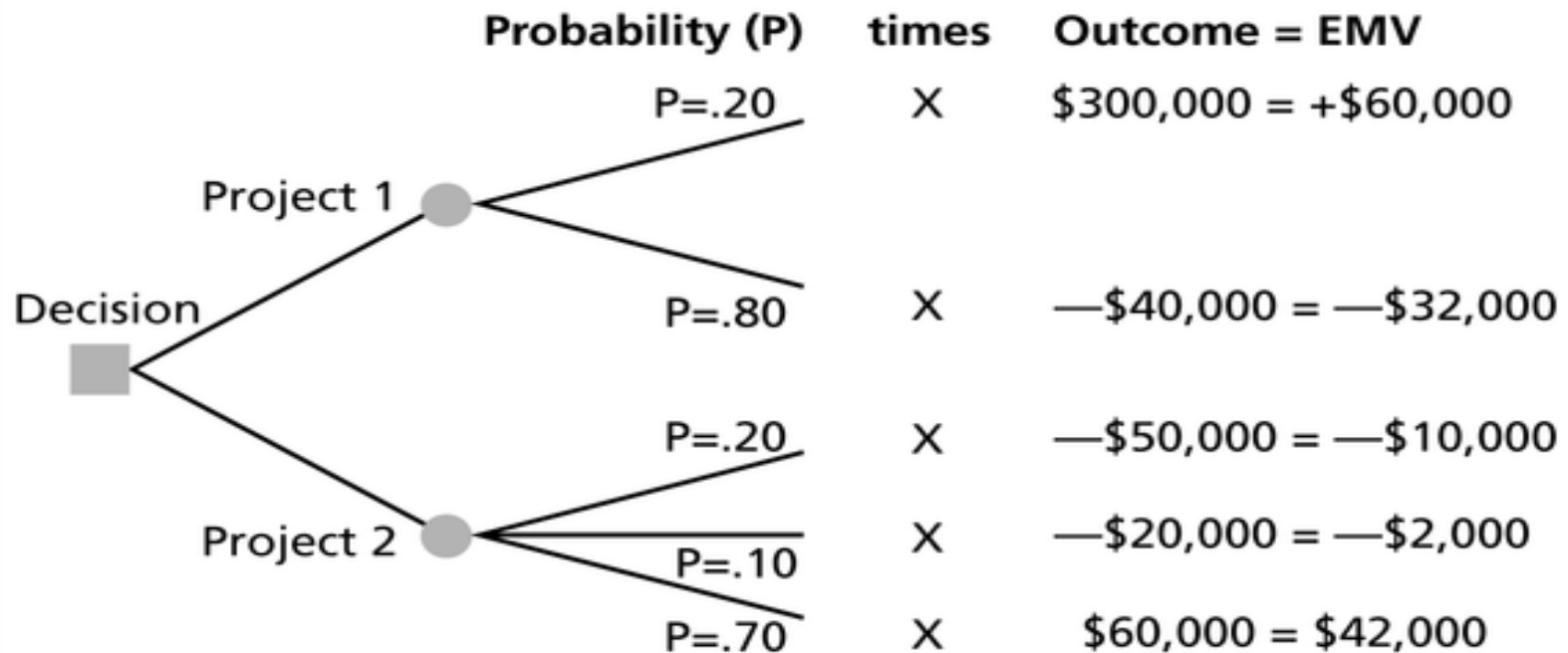
You multiply the probability by the impact of the identified risk to get the EMV.

$$\text{Expected Monetary Value (EMV)} = \text{Probability} * \text{Impact}$$

Risk	Probability	Impact (USD)	EMV (Probability * Impact)
1	10%	-4,000	-400
2	30%	-1,000	-300
3	25%	2,000	500
4	60%	-1,500	-900
		-4,500	-1,100

You might think you need 4,500 USD to manage all risks above, but that is incorrect. Among all the identified risks, only a few will occur. The risks that do not occur will add their EMV to the pool, and the risks that do occur will use that money. So, you will need 1,100 USD to cover all identified risks in this case.

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

The Probability of Risk event occurring in Project 1 is less as compare to Project 2, ₃₆
 SO there is more chances of risk event in Project 2

You have identified a risk with a 30% chance of occurring. It may cost you 500 USD. Calculate the expected monetary value for this risk event.

Given in the question:

The probability of risk = 30%

Impact of risk = – 500 USD

We know that:

Expected monetary value (EMV) = probability * impact

= $0.3 * -500$

= – 150

The expected monetary value (EMV) of the risk event is –150 USD.

Risk Response Planning

- After identifying and quantifying risks, you must decide how to respond to them
- Four main strategies:
 - **Risk avoidance:** eliminating a specific threat or risk, usually by eliminating its causes
 - **Risk acceptance:** accepting the consequences should a risk occur
 - **Risk transference:** shifting the consequence of a risk and responsibility for its management to a third party
 - **Risk mitigation:** reducing the impact of a risk event by **reducing the probability** of its occurrence

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		

Risk Monitoring and Control

- Monitoring risks involves **knowing their status**
- Controlling risks involves carrying out the **risk management plans as risks occur**
- **Workarounds are** unplanned responses to risk events that must be done when there are no contingency plans (Uncertain)
- **The main outputs Main outputs of risk monitoring and control are:**
 - **Requested changes.**
 - Recommended **corrective** and **preventive** actions.
 - Updates to the **risk register, project management plan, and organizational process assets.**
 - risk monitoring and control are corrective action, project change requests, and updates to other plans

Risk Response Control

- ❑ Risk response control involves **executing the risk management processes and the risk management plan** to respond to risk events
- ❑ Risks must be **monitored** based on **defined milestones** and decisions made regarding risks and mitigation strategies
- ❑ Sometimes workarounds or unplanned responses to risk events are needed when there are no contingency plans

Using Software to Assist in Project Risk Management

- ❑ **Databases** can keep track of risks. Many IT departments have issue tracking databases
- ❑ **Spreadsheets** can aid in tracking and quantifying risks