Project Risk Management
Objective

- Risk is an uncertain event or condition that, if it occurs, has an effect on at least one Project objective, such as Scope, Schedule, Cost and Quality.
- The objective of Risk Management is to increase the probability and impact of positive events and decrease the probability and impact of negative events.
What is RISK?

- Risk is an uncertain event (May or May not occur) resulted in Impact which are negative (threat) and positive (opportunity)
- Risk can be classified as known and unknown and impact also classified as known and unknown
Definitive Plan

Contingency Plan

Management Plan

Project Risk

IMPACT

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Key Terms

- **Risk Tolerance**
  - Risk tolerance is the degree to which a risk can be considered as acceptable or unacceptable by the organization or Stakeholders. Risk tolerance may vary between Projects and organizations.

- **Threats and Opportunities**
  - Risks, when they happen, can positively or negatively impact Projects.
    - When they negatively impact the Project, they are called threats.
    - When they positively impact the Projects, they are called opportunities.
Quantitative Risk Analysis
- Quantitative risk analysis is the process of numerically analyzing the effect of identified risk on the Project objectives.

Probability Distributions
- Probability distributions of cost elements and activity durations are used to do risk analysis.

Decision Tree Analysis
- Decision trees are used to improve the organization’s capability to make the right decision, when the impact of the different decisions cannot be foretold with certainty.
Project Risk Management

- Includes the processes for conducting Risk Management Planning, Identification, Analysis, Response planning and controlling risk on a Project
- The objective of Risk Management is to increase the probability and impact of positive events and decrease the probability and impact of negative events
- Project Management team and organization have to be committed to address risks proactively and consistently throughout the Project, to make the Project successful
Risk – Plan vs Actual

Poor Risk Management

Technical Incapability

Performance

Time

Customer Expectation

Actual Performance
Sources of Project Risk

- Scope
- Quality
- Time
- Integration
- Communication
- Human Resource
- Cost
- Procurement
- Life cycle Environment Variables
- Expectation Feasibility
- Requirement Standards
- Time, Objectives Restraints
- Services, Materials, Performance
- Availability Productivity
- Ideas, Derivatives, Info exchange
- Costs, Objectives, restraints
Project Risk Cycle

1. Identify Risks
2. List Critical Risks
3. Keep Non-Critical Risks in the Watch-List
4. Eliminate Risks
5. Reduce Probability / Impact of the Risks
6. Accept Risks
7. Add Additional Risks to the Watch-List
8. Identify Residual Risks
9. Develop Contingency Plans
10. Update Project Plan

Plan for Risks

Identify Risks

List Critical Risks

Eliminate Risks

Reduce Probability / Impact of the Risks

Accept Risks

Add Additional Risks to the Watch-List

Identify Residual Risks

Develop Contingency Plans

Update Project Plan

Specialized Training for e-Governance Programme
Project Risk Management

Key Processes

• Plan Risk Management
• Identify Risks
• Perform Qualitative Risk Analysis
• Perform Quantitative Risk Analysis
• Plan Risk Responses
• Control Risks
PLAN RISK MANAGEMENT

Planning Process Group

Plan Risk Management
Identify Risks
Perform Qualitative Risk Analysis
Perform Quantitative Risk Analysis
Plan Risk Responses
Control Risks
Plan Risk Management

- Is the process of identifying how to conduct the Risk Management activities in a Project
- Risk planning should start as soon as a Project is conceived and should be completed during the initial stages of Project planning
- Is an element of Planning Process Group
Plan Risk Management

INPUTS
- Project Management Plan
- Project Charter
- Stakeholder register
- Enterprise Environmental factors
- Organizational process assets

TOOLS and TECHNIQUES
- Analytical Techniques
- Expert Judgment
- Meetings

OUTPUTS
- Risk Management plan

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

Inputs

- **Project Management Plan**
  - All approved subsidiary Management plan and baselines
  - Provides baseline or current state of risk affected areas includes
    - Scope
    - Schedule
    - Cost

- **Project Charter**
  - High level risks, high level Project descriptions and High level requirements

- **Stakeholder Register**
  - All details related to the Project Stakeholder, provides an overview of their roles
Plan Risk Management

Inputs

- Enterprise Environmental Factors
  - EEF which influence this process include risk attitudes, tolerances and threshold levels that an organization can withstand

- Organizational Process Assets
  - OPA that can affect this process include
    - Risk categories
    - Common Definition of Concepts and Terms
    - Risk statement formats
    - Standard templates
    - Roles and responsibilities
    - Authority levels for decision making
    - Lessons learned
Plan Risk Management
Tools and Techniques

- Analytical Techniques
  - Used to understand and define the overall risk Management context of the Project
  - Example
    - Stakeholder Risk Profile analysis
    - Qualify the Project Stakeholder risk appetite and tolerance
    - Strategic risk scoring sheet
Plan Risk Management
Tools and Techniques

- **Expert Judgment**
  - Considered from groups or individuals
    - Senior Management
    - Project Stakeholders
    - Project Managers
    - Subject Matters Experts (SME)
    - Industry groups and consultants
    - Professional and technical associates
Plan Risk Management
Tools and Techniques

Meetings

- Project teams hold planning meetings to develop Risk Management Plan
  - Attendees at these meetings
    - Project Manager
    - Selected Project team members
    - Stakeholders