Presented by :

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Risk Management Professional / PMI-RMP®

Chapter 1—Introduction to PMI-RMP Certification

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PROJECT CHAMPIONS ACADEMY

Day 1

Time	Task
09:00 – 09:45	Session 1
09:45 – 10:00	QA
10:00 - 10:15	Break 1
10:15 - 11:00	Session 2
11:00 - 11:15	QA
11:15 - 11:30	Break 2
11:30 – 12:30	Session 3
12:30 – Next day	Quiz (Certificate)

Objectives

After completing this Chapter, you will be able to:

- Describe the PMI-RMP certification exam outline
- Explain the eligibility criteria for PMI-RMP exam
- Explain the application processing timeline and the exam syllabus
- List the domains and processes in Project Risk Management

Course Overview (contd.)

There are following 10 Chapters in this course:

Chapter number	Name of the Chapter	Days
1	Introduction to PMI-RMP Certification Course	**Day 1**
2	Risk Management Framework	
3	Principles and Concepts	
4	Introduction to Project Risk Management processes	
5	Plan Risk Management	**Day 2**
6	Identify Risks	
7	Perform Qualitative Risk Analysis	
8	Perform Quantitative Risk Analysis	**Day 3**
9	Plan Risk Responses	
10	Control Risks	

Prerequisites for the PMI-RMP Exam

The eligibility norms for the PMI-RMP exam are as follows:

Category	College/University Education	Education	Experience
One	Four-year degree (Bachelor's degreeor global equivalent)	30 contact hours or PDUs	3,000 hours within the last five years
Two	Secondary Diploma (High school diploma, associate's degree, or global equivalent)	40 contact hours or PDUs	4,500 hours within the last five years

- Visit the website www.pmi.org for more details.
- Application can be submitted online.

About the PMI-RMP Exam

Details of the examination are as follows:

- Total number of Questions: 170, of which, 20 questions are test questions for future tests.
- Only 150 questions are scored.
- Exam duration is 3.5 hours.
- PMI grades students on each of the 5 Project Risk Management domains and based on this grading, it declares a PMI-RMP pass or fail.
- The number of grades one has to score to pass the PMI-RMP exam is not made public by PMI®.
- The grades used are “Below Proficient”, “Proficient”, and “Moderately Proficient.”

Exam questions will cover all the five domains of Project Risk Management.

Project Risk Management Domains	Percentage of Questions
Domain 1 - Risk strategy and planning (5 tasks)	19-20%
Domain 2 - Stakeholder engagement (9 tasks)	19-20%
Domain 3 - Risk process facilitation (7 tasks)	25-28%
Domain 4 - Risk monitoring and reporting (7 tasks)	19-20%
Domain 5 - Perform specialized risk analyses (3 tasks)	14-16%
Total	100%

PMI-RMP Exam Syllabus

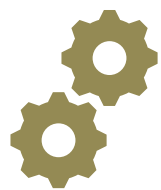
There are 5 domains and 6 processes in Project Risk Management. The first five processes belong to the planning process group, and the last process belongs to the monitor and control process group.

Domains

- Risk strategy and planning (5 tasks)
- Stakeholder engagement (9 tasks)
- Risk process facilitation (7 tasks)
- Risk monitoring and reporting (7tasks)
- Perform specialized risk activities (3 tasks)

Processes

- Plan risk management
- Identify risks
- Perform qualitative risk analysis
- Perform quantitative risk analysis
- Plan risk responses
- Control risks



Risk Strategy and Planning domain contains activities related to developing policies, processes, and procedures; risk assessment, planning, and response. The tasks in this domain are the following:

- Develop risk assessment processes and tools.
- Update risk policies and procedures.
- Develop and recommend project risk strategy.
- Produce risk management plan for the project.
- Establish evaluation criteria for risk management processes.

Stakeholder Engagement domain contains activities related to promoting the understanding of Project Risk Management for stakeholders and project team members, assessing stakeholder risk tolerance, prioritizing project risk, and promoting risk ownership. The tasks in this domain are the following:

- Promote common understanding of value of risk management.
- Train, coach, and educate stakeholders in risk principles and processes.
- Coach project team members.
- Assess stakeholder's risk tolerance.
- Identify stakeholder's risk attitudes.
- Engage stakeholders based on risk prioritization.
- Provide risk-related recommendations to stakeholders.
- Promote risk ownership by proactive communication.
- Liaise with stakeholders of other projects.

Domain 3—Risk Process Facilitation

Risk Process Facilitation domain contains activities related to facilitating risk identification, evaluation, prioritization, and response among project team members. The tasks in this domain are the following:

- Apply risk assessment processes and tools.
- Facilitate risk identification.
- Facilitate project team's evaluation of the identified risks attributes.
- Facilitate development of an aligned risk response strategy and actions.
- Facilitate the formulation of project contingency reserve.
- Provide risk data to cost and schedule analysts.
- Validate potential risk responses, key dependencies, and requirements.

Domain 4—Risk Monitoring and Reporting

Risk Monitoring and Reporting domain contains activities related to monitoring risk, evaluating risk response against established metrics, and communicating risk response performance to stakeholders and project team. The tasks in this domain are the following:

- Document and periodically update project risk information.
- Coordinate with project manager.
- Create periodic standard and custom reports.
- Monitor risk response metrics.
- Analyze risk process performance against metrics.
- Update Project Risk Management plan.
- Capture risk lessons learned.

Perform Specialized Risk Analyses domain contains activities related to the specialized qualitative and quantitative tools and techniques used by Project Risk Management professionals. The tasks in this domain are the following:

- Evaluate the attributes of identified risks.
- Analyze risk data produced during the project.
- Perform specialized risk analysis.

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Chapter 2—Risk Management Framework

Objectives

After completing this Chapter, you will be able to:

- Describe the purposes of Practice Standard for RiskManagement
- Define Project Risk Management
- List the good risk management practices
- List the different types of risks

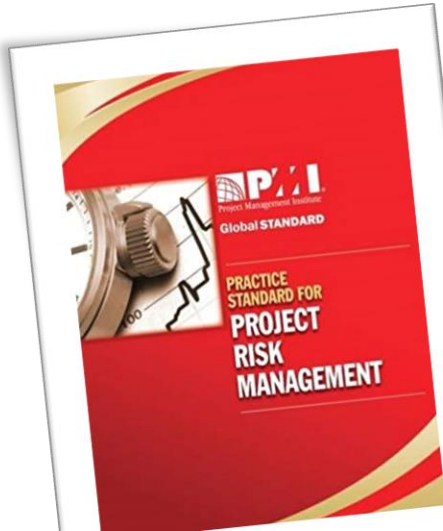
Project Risk—Definition

The purposes of Practice Standard for Risk Management are as follows:

- **To provide a standard for stakeholders, and a framework which are recognized as good practices.**
- **To provide a standard that is globally applicable and consistently applied.**

The Standard for Project Risk Management defines project risk as: “An uncertain event or condition that, if it occurs, has a positive or a negative effect on a project’s objectives.”

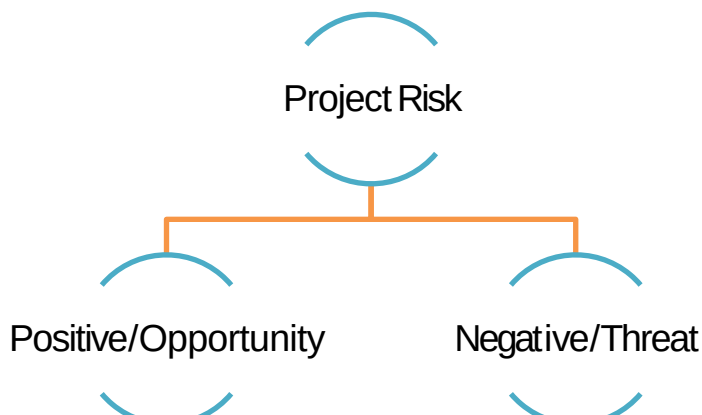
The negative effect is called **threat** and the positive effect is called **opportunity**.



Project Risk Management—Definitions

The Standard for Project Risk Management defines Project Risk Management as follows:

Project Risk Management includes the processes concerned with conducting risk management planning, identification, analysis, responses, and monitoring and controlling of a project. The objective is to increase the probability and the impact of positive risks and decrease the probability and the impact of negative risks.



Project Risk Management—Definitions (contd.)

Issue	It is something that is occurring in the present; It is known, and it is being dealt with.
Risk Event	Description of a scenario that may occur if the risk were to materialize (good to capture it in the cause-risk-effect format).
Risk Trigger	Sign or indicator that a risk event is about to occur.

Project Risk Management—Definitions (contd.)

Risk Management Plan	Documents how risk management processes will be carried out.
Risk Register	The risk register details all identified risks, including description, category, cause, probability of occurring, impact(s) on objectives, proposed responses, owners, and current status.
Risk Breakdown Structure	A hierarchical breakdown of risks organized by risk categories.

Project Risk Management—Definitions (contd.)

Residual Risk	The amount of **risk** or danger associated with an action or event remaining after natural or inherent **risks** have been reduced by **risk** controls.
Secondary Risk	A risk that arises as a direct result of implementing a risk response.
Contingency Plan	A plan developed in anticipation of the occurrence of a risk, to be executed only if specific, predetermined trigger conditions arise

Project Risk Management—Definitions (contd.)

fallback plan	The **fallback plan** is a part of the project management **plan** and defines under which circumstances action has to be taken. A **fallback plan** is implemented when the contingency **plan** fails or is not fully effective. It is a backup for the contingency **plan**.
Risk Statement - Metalanguage	A standard structure for the way in which the risk is described should be specified and applied. A typical such statement is: "Because of <one or more causes>, <risk> might occur, which would lead to <one or more effects>.
Response Strategy	A high-level approach to address an individual risk or overall project risk, broken down into a set of risk actions.

Roles of Project Risk Management

The roles of Project Risk Management are as follows:

- Essential for successful project management because of high level of uncertainties.
- Addresses uncertainty in project estimates and assumptions.
- Not a substitute for other project management processes.
- Integral part of project management processes.

The risk management outcomes act as inputs for considering the **contingency reserve** in case of scheduling and cost management. Risk management should be conducted throughout the life cycle of the project.

Good Risk Management Practices

To achieve risk management successfully, good practices need to be followed.

The good practices in Risk Management are as follows:

- It should consider enterprise environmental factors **(EEF)** and organizational process assets **(OPA)**.
- It should be conducted in compliance with internal and external requirements.
- It should be conducted in an ethical manner following the code of conduct.
- Periodic review should be conducted.

In general, large projects that provide value to an important customer require more resources, time, and attention to project risk management.

Critical Success Factors

The two types of risks are business and pure risks.Types of Risk

Risks could be captured by impact on the following project objectives:

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Chapter 3—Principles and Concepts

Objectives

After completing this Chapter, you will be able to:

- Explain individual and overall project risk
- Identify stakeholder risk attitudes
- Explain iterative process
- Define communication
- Describe responsibility for Project Risk Management
- Recognize the role of project manager

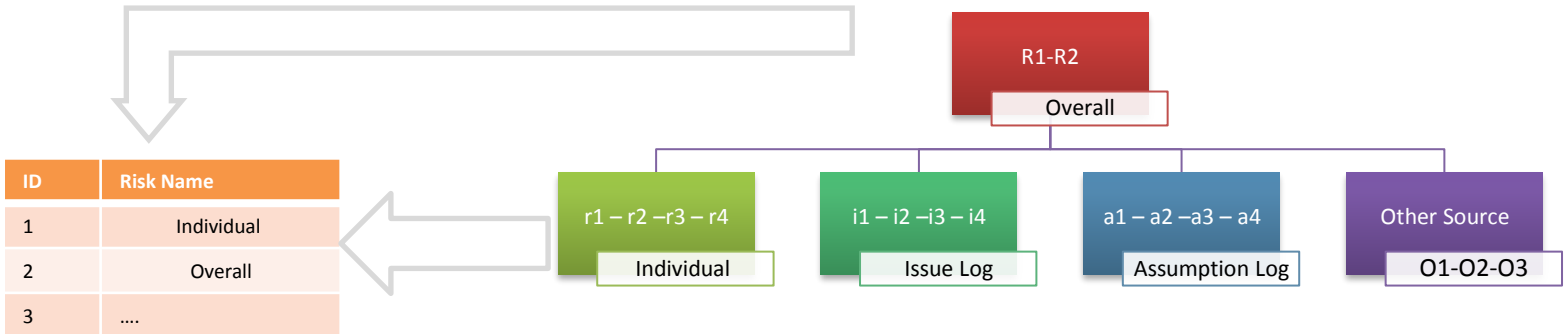
Individual and Overall Project Risks

The project risk is an uncertain event or a condition that has a positive or a negative effect on the project objectives. it classified into two levels:

1. Individual risk
2. Overall project risk

- Understanding individual risk helps in overcoming the project-related risks and increases the probability of project success.
- The overall project risk represents the effect of uncertainty on the project as a whole.
- The assessment of project risk helps in decision-making at strategic level and in turn at program, portfolio, and project governance levels to decide priorities.

Individual and Overall Project Risks



ID	Risk Name
1	Individual
2	Overall
3	....

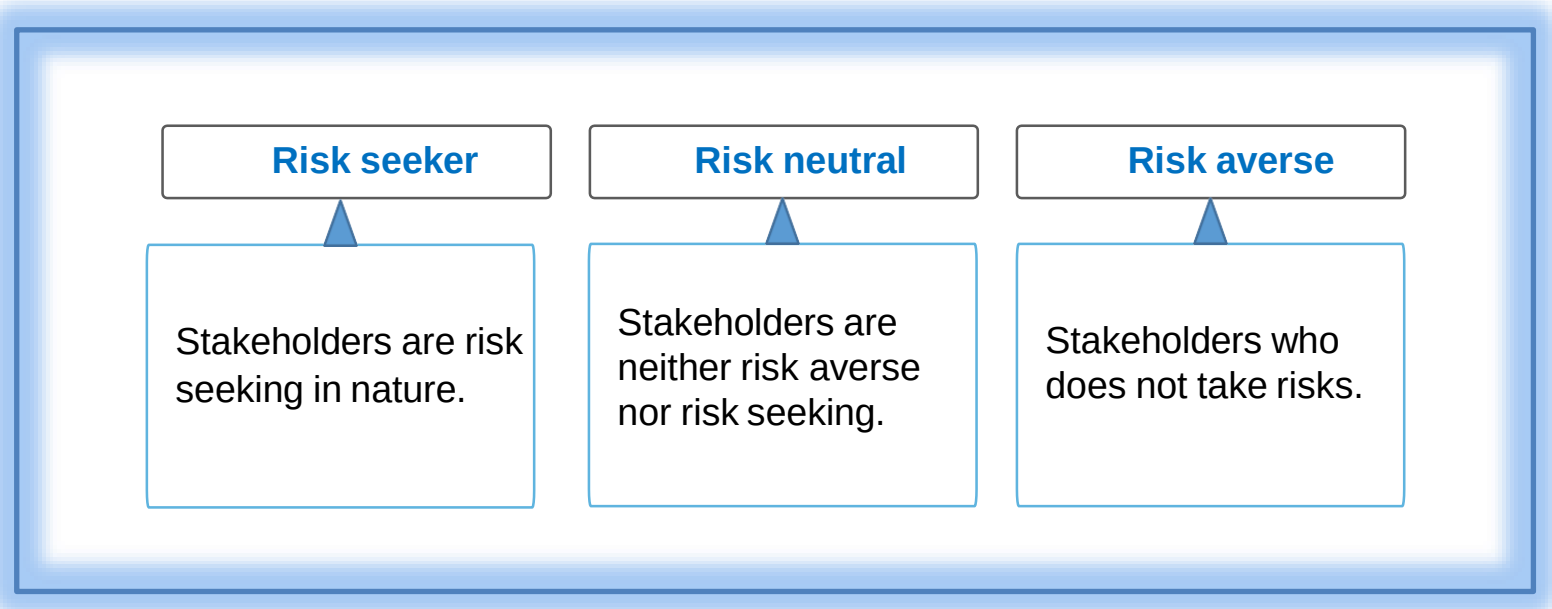
Risks Register

Stakeholder Risk Attitudes

It is important for a project or a risk manager to understand stakeholders' risk attitudes. The risk attitudes of the project stakeholders determine the extent to which an individual risk or overall project risk matters. It usually result in a desire for increased certainty in project outcomes and it may express a preference for one project objective over the other.

- **The priority of the risk depends upon the risk attitudes and tolerance levels of the stakeholders.**
- **Understanding stakeholders' attitudes towards risk is an important component of risk management planning.**

Stakeholder Risk Attitudes



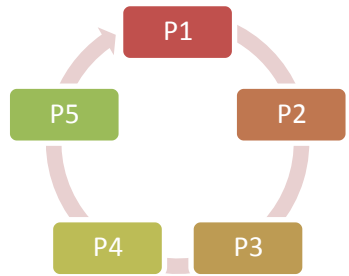
Risk Tolerance

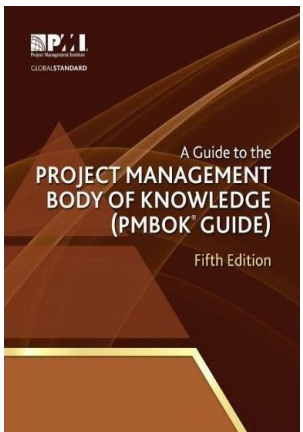
- Risk tolerance refers to the level of risk acceptability of a project manager or key stakeholder when the investment required for managing the risk is compared to the potential pay off.
- The definition of probability and impact scales, and the definition of risk exposures on the probability and impact matrix are influenced by your understanding of the risk tolerance of stakeholders.

Iterative Process

Risk management is not a one-time activity. Some important pointers, which must be kept in mind when discussing the iterative processes of risk management are as follows:

- Risk identification is repeated throughout the project life cycle.
- Periodicity should be determined.
- Risk identification can be repeated at a key milestone or when there is a change in the project or its operating environment.





PMBOK 5

Knowledge Areas	Project Management Process Groups				
	Initiating Process Group	Planning Process Group	Executing Process Group	Monitoring and Controlling Process Group	Closing Process Group
4. Project Integration Management	4.1 Develop Project Charter	4.2 Develop Project Management Plan	4.3 Direct and Manage Project Work	4.4 Monitor and Control Project Work 4.5 Perform Integrated Change Control	4.6 Close Project or Phase
5. Project Scope Management		5.1 Plan Scope Management 5.2 Collect Requirements 5.3 Define Scope 5.4 Create WBS		5.5 Validate Scope 5.6 Control Scope	
6. Project Time Management		6.1 Plan Schedule Management 6.2 Define Activities 6.3 Sequence Activities 6.4 Estimate Activity Resources 6.5 Estimate Activity Durations 6.6 Develop Schedule		6.7 Control Schedule	
7. Project Cost Management		7.1 Plan Cost Management 7.2 Estimate Costs 7.3 Determine Budget		7.4 Control Costs	
8. Project Quality Management		8.1 Plan Quality Management	8.2 Perform Quality Assurance	8.3 Control Quality	
9. Project Human Resource Management		9.1 Plan Human Resource Management	9.2 Acquire Project Team 9.3 Develop Project Team 9.4 Manage Project Team		
10. Project Communications Management		10.1 Plan Communications	10.2 Manage Communications	10.3 Control Communications	
11. Project Risk Management		11.1 Plan Risk Management 11.2 Identify Risks 11.3 Perform Qualitative Risk Analysis 11.4 Perform Quantitative Risk Analysis 11.5 Plan Risk Responses		11.6 Control Risks	
12. Project Procurement Management		12.1 Plan Procurement Management	12.2 Conduct Procurements	12.3 Control Procurements	12.4 Close Procurements
13. Project Stakeholder Management	13.1 Identify Stakeholders	13.2 Plan Stakeholder Management	13.3 Manage Stakeholder Engagement	13.4 Control Stakeholder Engagement	

Communication

Communication is essential while conducting Project Risk Management.

Important points to be kept in mind to make the risk management informative or to create awareness are as follows:

- Project Risk Management cannot be conducted in siloes.
- Risk identification and analysis depends on stakeholders' input.
- Effective and honest communication among the stakeholders.
- The result of the communication should meet the need of each stakeholder as well as the overall project objectives.

Responsibility for Project Risk Management

Since project risks can affect project objectives, anyone with an interest in achieving those objectives should play a role in Project Risk Management. Some of the responsibilities for Project Risk Management are as follows:

- Project Risk Management should be an integral part of all the other project knowledge areas.
- Roles and responsibilities like owner, should be clearly identified and communicated.
- RACI model can be used to define the roles and responsibility.

Activity	John	Kris	Sally	Ting
Project Plan	A	R	R	R
Configuration Management	C	A	R	R
Test Plan	C	R	A	R
Design	C	I	R	A
Team Budget	C	A	R	R
Customer Liaison	A	C	R	I
Team Building	R	R	A	C

RACI Matrix

R: Responsibility, A: Accountability, C: Consult, I: Inform.

Role of Project Manager

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Chapter 4—Introduction to Project Risk Management Processes

Objectives

After completing this Chapter, you will be ableto:

- Define Project Risk Management
- Explain Project Management
- Identify Project Risk Management processes

Project Risk Management

The definition of Project Risk Management is as follows:

Project Risk Management includes the processes of conducting risk management planning, identification, analysis, response planning, and controlling risk on a project.

Project Risk Management:

- Is an integral part of Project Management.
- Provides an approach to understand, assess, and manage uncertainties within projects.

Effective Project Risk Management is essential for the success of a project.

The output of the risk Management process can be considered as an input for any project management process and vice versa. Project Management is an attempt to control the uncertain environment through the use of structured techniques like estimating, planning, cost control, activity allocation, earned value analysis, monitoring, and review meetings.

The management or the project manager should not look at Project Risk Management as an optional activity or overhead. The outputs of Project Risk Management can impact:

- Estimating resource, cost, or duration;
- Assessing the impact of scope changes;
- Resource allocation; and
- Project progress.

Project Risk Management Processes

- Risk management can be effective by using processes, methodologies, or a set of activities.
- It is important to have a clear understanding of the risk threshold that define the views of key stakeholders on acceptable levels of risk. The outputs should be documented, communicated, and reviewed to ensure common understanding of the scope and objectives for the Project Risk Management Processes.

Project Risk Management Processes (contd.)

The following are the high level activities carried out in the six Project Risk Management processes:

Movement between processes could be sequential, overlapping or synchronised

Project Risk Management Processes (contd.)

The working and typical flow of the six Project Risk Management processes is shown below:

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Project Risk Management Processes (contd.)

The working and typical flow of the six Project Risk Management processes is shown below:

Project Risk Management Processes (contd.)

The working and typical flow of the six Project Risk Management processes is shown below:

Using numerical models this process can be effective. Quantitative techniques provide insights into the combined effect of identified risks on project outcome. Agreed confidence limits or levels and sensitivity analysis techniques can be used to increase the effectiveness.

Project Risk Management Processes (contd.)

The working and typical flow of the six Project Risk Management processes is shown below:

Finding the response for each risk, based on the opportunity and threat. Identifying contingency plans, strategies, actions, action owners, timing, analysis, project plan updates, and communication are also involved in this step.

Project Risk Management Processes (contd.)

The working and typical flow of the six Project Risk Management processes is shown below:

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Chapter 5—Plan Risk Management

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PROJECT CHAMPIONS ACADEMY

Day 2

Time	Task
09:00 – 09:45	Session 1
09:45 – 10:00	QA
10:00 - 10:15	Break 1
10:15 - 11:00	Session 2
11:00 - 11:15	QA
11:15 - 11:30	Break 2
11:30 – 12:30	Session 3
12:30 – Next day	Quiz (Certificate)

Objectives

After completing this Chapter, you will be able to:

- Explain the objectives and purposes
- List the critical success factors
- Define risk tolerance
- List the three levels of risk tolerance

Objectives of Plan Risk Management Process

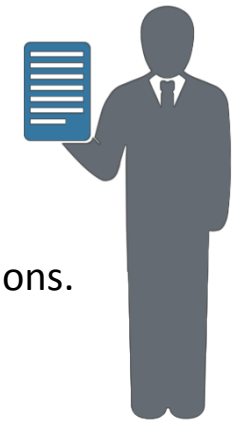
Following are the objectives of Plan Risk Management process:

- Developing an overall risk management strategy for a project.
- Knowing how the processes are executed.
- Integrating with other project management activities.

Plan Risk Management Process

Risk management planning is not a one-time activity.

- Risk management activities need to be repeated throughout the project. This is similar to the concept of progressive elaboration in project management.
- Risk management plan should define both the normal frequency for repeating the processes as well as the specific or exceptional conditions.



What is progressive elaboration?

Critical Success Factors

Following are the critical success factors for Plan Risk Management process:

Plan Risk Management / Inputs, Tools and Techniques, and Outputs

Inputs	Tools and Techniques	Outputs
• Project management plan • Project charter • Stakeholder register • Enterprises environmental factors • Organizational process assets	• Analytical techniques • Expert judgment • Meetings	• Risk management plan

Plan Risk Management Process - Input

1 Project management plan

It is “A formal, approved document that defines how the project is managed, executed, and controlled”. It may be Summary or detailed. It composed of one or more subsidiary management plans and other planning documents.

2 Project charter

Documents the business needs, current understanding of the customer's needs, and the new product, service, or result that it is intended to satisfy, such as:

1. Product purpose or justification.
2. Measurable project objectives and related success criteria.
3. High-level requirements.
4. High-level risks.

Plan Risk Management Process - Input

3 **Stakeholder register**

Contains all details related to the identify stakeholders including, but not limited to:

- **Identification information:** name, organizational position, location, role in the project, contact information
- **Assessment information:** major requirements, main expectations, potential influence in the project, phase in the life cycle with the most interest, and

Stakeholder classification: internal/external, supporter, natural, resistor, etc.

4 **Enterprises environmental factors**

5 **Organizational process assets**

Plan Risk Management Process - Input

Project **Environment**

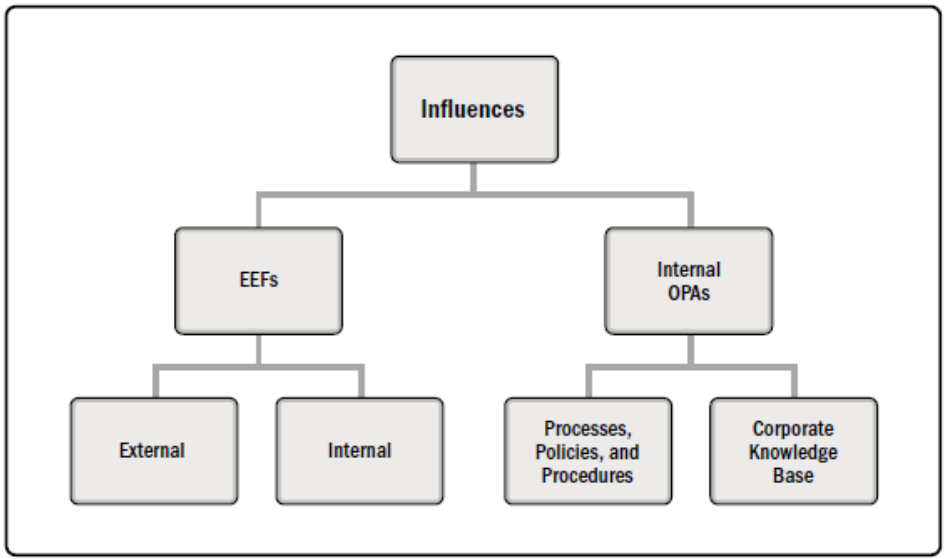


Figure 2-1. Project Influences

Plan Risk Management Process - Input

Enterprise environmental factors

Refer to conditions, not under the control of the project team, that influence, constrain, or direct the project **positive or negative**.

Internal EEFs Examples:

- Resource availability.
- Employee capability.
- Infrastructure.
- Information technology software.
- Organizational culture, structure, and governance.
- Geographic distribution of facilities and resources.

External EEFs Examples:

- Marketplace conditions.
- Social and cultural influences and issues.
- Legal restrictions.
- Commercial databases.
- Government or industry standards.
- Financial considerations.
- Physical environmental elements.

Plan Risk Management Process - Input

Organizational process assets - OPA

Plans, processes, policies, procedures, and knowledge bases specific to and used by the performing organization.

- Processes, policies, and procedures
- Organizational knowledge bases

Plan Risk Management Process - Input

OPA- Processes, Policies, And Procedures

1. **Related to Initiating and Planning**
2. **Executing, Monitoring, and Controlling:**
3. **Related to Closing**
4. **OPA- Organizational knowledge bases**

- Configuration management knowledge repositories.
- Financial data repositories.
- Historical information and lessons learned knowledge repositories
- Issue and defect management data.
- Data repositories for metrics and measurement.
- Project files from previous projects.

Plan Risk Management Process – Tools and Techniques

- **Analytical techniques**
  Determine the essential features and relationships of components in the project management plan to establish a reserve for the schedule duration, budget, estimated cost, or funds for a project.
- **Expert judgment**
  Judgment provided based upon expertise in an application area, Knowledge Area, discipline, industry, etc., as appropriate for the activity being performed.
- **Meetings**
  Meetings are used to discuss the plans and approach, determine how work will be executed to accomplish the project risk objectives, and establish the way the project risks will be monitored and controlled.

Plan Risk Management Process – Output

Risk Management Plan

- Methodology: define approach, tools and data sources used for risk management.
- Roles and responsibilities: How risk will be managed and by whom.
- Budgeting.
- Timing.
- Categorize.
- Definition of Risk probability and impact.

Risk Management Plan—Components

Below are the components of risk management plan:

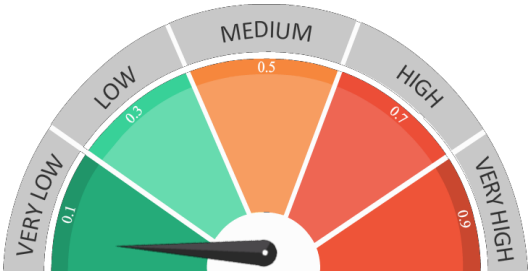
Component	Description
Risk management methodology	Defines the tools, approaches, and data sources that may be used to perform risk management on the project.
Roles,responsibilities, and Authority	Defines the lead, support, and risk management team membership for each type of action in the risk management plan.
Definitions of risk probability and impact	Scales of risk probabilities and impact are defined in qualitative risk analysis, using terms such as “very unlikely” to “almost certain” with respective values in numbers for these terms.
Probability and impact matrix	A predefined matrix with risk priority areas is marked, which has the product of impact value on X axis and the probability value on Y axis.
Revised stakeholder tolerances	Revised stakeholder tolerances may need to be updated as a result of the Plan Risk Management process.

Risk Management Plan—Components (contd.)

A few other components are as follows:

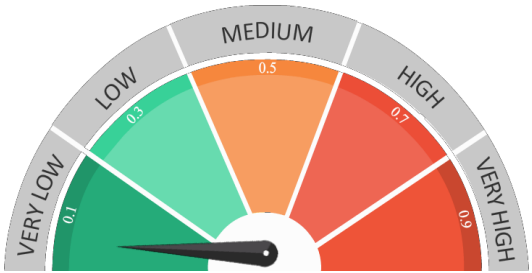
Component	Description
Budgeting	A budget for project risk management should be established and included in the risk management plan. Budgeting also specifies how the contingency reserve should be applied.
Timing	Defines how often the risk management activities will be performed throughout the project lifecycle.
Risk categories	Documentation such as a Risk Breakdown Structure (RBS) or categories from previous projects will help in identifying and organizing risks.
Reporting formats	Define how outputs of this process will be documented, analyzed, and communicated.
Tracking	Documents how risk activities will be recorded and audited.

Probability Scales and Impact Scales



Probability Scales

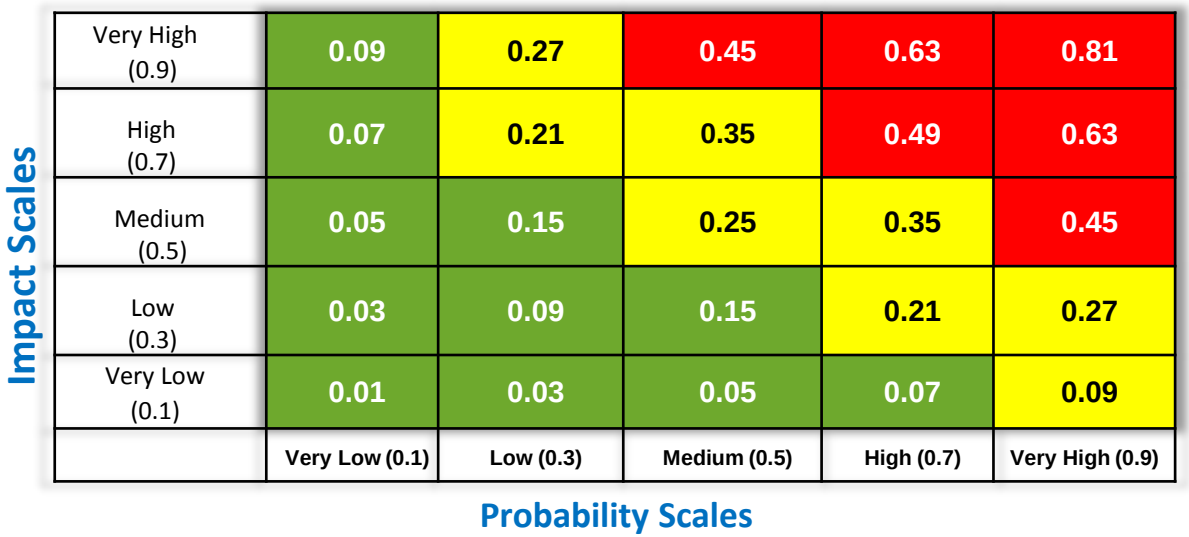
Very Low (0.1)	The event is unlikely to occur: 1% to 20% probability.
Low (0.3)	The event may occur: 21% to 40% probability.
Medium (0.5)	The event is likely to occur: 41% to 60% probability.
High (0.7)	The event will probably occur: 61% to 80% probability.
Very High (0.9)	The event will most likely occur: 81% or higher probability.



Impact Scales

Very Low (0.1)	Slippage on noncritical paths, yet the float exists.
Low (0.3)	Noncritical paths have made use of all their float, or an overall increase in schedule by 1% to 5%.
Medium (0.5)	Between 5% and 10% overall schedule increase.
High (0.7)	Between 10% and 20% overall schedule increase.
Very High (0.9)	Greater than 20% overall schedule increase.

Probability and Impact Matrix



Risk Breakdown Structure (RBS)

A hierarchical arrangement of identified risks that help project managers to organize potential sources of risk to the project.

RBS LEVEL 0	RBS LEVEL 1	RBS LEVEL 2
0. ALL SOURCES OF PROJECT RISK	1. TECHNICAL RISK	1.1 Scope definition
		1.2 Requirements definition
		1.3 Estimates, assumptions, and constraints
		1.4 Technical processes
		1.5 Technology
		1.6 Technical interfaces
		Etc.
	2. MANAGEMENT RISK	2.1 Project management
		2.2 Program/portfolio management
		2.3 Operations management
		2.4 Organization
		2.5 Resourcing
		2.6 Communication
		Etc.
	3. COMMERCIAL RISK	3.1 Contractual terms and conditions
		3.2 Internal procurement
		3.3 Suppliers and vendors
		3.4 Subcontracts
		3.5 Client/customer stability
		3.6 Partnerships and joint ventures
		Etc.
	4. EXTERNAL RISK	4.1 Legislation
		4.2 Exchange rates
		4.3 Site/facilities
		4.4 Environmental/weather
		4.5 Competition
		4.6 Regulatory
		Etc.

Risk Management—Roles and Responsibilities

Risk Manager

Creates the risk management plan, the risk register, and the RBS.

Risk Owner

Ensures that the appropriate risk response actions are performed when the risks occur.

Risk Action Owner

Ensures that the risk response, as defined in the plan, is carried out in a timely manner when a risk occurs.

Levels of Uncertainty

The Project Management Institute describes three types of risks based on the understanding of uncertainty.

Types of Risk

Known

Risks that you know could affect you, and for which you can roughly predict the nature and extent of the effect.

Known-Unknown

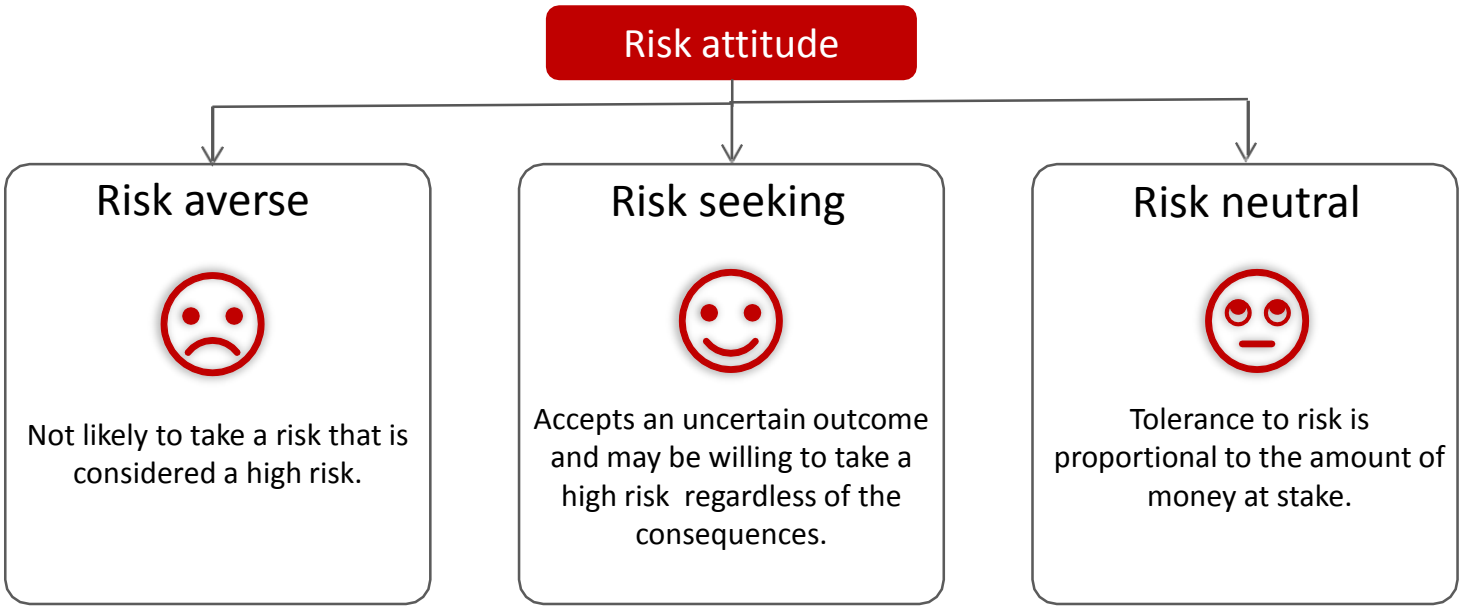
Risks that will affect us, although you cannot predict how or how much they will affect you.

Unknown-Unknown

Risks beyond your ability to identify.

Levels of Uncertainty

The Project Management Institute describes three levels of attitude:



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Chapter 6—Identify Risks

Objectives

After completing this Chapter, you will be ableto:

- Define the purposes and objectives
- Discuss the critical success factors
- List the three categories of tools and techniques
- Describe the best practices
- Explain how to document the results

Purposes of Identify Risks Process

Following are the purposes of Identify Risks process:

- Identify risks to the maximum extent that is practicable.
- Recognize all the identifiable risks to project objectives.
- Make risk identification process iterative to ensure that the process is not only restricted to planning phase.
- Identify potential responses at the time when a risk is first identified.
- Record and consider for immediate action if such action is appropriate.

Following are the objectives of Identify Risks process

Identifyrisks | Document risks | Categorize risks

Critical Success Factors

Following are the critical success factors for Identify Risks process:

• Early identification.	• Multiple perspectives.
• Iterative identification.	• Risks linked to project objectives.
• Emergent identification.	• Complete risk statement.
• Comprehensive identification.	• Ownership and level of details.
• Explicit identification of opportunities.	• Objectivity.

Identify Risks\ Inputs, Tools and Techniques, and Output

Inputs

1. Risk management Plan
2. **Cost management Plan**
3. **Schedule management Plan**
4. **Quality management plan**
5. **Human Resource management plan**
6. **Scope baseline**
7. Activity Cost Estimates
8. Activity duration estimates
9. **Stakeholder register**
10. **Project documents**
11. **Procurements documents**
12. EEF
13. OPA

Tools and Techniques

1. **Documentation Reviews**
2. **Info Gathering Techniques**
3. **Checklist Analysis**
4. **Assumptions Analysis**
5. **Diagramming Technique**
6. **SWOT analysis**
7. Expert judgment

Outputs

1. **Risk Register**

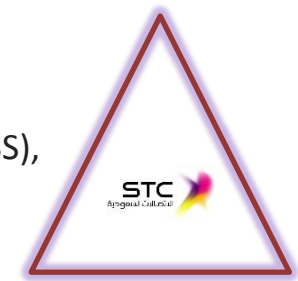
Identify Risks Process - Input

2. **Cost Management Plan**
3. **Schedule Management Plan**
4. **Quality Management Plan**
5. **Human Resource Management Plan**

The Management Plans show how to plan, execute, monitor and control The knowledge area.

6. **Scope baseline**

   The approved version of a **scope** statement, work breakdown structure (WBS), and its associated WBS dictionary.



9 Stakeholder Register

Stakeholder Register may contains all details related to the identified stakeholders like:

Stakeholder Register Sample

Project Manager	Anthony Daukes	Project Phase	Initiation

Role	Contact	Category	Interest	Influence	Expectations	Comms requirements
Sponsor	Phone: +61 4834467651 Email: john.matthew@gmail.com	Internal	●●●	●●●	User friendly and responsive UI across handheld device, tablet or desktop	Video Conference and Emai
Project Lead	Phone: +61 4785739580 Email: luke.wilson@gmail.com	Internal	●●●	○●●	Project to be delivered on time within budget	Email and Telephone
Product Manager	Phone: +91 9923535534 Email: deepak.patel@gmail.com	Internal	○●●	○○●	Clear Requirements and timely completion of documentation	Email and Telephone
PMO	Phone: +65 8542533152 Email: suzie.barker@gmail.com	Internal	○●●	○○●	Project to be delivered on time within budget Timely approvals to be obtained	Email and Telephone
Dev Manager	Phone: +44 5871512134 Email: thomas.atkins@gmail.com	Internal	○●●	○●●	Develop responsive UI	Email and Telephone
QA Manager	Phone: +91 9852425634 Email: disha.sharma@gmail.com	Internal	○●●	○●●	UI is responsive No quality issues Branding is maintained	Email and Telephone
Infrastructure Team Lead	Phone: +61 4854665621 Email: jim.arthur@gmail.com	Internal	○●●	○○●	Changes should not affect the uptime of the system No memory spikes	Email and Telephone

- **Identification information.** Name, organizational position, location, etc.
- **Assessment information.** Major requirements, expectations, potential influence in the project, phase in the life cycle with the most interest.
- **Stakeholder classification.** Internal/external,supporter/neutral/resistor, etc.

The stakeholder register should be consulted and updated on a regular basis, as stakeholders may change or new ones identified—throughout the life cycle of the project.

Project documents

Project Management Plan

1. Scope management plan
2. Requirements management plan
3. Schedule management plan
4. Cost management plan
5. Quality management plan
6. Resource management plan
7. Communications management plan
8. Risk management plan
9. Procurement management plan
10. Stakeholder engagement plan
11. Change management plan
12. Configuration management plan
13. Scope baseline
14. Schedule baseline
15. Cost baseline
16. Performance measurement baseline.
17. Project life cycle description
18. Development approach

Project Documents

1. Activity attributes
2. Activity list
3. Assumption log
4. Basis of estimates
5. Change log
6. Cost estimates
7. Cost forecasts
8. Duration estimates
9. Issue log
10. Lessons learned register
11. Milestone list
12. Physical resource assignments
13. Project calendars
14. Project communications
15. Project schedule
16. Project schedule network diagram
17. Project scope statement
18. Project team assignments
19. Quality control measurements
20. Quality metrics
21. Quality report
22. Requirements documentation
23. Requirements traceability matrix
24. Resource breakdown structure
25. Resource calendars
26. Resource requirements
27. Risk register
28. Risk report
29. Schedule data
30. Schedule forecasts
31. Stakeholder register
32. Team charter
33. Test and evaluation documents

Procurement documents

Common terms are in use for different types of procurement documents and may include request for information (RFI), invitation for bid (IFB), request for proposal (RFP), request for quotation (RFQ), tender notice, invitation for negotiation, and invitation for seller's initial response.

These documents include a description of the desired form of the response, the relevant procurement statement of work (SOW) and any required contractual provisions.

Identify Risks Process – Tools and Techniques

1. **Documentation Reviews**

   A structured review of the project documentation may be performed, including plans, assumptions, previous project files, agreements, and other information.

2. **Info Gathering Techniques**

   - Brainstorming.
   - Delphi technique.
   - Interviewing.
   - Root cause analysis.

3. **Checklist Analysis**

   Risk identification checklists are developed based on historical information and knowledge that has been accumulated from previous similar projects and from other sources of information.

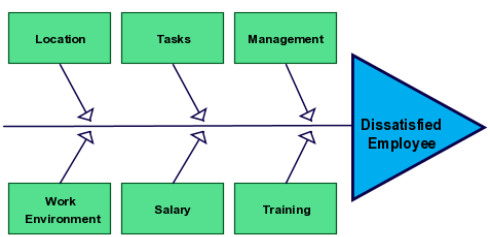
4. **Assumptions Analysis**

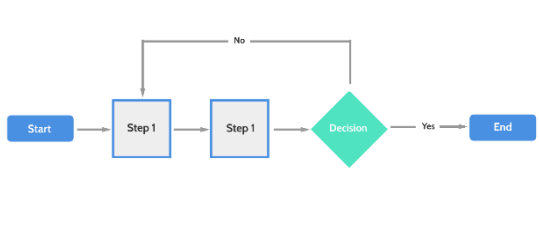
   Every project and its plan is conceived and developed based on a set of hypotheses, scenarios, or assumptions. Assumptions analysis explores the validity of assumptions as they apply to the project

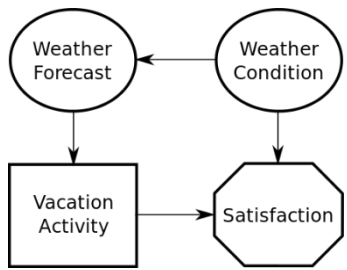
Identify Risks Process – Tools and Techniques

5 Diagramming Techniques

- **Cause and effect diagrams :** also known as Ishikawa or fishbone diagrams and are useful for identifying causes of risks.
- **System or process flow charts:** it show how various elements of a system interrelate and the mechanism of causation.
- **Influence diagrams:** These are graphical representations of situations showing causal influences, time ordering of events, and other relationships among variables and outcomes







6 SWOT Analysis

This technique examines the project from each of the strengths, weaknesses, opportunities, and threats (SWOT) perspectives to increase the breadth of identified risks by including internally generated risks.

	Helpful to achievethe objective	**Harmful** to achievethe objective
Internal	**S**trengths	**W**eaknesses
External	**O**pportunities	**T**hreats

Identify Risks Process – Output

Risk register: The risk register contains the list of identified risks and potential responses. When complete, the risk register will ultimately contain the outcomes of the other risk management processes, including the results of the qualitative risk analysis, quantitative risk analysis, and risk response planning. It also includes risk actions,risk statuses, and names of risk owners.

ID	Risk Description	Root Cause	Potential Responses	.....
1	Lack of labors	Labor Regulation Act	Use of local labor	
2	Delay in MEP work package	Weak experience in MEP work	Award MEP work to a Qualified subcontract.	
3	Delay on shop drawing	Weak technical office	Assign good technical Engineer	
4	Mistakes on drawings	Due to miss coordination between department	Use BIM technology	
5	Mistakes on execution Work	Due to parallel execution.	Use sequence between activities (FS)	

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Chapter 7—Perform Qualitative Risk Analysis

Objectives

After completing this Chapter, you will be ableto:

- Define the purposes and objectives
- Identify critical successfactors
- Explain inputs, tools and techniques along with their characteristics, and outputs
- Describe how to document the results

Purposes and Objectives

Prioritizing the risks of the project is important. The purposes and objectives of qualitative risk analysis are to:

- Assess and evaluate characteristics of individually identified risk.
- Prioritize risks based on agreed-upon characteristics.
- Assess individual risk, which evaluates the probability that each risk will occur and the effect it can have on project objectives.
- Categorize risks according to their sources or causes.
- Qualitative risk analysis is used to determine the risk exposure of the project by **multiplying the probability and impact.**

Critical Success Factors

Following are the critical success factors for qualitative risk analysis:

• Iterative.	• High-Quality Information.
• Agreed-Upon Definitions.	• Agreed-Upon Approach.

Use Agreed-Upon Approach

All risks may be assessed according to the probability of occurrence and impact on individual objectives.

Other factors to be considered are as follows:

- **Urgency (proximity)**: Implies that risks that need near-term responses may be considered as urgent to deal with. Indicators of urgency can include lead time to execute a risk response and clarity of symptoms and warning signs (detectability).
- **Manageability**: Implies that some risks are not manageable and if you try to address those, it may be a waste of time and resources.
- **Impact external to the project**: The importance of a risk may be increased if it affects the enterprise beyond the project.

Use Agreed-Upon Definitions of Risk Terms

Risk assessment should be based on agreed-upon definitions of important terms and should be used consistently.

For example: Levels of probability (25%) and impact on objectives (cost -$10,000.)

- The use of definitions assists the providers of information in giving realistic assessments for each risk.
- Communication will be better for the management and the stakeholders.

Collect High-Quality Information on Risks

For any risk analysis, quality of data is very important.

- Data should be gathered from interviews, workshops, and using expert judgment.
- It may be unbiased or intentionally biased.
- Biased data should be remedied.
- The remedy or the corrective action comes with experience and communication with the stakeholders.

Perform Iterative Qualitative Risk Analysis

Qualitative risk analysis is not complete with one analysis. Qualitative risk analysis:

- Is done throughout the phases of a project's lifecycle; and
- Ensures accurate analysis of risks in accordance with the changes happening in the project.

The frequency of this effort will be planned in the Plan Risk Management process, but it may also depend on events occurring within the project.

Perform Qualitative Risk Analysis / Inputs, Tools and Techniques, and Outputs

Inputs	Tools and Techniques	Outputs
1. Risk Management Plan 2. Scope Baseline 3. Risk Register 4. EEF 5. OPA	**1. Risk Probability and Impact Assessments.** **2. Probability and Impact Matrix** **3. Risk Data Quality Assessment** **4. Risk Categorization** **5. Risk Urgency Assessment** 6. Expert judgment	1. Project documents updates

Perform Qualitative Risk Analysis – Tools and Techniques

1 Risk Probability and Impact Assessments

Risk probability assessment investigates the likelihood that each specific risk will occur. Risk impact assessment investigates the potential effect on a project objective such as schedule, cost, quality, or performance, including both negative effects for threats and positive effects for opportunities.

Risks can be assessed in interviews or meetings with participants selected for their familiarity with the risk categories on the agenda. Project team members and knowledgeable persons external to the project are included.

Risk probabilities and impacts are rated according to the definitions given in the risk management plan. Risks with low ratings of probability and impact will be included within the risk register as part of the watch list for future monitoring.

Perform Qualitative Risk Analysis – Tools and Techniques

2 **Probability and Impact Matrix**

Evaluation of each risk's importance and priority for attention is typically conducted using a look-up table or a probability and impact matrix. Such a matrix specifies combinations of probability and impact that lead to rating the risks as low, moderate, or high priority.

Descriptive terms or numeric values can be used depending on organizational preference. Each risk is rated on its probability of occurrence and impact on an objective if it does occur. an organization can rate a risk separately for each objective. In addition, it may develop ways to determine one overall rating for each risk

3 Probability and Impact Matrix

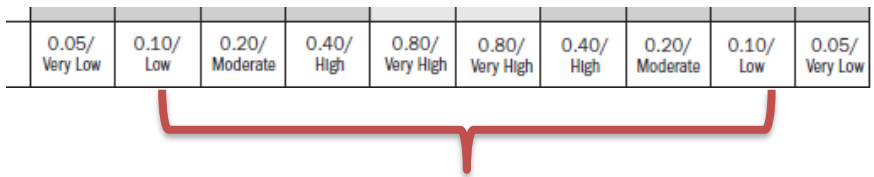
Probability and Impact Matrix

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

Risk rating rules can be tailored in the Plan Risk Management process to the specific project.

4 Risk Data Quality Assessment

Risk data quality assessment is a technique to evaluate the degree to which the data about risks is useful for risk management. It involves examining the degree to which the risk is understood and the accuracy, quality, reliability, and integrity of the data about the risk. The use of low-quality risk data may lead to a qualitative risk analysis of little use to the project.

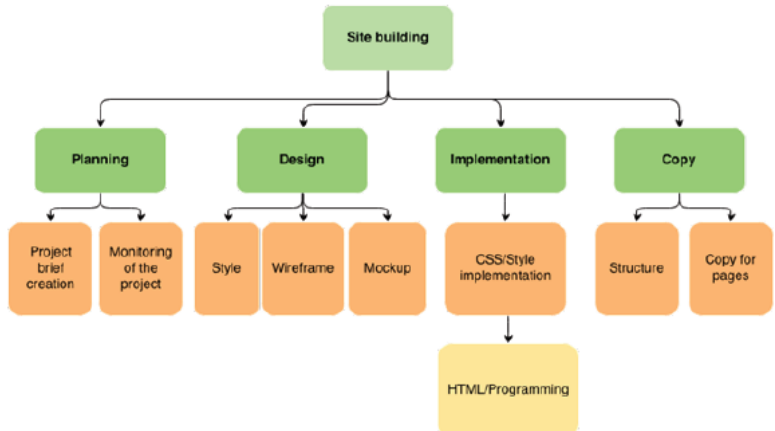


The numbers of steps in the scale are usually established when defining the risk attitude of the organization.

5 Risk Categorization

Risks to the project can be categorized by sources of risk (e.g., using the RBS), the area of the project affected (e.g., using the WBS), or other useful categories to determine the areas of the project most exposed to the effects of uncertainty. Risks can also be categorized by common root causes. This technique helps determine work packages, activities, project phases or even roles in the project, which can lead to the development of effective risk responses.

WBS is Deliverable oriented hierarchical decomposition of the work to be executed by the project team.



6 Risk Urgency Assessment

Risks requiring near-term responses may be considered more urgent to address. Indicators of priority may include:

- The probability of detecting the risk,
- The time to affect a risk response,
- The symptoms and warning signs,
- The risk rating.

In some qualitative analyses, the assessment of risk urgency is combined with the risk ranking that is determined from the probability and impact matrix to give a final risk severity rating.

Perform Qualitative Risk Analysis – Other Tools and Techniques

Estimating Techniques

A common estimating technique associated with risk management is the probability and impact assessment. This tool will be used concurrently with a predefined probability and impact matrix. It must be used consistently throughout the project with clearly defined definitions for probability andimpact.

Historical Documentation

One invaluable source of information for a project is any available data on previous projects that were similar to the current one. There are many risks that will reoccur from one project to the next. To capitalize on lessons learned, you will need access and it must be well structured.

Examples of historical documentation includes previous:

- risk plans,
- risk registers,
- contracts,
- project post-mortem documentation,
- change requests,
- cost and time estimates, etc.

Perform Qualitative Risk Analysis – Other Tools and Techniques

Analytical Hierarchy Process (AHP):

A tool used to determine the preferences for achieving the project objectives.

Preference Factor	
1	Constraints equal
2	Slightly preferred
3	Moderately preferred
4	Mostly preferred
5	Alwayspreferred

In step 1, Preferencefactors are determined.

Input Matrix (Preference Factors)

	Cost	Time	Scope	Quality
Cost	1.00	0.25	0.33	0.20
Time	4.00	1.00	1.00	0.25
Scope	3.00	1.00	1.00	0.25
Quality	5.00	4.00	4.00	1.00
Sum	13.00	6.25	6.33	1.70

In step2,
Each constraint is compared to one another and scored. Quality is always preferred to cost. Then calculate 1/preference factor for each and score. Notice the sum of each column.

Calculated factor (Preference Factor/Column Total)					Weighting Factors Row Average
	Cost	**Time**	**Scope**	**Quality**	
Cost	0.08	0.04	0.05	0.12	0.1
Time	0.31	0.16	0.16	0.15	0.2
Scope	0.23	0.16	0.16	0.15	0.2
Quality	0.38	0.64	0.63	0.59	0.6
Sum	13	6.25	6.33	1.7	1

In step3,
Divide each factor by the column sum.
Example: 1/13=.08 Then average each row to determine preference list of quality, scope, time and thencost.

The **analytic hierarchy** (**AHP**):

Is a structured technique for organizing and analyzing complex decisions, based on mathematics and psychology.

Apply AHP:

- Specifying the objective.
- Specifying the criterias and considerations.
- Develop alternative approach to achieve the objectives.
- Compare alternatives as per criterias and considerations.

It can also be used to create an overall project risk priority list from risks that have been assessed on their implications for individual objectives.

Perform Qualitative Risk Analysis Process

The steps involved in the Perform Qualitative Risk Analysis process are shown below:

Output

Following is the Output required to Perform Qualitative Risk Analysis:

Output	Description
Project documents updates	The project documents updates include risk register updates and assumptions log updates.
	Updates to the risk register include new information based on qualitative risk analysis of individual risks like probability, impact, ranking, urgency, as well as categorization; and watch list for high-priority and low-priority risks respectively.
	Assumptions log updates are required if there is any change in the assumptions due to analysis. This may be updated in a project scope statement.

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Chapter 8—Perform Quantitative Risk Analysis

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PROJECT CHAMPIONS ACADEMY

Day 3

Time	Task
09:00 – 09:45	Session 1
09:45 – 10:00	QA
10:00 - 10:15	Break 1
10:15 - 11:00	Session 2
11:00 - 11:15	QA
11:15 - 11:30	Break 2
11:30 – 12:30	Session 3
12:30 – Next day	Quiz (Certificate)

Objectives

After completing this Chapter, you will be ableto:

- Explain the purposes and objectives
- List the tools and techniques
- Describe EMV analysis
- List the uses of Monte Carlo analysis
- Describe probability distribution

Purposes and Objectives

Following are the purposes and objectives of Perform Quantitative Risk Analysis process:

- Performing Quantitative Risk Analysis provides a numerical estimate of the overall effect of risk on the project objectives.
- Helps in evaluating the likelihood of success in achieving theproject objectives and estimating contingency reserve.
- Usually applicable for time and cost invested in the project.
- Quantitative analysis is not mandatory, especially for smaller projects.
- Calculating estimates of overall project risk is the main focus of this process.

Implementation of Overall Risk Analysis

Implementation of overall risk analysis requires the following:

- Complete and accurate representation of the project objectives built from individual project elements.
- Identifying risks on individual project elements such as schedule activities or line-item costs, at a level of detail that lends itself to specific assessment of individual risks.
- Including generic risks that have abroader effect than individual project elements.
- Applying a quantitative method using Monte Carlo simulation that incorporates multiple risks simultaneously in determining the impact on the overall project objective.

Overall Risk Analysis — Post Implementation

The following can be predicted after implementing the overall risk analysis:

- The probability of meeting the project objectives.
- The total contingency reserve required.
- The line-item costs or schedule activities that contribute more risks when all risks are considered simultaneously.
- The individual risks that contribute the most to overall projectrisk.
- Projects where the quantified risks threaten objectives beyond the tolerance of the stakeholders.
- Project objectives that have risks well within acceptable tolerances.

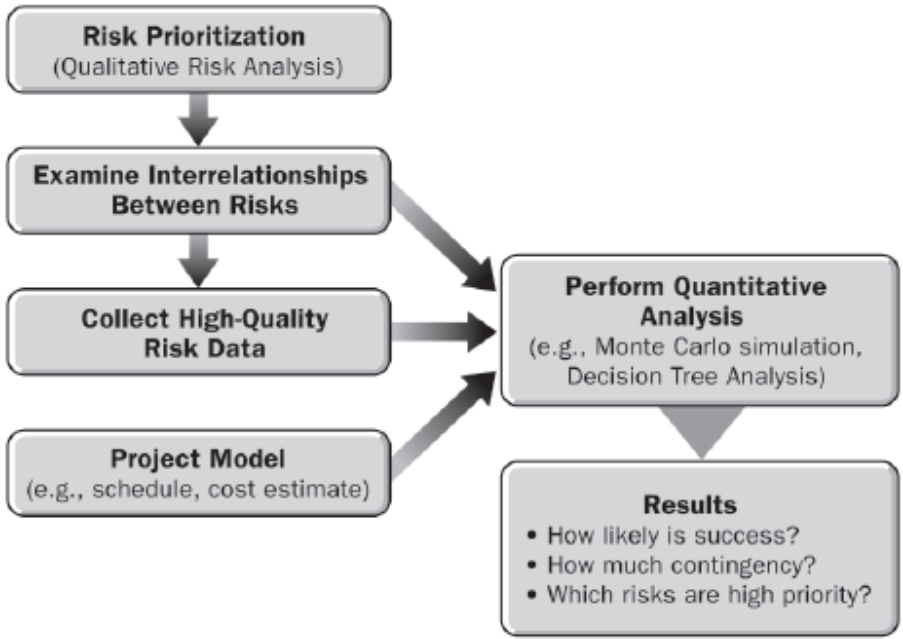
Qualitative and Quantitative Risk Analysis / High-Level Comparison

High-level comparison of qualitative and quantitative risk analysis are as follows:

Qualitative risk analysis	Quantitative risk analysis
• Addresses individual risks in detail. • Assesses the discrete probability of occurrence and impact on objectives if risk occurs. • Helps prioritize the individual risks for subsequent treatment. • Adds to risk register. • Leads to quantitative risk analysis.	• Predicts likely project outcomes based on combined effects of risks. • Uses probability distribution to characterize the risk related to cost and schedule values. • Requires specialized tools. • Estimates the likelihood of achieving targets and contingency needed. • Identifies risks with greatest effect on the overall project. • Adds to risk report.

Qualitative and Quantitative Risk Analysis / High-Level Comparison

The elements of a quantitative risk analysis



Critical Success Factors

Following are the critical success factors for Perform Quantitative Risk Analysis process:

• Prior Risk Identification and Qualitative Risk Analysis.	• Appropriate Project Model.
• Commitment to Collecting High-Quality Risk Data.	• Agreed-Upon Approach.
• Unbiased Data.	• Overall Project Risk Derived from Individual Risks
• Interrelationships between Risks in Quantitative Risk Analysis	

Perform Quantitative Risk Analysis / Inputs, Tools and Techniques, and Outputs

Inputs	Tools and Techniques	Outputs
1. Risk register 2. Risk management plan **3. Cost management plan** **4. Schedule management plan** 5. EEF 6. OPA	**1. Data gathering and Representation techniques.** **2. Quantitative risk analysis and modeling techniques** 3. Expert judgment	1. Project documents updates

Following are the Inputs required for Perform Quantitative Risk Analysis process:

3 **Cost management Plan:**

The cost management plan is a component of the project management plan and describes how the project costs will be planned, structured, and controlled. It Establishes the criteria for making plans, structuring, preparing an estimate, budgeting, and Establishing control over project costs.

4 **Schedule Management Plan:**

A component of the project or program management plan that establishes the criteria and the activities for developing, monitoring, and controlling the schedule. It Describes the scheduling methodology, the scheduling tool(s) to be used, and the format and established criteria for developing and controlling the project schedule.

Tools and Techniques

The 3 main techniques to Perform Quantitative Risk Analysis process are as follows:

Data gathering and representationtechniques

Quantitative risk analysis and modelingtechniques

Expert judgment

Interviewing:

Interviewing draw on experience and historical data, to quantify the probability and impact of risks on project objectives.

Probability distribution:

Used extensively in modeling and simulation, representing the uncertainty invalues such as duration of scheduled activities and costs of project components.

Tools and Techniques

The 3 main techniques to Perform Quantitative Risk Analysis process are as follows:

Data gathering and representationtechniques

Quantitative risk analysis and modelingtechniques

Expert judgment

Sensitivity analysis:

Places a value on the effect of changing a single variable within a project by analyzing that effect on the project plan.

Expected Monetary Value (EMV) analysis:

Assesses the average outcome of both known and unknown scenarios.

Modeling and simulation:

Uses models that calculate potential impact of events on the project, based on random input values.

Basic Principles of Probability

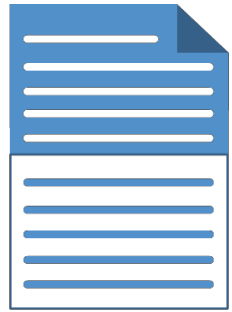
The following details the basics on principles of probability and its

Principles of Probability	Description
Sum of probabilities	The sum of the probabilities of all events that may occur should be equivalent to 1 (100%).
Probability of single event	The probability of any single event must be greater than or equal to 0 and less than or equal to1.
Mean	The sum of the events divided by the number of occurrences.
Average	The number which typifies the data in a set. It is calculated by adding the values of a group of numbers and dividing the sum by the number of objects considered.
Standard deviation	This is a measure of the spread of data, or the statistical dispersion of the values in your data set.

Historical Documentation

One invaluable source of information for a project is any available data on previous projects that were similar to the current one. There are many risks that will reoccur from one project to the next.

To capitalize on lessons learned, you will need access and it must be well structured.

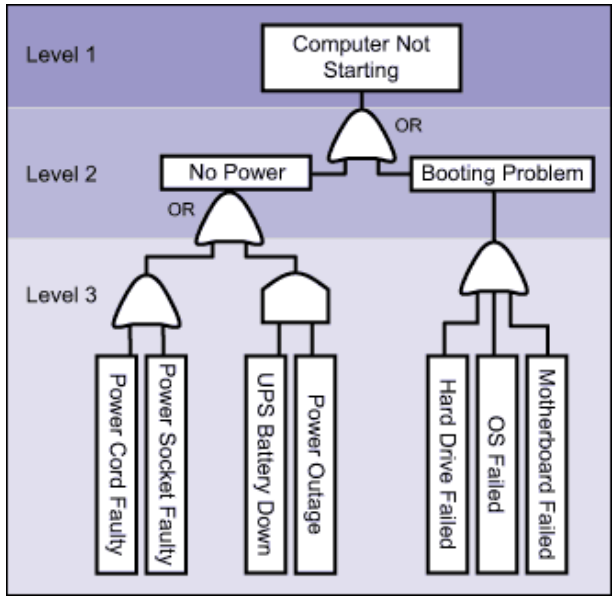


Examples of historical documentation includes previous:

- risk plans,
- risk registers,
- contracts,
- project post-mortem documentation,
- change requests,
- cost and time estimates, etc.

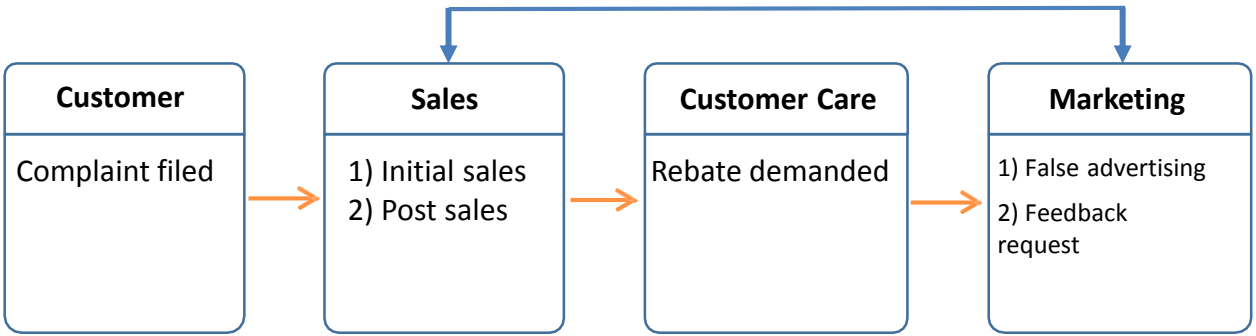
Fault Tree Analysis

Fault Tree Analysis is also known as Failure Modes and Effects Analysis (FMEA). This type of model is structured to identify the points of failure that are risks by themselves, or in combinations with one another. An example is illustrated below.



System Dynamics

The System Dynamics (SD) model represents the flow of information and interactions among stakeholders or teams on aproject. An example of SD is shown below.



System dynamics is a methodology and mathematical modeling technique to frame, understand, and discuss complex issues and problems.

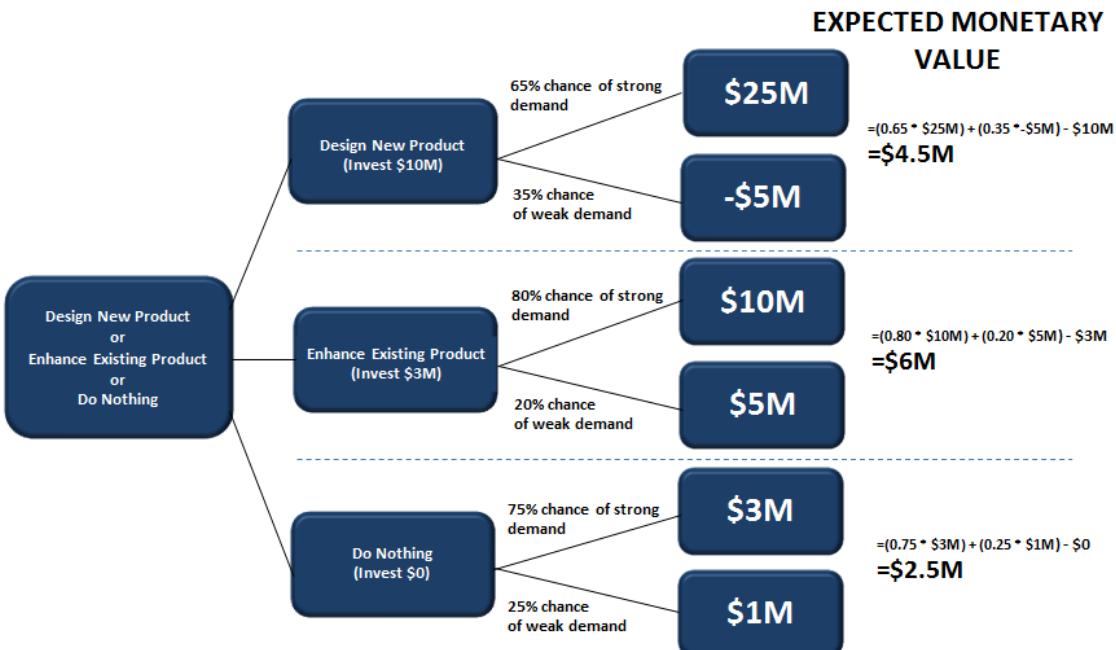
EMV Analysis

EMV Analysis is also called as Expected Monetary Value Analysis.

- It is a method of calculating the average outcome when the future is uncertain.
- It is the product of the expected monetary value of an outcome and the probability that it will occur.
- It is used in decision tree analysis.
- It is calculated to find the best outcome, which is the lowes combination of cost and EMV.

Decision Tree Analysis

An example of the decision tree analysis is illustrated below.

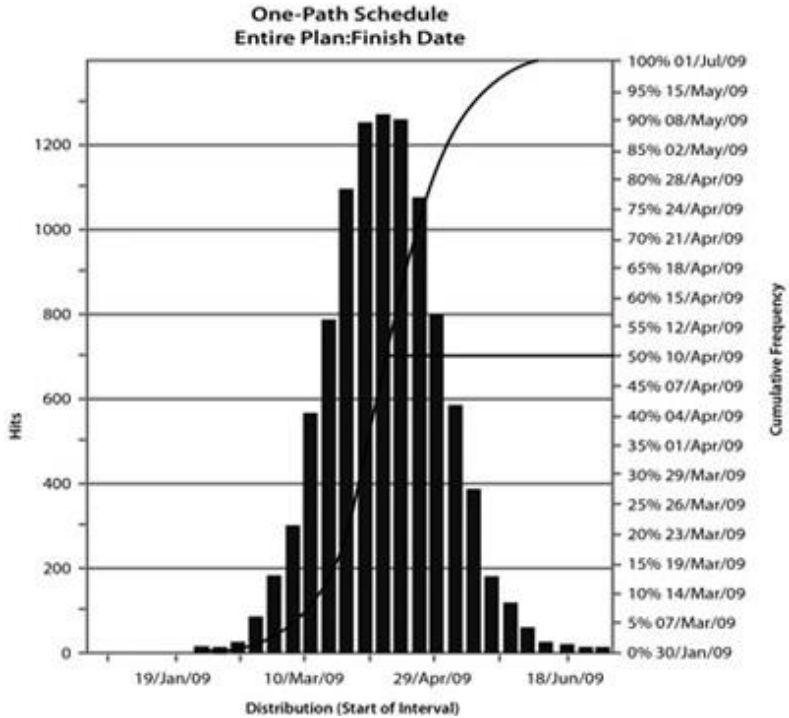


EMV = P * I

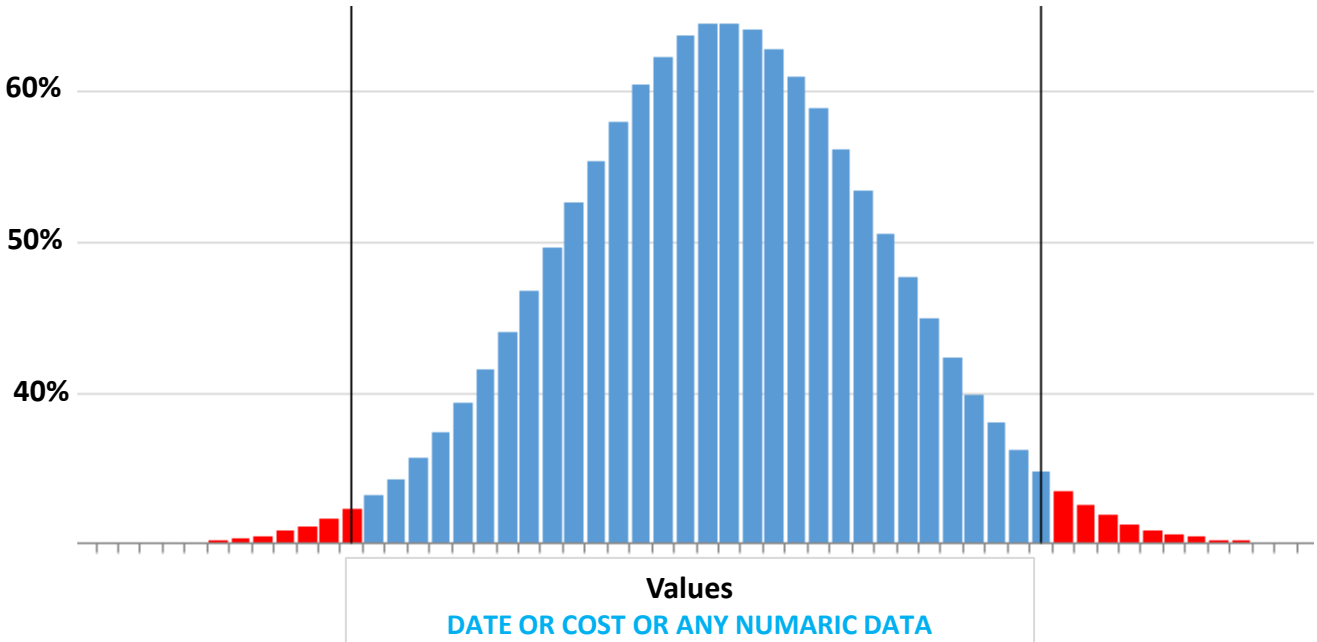
Monte Carlo Analysis

Following are the uses of Monte Carlo analysis:

- Uses the optimistic, most likely, and pessimistic estimates.
- Simulates various outcomes.
- Predicts a range of possible results.
- Used to predict likely outcome for schedules and costs.
- Uses sophisticated software applications.
- Effective with large number of inputs.
- Effective while predicting business risks.



Exam Simulation



Project Risk Ranking

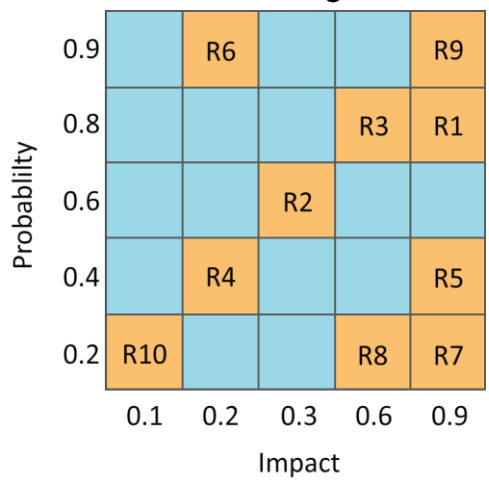
The project risk ranking table helps in the following:

- Overall risk ranking for the final deliverable.
- Allows for comparisons among other projects.

Risk Exposure Table

R9	0.9	0.9	0.81
R1	0.8	0.9	0.72
R3	0.8	0.6	0.48
R5	0.4	0.9	0.36
R6	0.9	0.3	0.27
R7	0.2	0.9	0.18
R2	0.6	0.3	0.18
R8	0.2	0.6	0.12
R4	0.4	0.2	0.08
R10	0.2	0.1	0.02
Tatal Exposure			3.22
Exposure of top 4 risks			2.37
% Exposure of top 4 risks			2.37/3.22x100
			73.6%

Risk Ranking Table



Steps to Perform Quantitative Risk Analysis

Following are the steps to perform quantitative risk analysis:

- Review the risk, cost, and schedule management plans.
- Begin with the original estimate of time or cost.
- Calculate and assess the impact of changing the range of results on the overall project estimate.
- Refer to historical information.
- Use the appropriate interviewing technique and obtain probability distributions from stakeholders and subject matter experts.
- Depict the distributions in a PDF format.
- Perform a sensitivity analysis.
- Conduct a project simulation.
- Update the risk register, project management plan, and other project documents.

Output

Outputs	Description
Project documents updates	Includes a probabilistic analysis of the project, the probability of fulfilling cost and time objectives, an updated list of quantified risks arranged in order of priority, and trends in the results of quantitative risk analysis.

Documenting the Results

Following are the points which are documented upon completing this process:

- The contingency reserve calculated in quantitative project cost and schedule risk analysis to be incorporated into the cost estimateand schedule.
- Contingency reserve established to capture the opportunities that are judged to be priorities oftheproject.
- If contingency reserve exceeds the time or resource available, changesthe scope and plan, then these have to be documented.
- The results of quantitative risk analysis must be recorded and passed on to the project management team for further actions tobe taken.

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Chapter 5—Plan Risk Responses

After completing this Chapter, you will be able to:

- Explain the purposes and objectives
- Identify the critical success factors
- List the inputs, tools and techniques, and outputs
- Define contingency plan
- List the different forms of contingency reserves

Purposes and Objectives

Plan Risk Responses process determines the effective responses that are appropriate to the priority of individual risks and overall project risk. While deciding the risk response, it is important to consider a few factors which includes the following:

- Stakeholders Attitude
- Stakeholders Conventions
- Stakeholders Assumptions
- Stakeholders Constraints

The objective of the Plan Risk Responses process is to determine the set of actions which enhances the chances of project's success while complying with organizational and project constraints.

Activities in Plan Risk Responses process

Following are the important activities and roles to be carried out as part of the Plan Risk Responses process:

- The risk response plans are developed on the basis of threats or the opportunities offered by negative or positive risk.
- Potential changes to budget, schedule, and scope of the project should be considered while planning for risk response.
- The implementation of response process can generate additional risks called **secondary risk**.
- Secondary risks should be analyzed and the required responses should be planned.

Activities in Plan Risk Responses process

A few other important activities and roles are as follows:

- Residual risks should be identified, analyzed, documented, and communicated to the stakeholders.
- Contingent risk response actions should be executed at the optimum time.

Risks that remain after the primary and secondary risks have been eliminated are called **residual risks**.

Critical Success Factors

Critical success factors for Plan Risk Responses process process are as follows:

Communicating to different stakeholders:

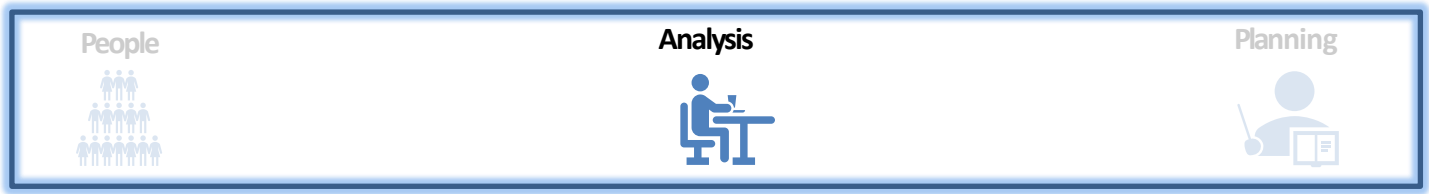
- Communication should be open and appropriate.
- The risk responses should ensure acceptance among the stakeholders.
- Organizational factors like culture, attitudes, ordisagreements should be addressed openly.

Defining roles and responsibilities:

- Key roles in project risk management must be assigned to risk owner and risk action owner.
- The team should understand what is expected of them. The stakeholders should understand and accept the need and authority.
- The senior management should approve and track the contingencyreserve.

Critical Success Factors

Critical success factors for Plan Risk Responses process process are as follows:



Specify response timing:

- The agreed-upon responses should be integrated into the project management plan.
- The responses should be scheduled and assigned for execution.

Provide resources, budget, and schedule:

- The approval from the management for resources, costs, and duration needs to be obtained.
- The commitment from risk owners and risk action owners needs to obtained.

Critical Success Factors

Critical success factors for Plan Risk Responses process process are as follows:

Address the interaction of risks and responses:

- Control the potential effects of strategy developed for treating the original risk.

Ensure appropriate responses:

- Consistency with organizational values, project objectives, and stakeholder expectations.
- Capability to balance the project objectives and improve the risk situation.

Analyze the threats and opportunities:

- If threats or opportunities are not addressed fully, the combined response strategy
- may be invalid.

Develop strategies to address tactical responses:

- The risk response strategy should be carried out at a general, strategic level; and the strategy should be validated and agreed upon.

Plan Risk Responses / Inputs, Tools and Techniques, and Outputs

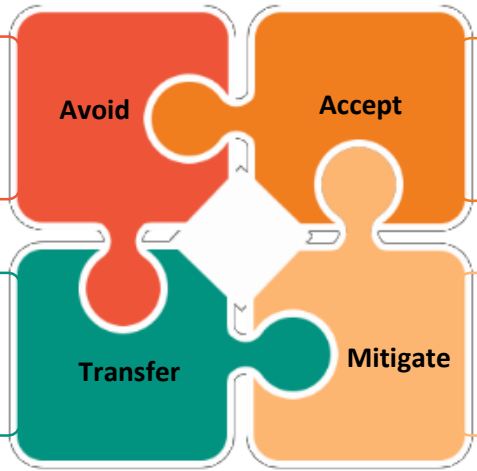
The Inputs, Tools and Techniques, and Outputs of Plan Risk Responses process are as follows:

Inputs	Tools and Techniques	Outputs
1. Risk Management Plan 2. Risk Register	1. **Strategies for negative risks or threats** 2. **Strategies for positive risks or opportunities** 3. **Contingent response strategies** 4. Expert judgment	1. Project managemet plan updates 2. Project documents updates

Tools and Techniques

1 Strategies for negativerisks or threats

A negative risk strategy that involves changing the project plan to prevent a determined potentially risk condition or event from happening.



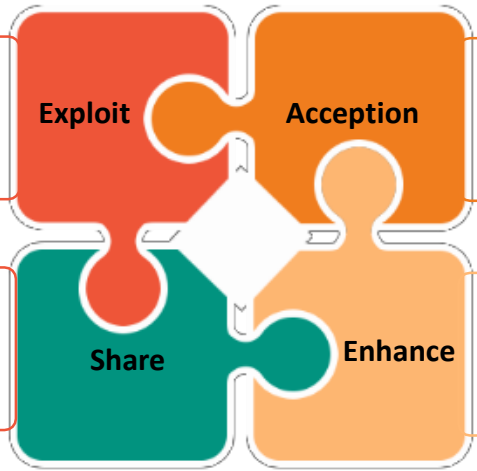
It is a negative risk strategy that involves accepting that a risk exists. The acceptance may be passive or active.

A negative risk strategy that shifts the impact of a risk event and ownership of the risk response toa third party.

Anegative risk strategy that attempts to reduce the probability or impact of a potential risk event to an acceptable level.

2 Strategies for positive risks or opportunities

A positive risk strategy that is often used when aproject team wants to make sure that a positive risk is fully realized.



It is a positive risk strategy that involves accepting the risk and actively responding to it as it comes, but not through the pursuit.

A positive risk strategy that involves partnering up with another party, in an effort to give aproject teamthe best chance of seizing an opportunity.

A positive risk strategy that attempts to increase the probability. that an opportunity will occur.

The four risk response strategies that are applied to individual risks can also be applied to address the overall project risk

For each risk or set of risks for which a contingent response has been defined, the corresponding set of trigger conditions should have been specified. It is the responsibility of the action owner to ensure that these conditions are effectively monitored and that the corresponding actions are carried out as defined, in a timely manner.

Strategies for Opportunities

3 **Contingent response strategies**

For each risk or set of risks for which a contingent response has been defined, the corresponding set of trigger conditions should have been specifi ed. It is the responsibility of the action owner to ensure that these conditions are effectively monitored and that the corresponding actions are carried out as defi ned, in a timely manner.

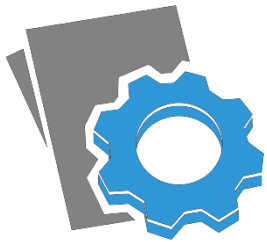
It is appropriate for the project team to make a response plan that will only be executed under certain predefined conditions. if it is believed that there will be sufficient warning to implement the plan. Events that trigger the contingency response should be defined and tracked.

Risk responses identified using this technique are often called **contingency plans** or **fallback plans** and include identified triggering events that set the plans in effect.

Tools and Techniques - Categories

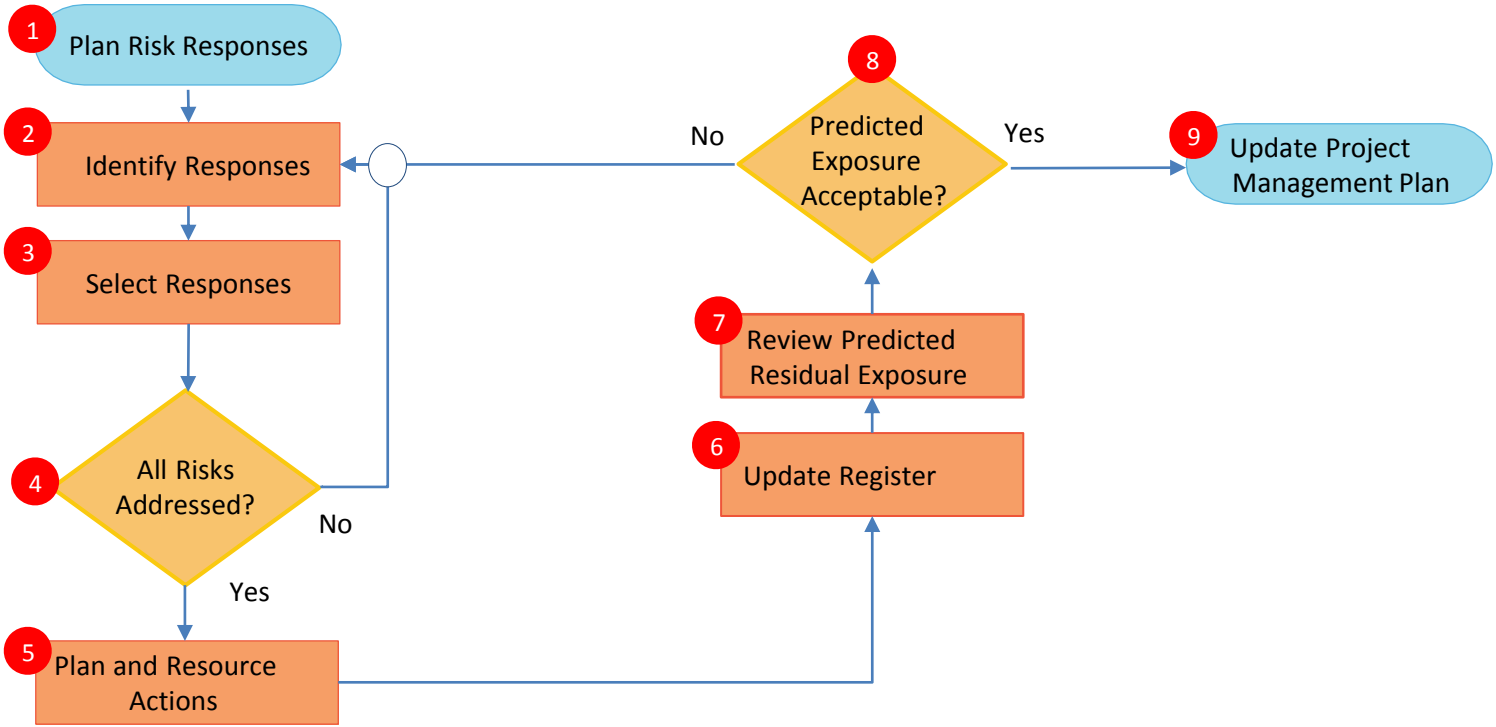
The four categories of tools and techniques are as follows:

- Creativity tools for potential response;
- Decision support tools for optimal potential response;
- Strategy implementation techniques to convert strategy into action.
- Tools to transfer control to the control risks process.



The risk action owner should keep the risk owner aware of the status of the response actions so that the risk owner can decide whether the risk has been effectively dealt with, or whether additional actions need to be planned and implemented.

Steps Involved in Planning Risk Responses Process

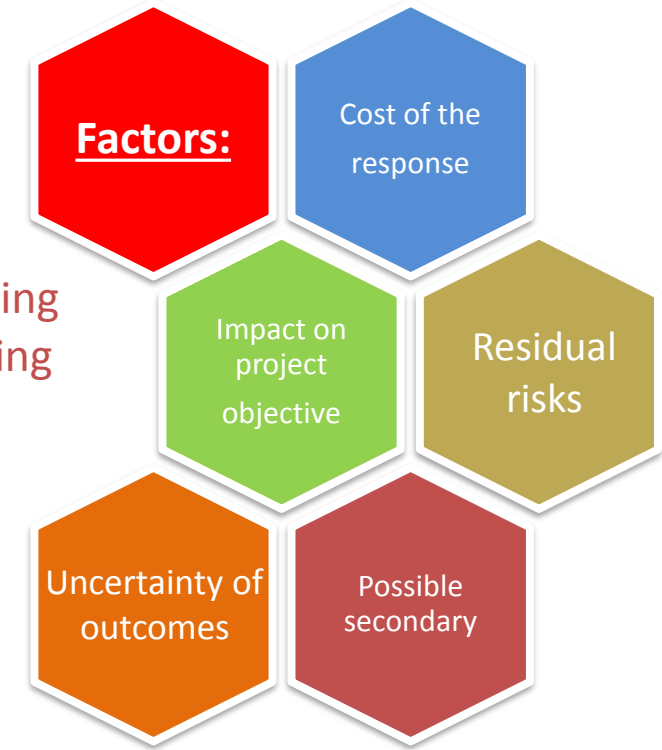


Response Identification

Response identification is based on the information available on potential risk. It aims to determine the optimal set of responses. As a result, it should involve subject matter experts and employ creativity techniques to explore all the options. Project planning and execution techniques are used to evaluate the potential effects on the projectobjectives.

Response Selection

Potential responses are identified using adecision-support technique. Following factors should be considered while selecting potential responses:



Outputs of Plan Risk Responses process is given below:

Outputs	Description
Project management plan updates	Include subsidiary management plans and their various requirements for the Plan Risk Responses process.
Project documents updates	Contain assumptions, log updates, and technical documentation updates.

Once the Plan Risk Responses process is complete, all of the approved unconditional response actions should have been included and defined in the current project management plan. The first action of risk monitoring and controlling is to check whether this is the case and take any appropriate action if necessary, such as invoking the change management .

Business Continuity Plan

A Business Continuity Plan (BCP) is a logistical risk response plan that documents the restoration and recovery methods of an organization during crisis.

This plan involves tested solutions to increase the chances of continuing operations, during or after disasters. BCP also contains details on the recovery timeline methods, procedures and tested action plans, and any alternate recovery resources, including facilities.

Contingency Reserves

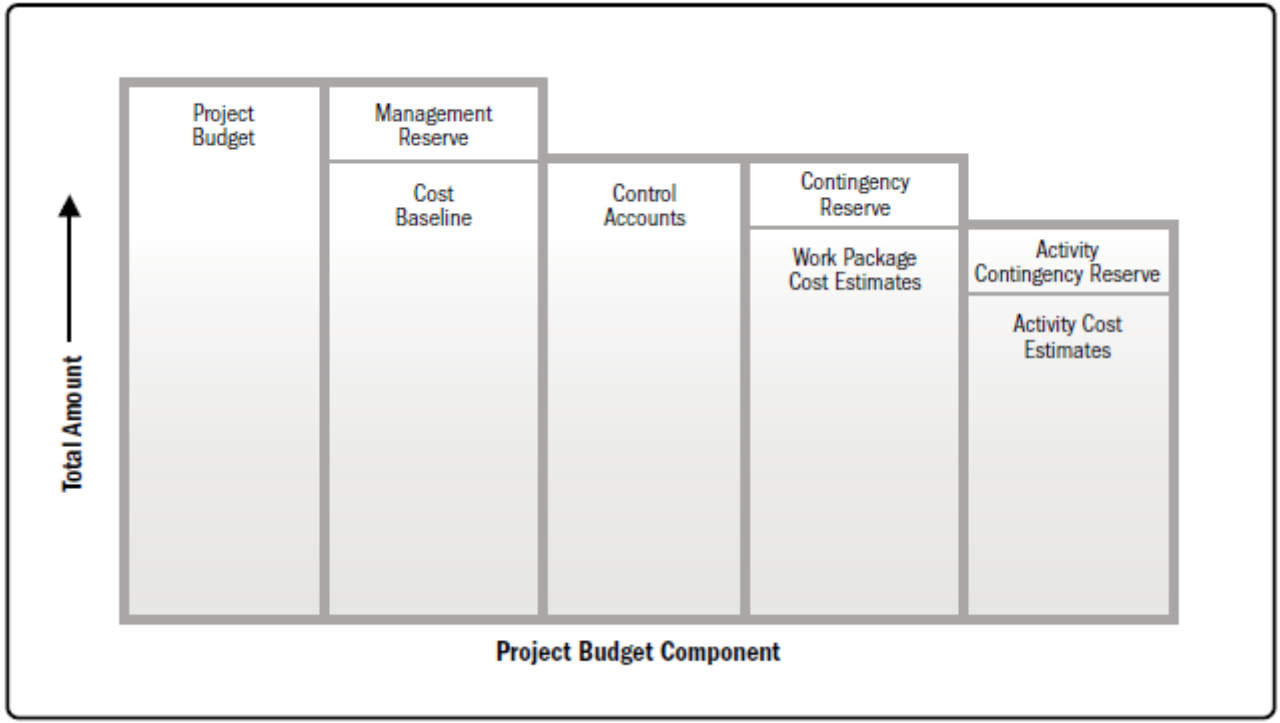
Contingency reserve is a predetermined amount that is set aside to be used when known risks become reality. Different forms of contingency reserves are as follows:

Additional time

Money

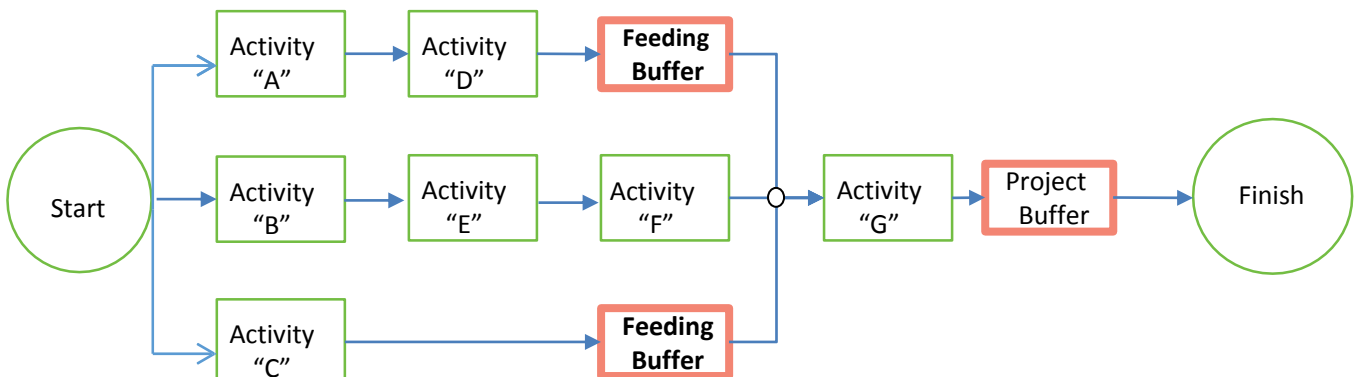
Resources

Contingency Reserves



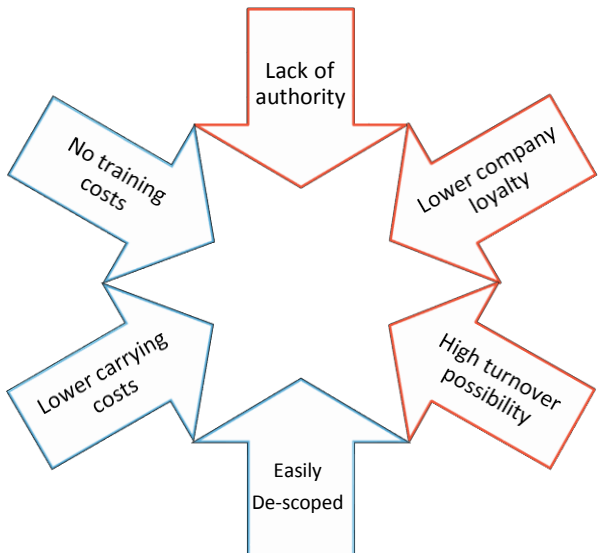
Critical Chain Project Management

Critical Chain Project Management (CCPM) is amethod that allows the project team to place buffers on any path to account for limited resources and other types of risk. A buffer is a non-work schedule activity with a duration based on the risk for that path. Are source constrained critical path is referred to as the critical chain.



Force Field Analysis

Force Field Analysis technique is often used when a change is under consideration. The two sets of variables that are compared are driving forces and restraining forces.



There are plenty of mature industries that publish lessons learned or scientific data that can be used in your project. This type of data is valuable for benchmarking on your project.

The biggest concern is getting access to relevant and accurate information.

Interviews

It may be necessary to have a one on one conversation with stakeholders to gather their feedback.

- To properly perform an interview, the questions must be prepared in advance and the interviewer should have sound questioning skills.
- **Active listening** and the ability to build relationship with the stakeholder is important.
- Appropriate time should be allotted for interviews.
- Be prepared to filter **issues** and **non-risks** during the interviews.

Multi-Criterion Selection Techniques

Multi-Criterion Selection tool could use weighted approach to compare options.

The stakeholders must agree upon the weights, criteria, and scoring results.

Criteria	Oracle	Microsoft
Price	30	60
Time	70	70
Quality	90	70
Total	190	200
Scoring is out of 100		

Historical Documentation

One invaluable source of information for a project is any available data on previous projects that were similar to the current one. There are many risks that will reoccur from one project to the next. To capitalize on historical documentation, you will need access and it must be well structured. Examples of historical documentation includes previous:

- Risk plans.
- Risk registers.
- Contracts.
- Project post-mortem documentation.
- Change requests.
- Cost and time estimates.

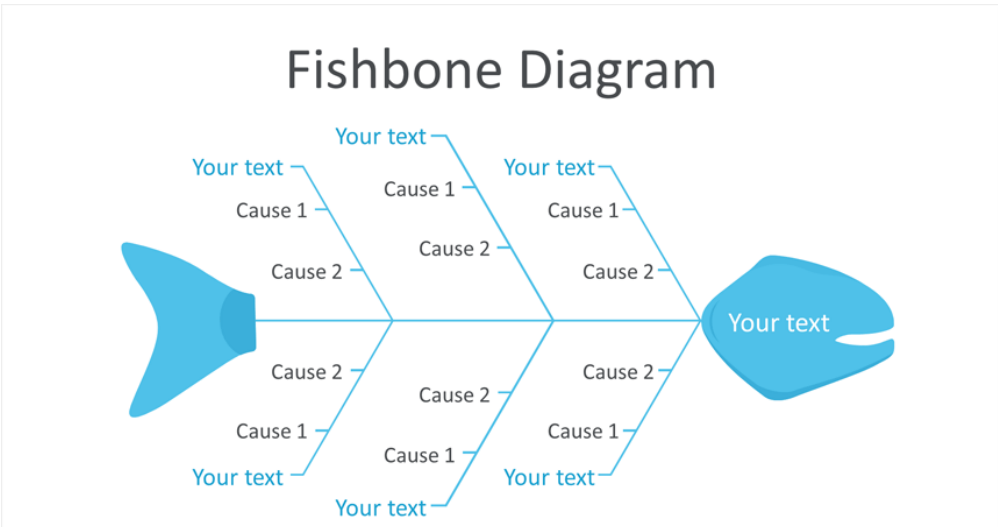
Quantitative Risk Analysis

Quantitative risk analysis may be used to determine which responses are cost effective based on the impact to the project.

Also decision tree analysis might help you determine whether you should purchase a piece of equipment or just rent it during the project. The cost or rental of the equipment, and the impact to the budget might be clearly displayed.

Root Cause Analysis

Root Cause Analysis technique can be used proactively or reactively. A commonly used example is the fishbone diagram which is shown below.



Scenario Analysis

Scenario analysis for risk response planning involves defining several plausible alternative scenarios. The different scenarios may require different risk responses that can be described and evaluated for their cost and effectiveness. If the scenarios are out of the control of the organization, the scenario analysis can lead to effective and necessary contingency planning. All participants need a good understanding of the project plans. It Can be time Consuming.

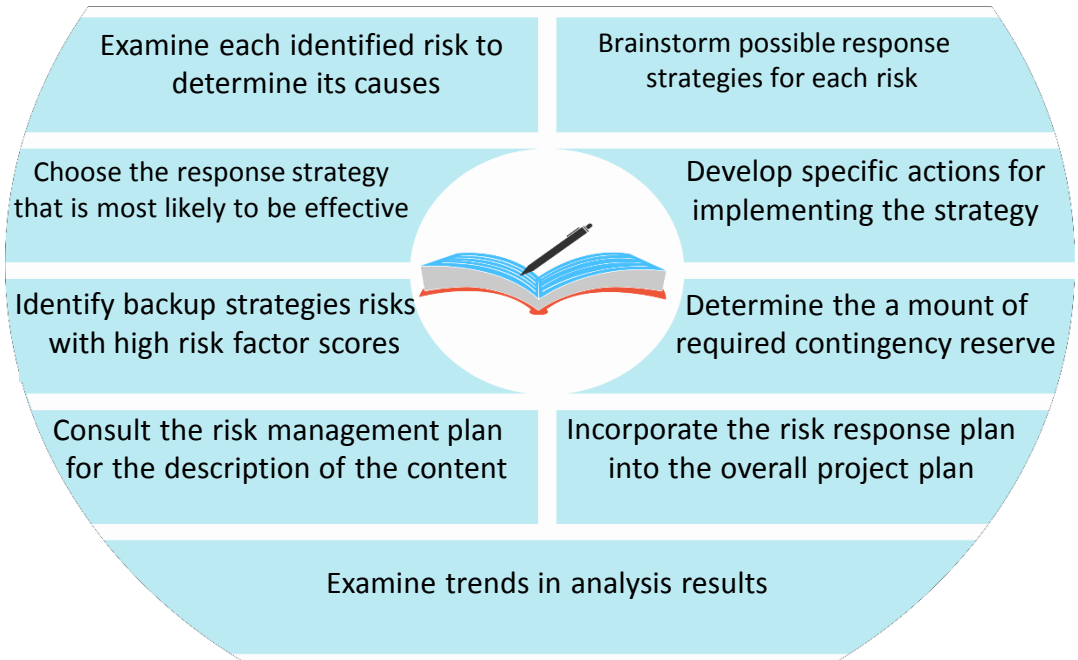
Residual Risks

Residual Risks refer to risks that remain in aproject even after the risk response actionis implemented. It is essential to add the contingency costs and duration to account these residual risks.

	Secondary Risks	Residual Risks
Definition	Those risks which arise as a direct outcome of implementing a risk response	Those risks which are expected to remain after the planned response of risk has been taken, as well as those that have been deliberately accepted
Action Required	Yes	Not always – depends
Action to take	Creation of a response plan	A contingency plan

Creating a Risk Response Plan — Guidelines

Guidelines for creating a risk response plan are as follows:



Documenting the Results

- **Adding risk responses to the risk register.**
- **Adding corresponding risk responses to the project management plan.**
- **Reviewing and documenting the predicted exposure.**

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Chapter 5—Cotrol Risk

Objectives

After completing this Chapter, you will be ableto:

- Explain the purposes and objectives.
- Identify the critical success factors.
- Describe the inputs, tools and techniques, and outputs.
- Discuss how to document the results.
- Describe risk audits.

Purposes and Objectives

The primary objectives of Control Risks process are as follows:

- Tracking identified risks
- Monitoring residual risks
- Identifying new risks
- Ensuring risk response plans are implemented
- Monitoring the effectiveness of risk response plans
- Reviewing the effectiveness of risk management processes
- Making improvements to the process

For each risk where a contingent response is identified, the corresponding trigger conditions should be specified. Risk owners should monitor the implementation in atimely manner.

Purposes and Objectives (contd.)

Once the Plan Risk Responses process is complete, all the approved unconditional response actions should be included and defined in the risk register.

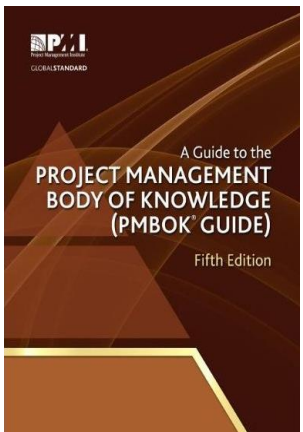
- Effective communication needs to be maintained between risk team and the project manager, so that the respective stakeholders accept the accountability.
- In the event of major organizational changes, risk management planning may need to be revised.

Critical Success Factors

Following are the critical success factors for Control Risks process:

- Integrate Risk Monitoring and Control with Project Monitoring and Control.
- Continuously Monitor Risk Trigger Conditions.
- Maintain Risk Awareness.

Maintain risk awareness. All the team members must be kept updated on risk management activities and status. Risk management must be fully integrated into all the project management decisions. The stakeholders must be made aware of the importance of maintaining the focus on risk and must be kept updated on risk management status.



PMBOK 5

Knowledge Areas	Project Management Process Groups				
	Initiating Process Group	Planning Process Group	Executing Process Group	Monitoring and Controlling Process Group	Closing Process Group
4. Project Integration Management	4.1 Develop Project Charter	4.2 Develop Project Management Plan	4.3 Direct and Manage Project Work	4.4 Monitor and Control Project Work 4.5 Perform Integrated Change Control	4.6 Close Project or Phase
5. Project Scope Management		5.1 Plan Scope Management 5.2 Collect Requirements 5.3 Define Scope 5.4 Create WBS		5.5 Validate Scope 5.6 Control Scope	
6. Project Time Management		6.1 Plan Schedule Management 6.2 Define Activities 6.3 Sequence Activities 6.4 Estimate Activity Resources 6.5 Estimate Activity Durations 6.6 Develop Schedule		6.7 Control Schedule	
7. Project Cost Management		7.1 Plan Cost Management 7.2 Estimate Costs 7.3 Determine Budget		7.4 Control Costs	
8. Project Quality Management		8.1 Plan Quality Management	8.2 Perform Quality Assurance	8.3 Control Quality	
9. Project Human Resource Management		9.1 Plan Human Resource Management	9.2 Acquire Project Team 9.3 Develop Project Team 9.4 Manage Project Team		
10. Project Communications Management		10.1 Plan Communications	10.2 Manage Communications	10.3 Control Communications	
11. Project Risk Management		11.1 Plan Risk Management 11.2 Identify Risks 11.3 Perform Qualitative Risk Analysis 11.4 Perform Quantitative Risk Analysis 11.5 Plan Risk Responses		11.6 Control Risks	
12. Project Procurement Management		12.1 Plan Procurement Management	12.2 Conduct Procurements	12.3 Control Procurements	12.4 Close Procurements
13. Project Stakeholder Management	13.1 Identify Stakeholders	13.2 Plan Stakeholder Management	13.3 Manage Stakeholder Engagement	13.4 Control Stakeholder Engagement	

Control Risks / Inputs, Tools and Techniques, and Outputs

Following are the inputs, tools and techniques, and outputs required for Control Risks process:

Inputs	Tools and Techniques	Outputs
• Risk register • Project management plan • **Work performance data** • **Work performance reports**	• Risk reassessment • Risk audits • Variance and trend analysis • Technical performance measurement • Reserve analysis • Meetings	• **Work performance info.** • OPA updates • Change requests • Project management plan updates • Project document updates

Inputs

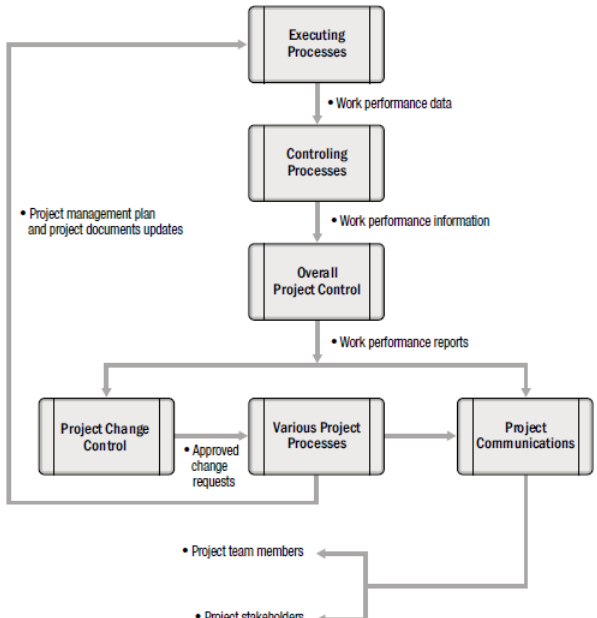
Following are the inputs for Control Risks process:

Inputs	Description
Work performance data	Provides items related to project performance results, which may be impacted by risks such as deliverable status, progress with respect to schedule, and cost incurred to accomplish the work.
Work performance reports	Provides information on project work performance that may affect the processesof risk management or the actual occurrence of risk.

The primary objectives of Monitor and Control Risks process are to track identified risks, monitor residual risks, identify new risks, etc. Prioritizing risks on the basis of agreed-upon characteristics is an objective of Perform Qualitative Risk Analysis process.

WPD Vs WPI


Work Performance Data
The raw observations and measurements identified during activities performed to carry out the project work.
Work Performance Information
The performance data collected from various controlling processes, analyzed in context and integrated based on relationships across areas


Executing Processes
• Work performance data
Controling Processes
• Project management plan and project documents updates
• Work performance information
Overall Project Control
• Work performance reports
Project Change Control
• Approved change requests
Various Project Processes
Project Communications
• Project team members
• Project stakeholders

Tools and Techniques

Following are the tools and techniques of Control Risks process:

Risk reassessment	Risk audits	Variance and trend analysis	Technical performance measurement	Reserve analysis

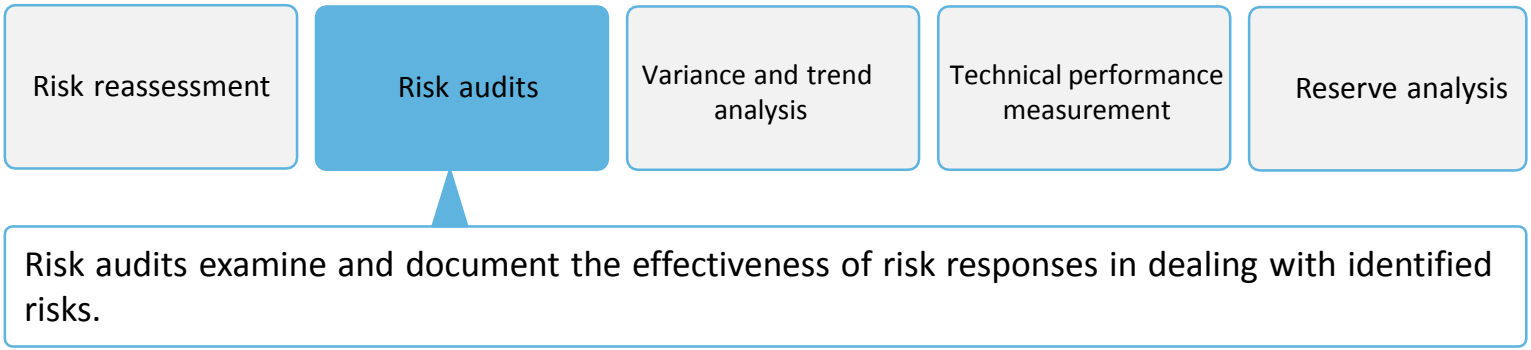
Risk reassessment is the identification of new risks, reassessment of current risks, and the closing of risks that are outdated.

Typical reasons for risk reassessment are:

Occurrence of a major or unexpected risk • Need to analyze a complex change request • Phase end review • Project re-planning or major plan elaboration, and • Periodic review to ensure that the information remains current

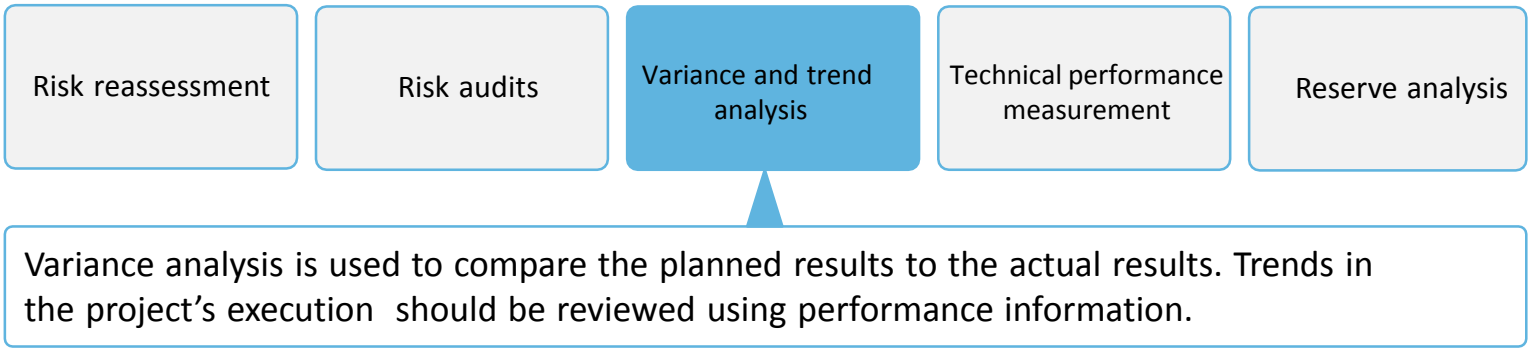
Tools and Techniques

Following are the tools and techniques of Control Risks process:



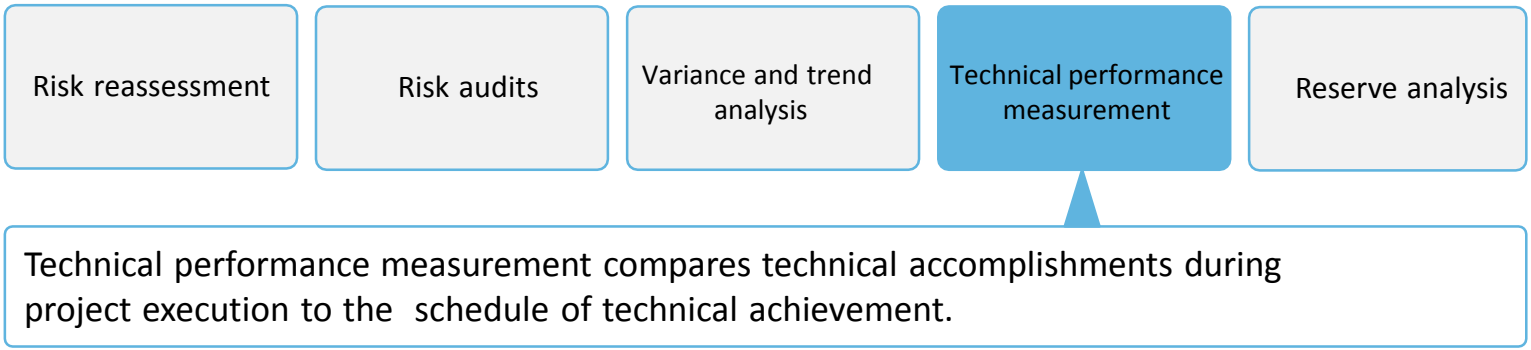
Tools and Techniques

Following are the tools and techniques of Control Risks process:



Tools and Techniques

Following are the tools and techniques of Control Risks process:



Tools and Techniques

Following are the tools and techniques of Control Risks process:

Reserve analysis compares the amount of the contingency reserves remaining to the amount of risk remaining at any time in theproject.

Other Tools and Techniques

A few other tools and techniques of Control Risk process are as follows:

- Meeting
- Managing contingency reserve
- Tracking trigger conditions
- Tracking overall risk
- Tracking compliance

In Status review meetings, all project reviews must include risks as agenda items and must address or assess: Changes, if any, to the highest priority risks of the current period.

Outputs

Following are the outputs of Control Risk process:

Outputs	Description
Project management plan updates	The project management plan needs to be revised and reissued, if there is any approved change which has an effect on risk management processes.
Project document updates	Various project documents that require updates include the assumptions log, the technical documentation, the contract terms, and the schedule and cost baselines.

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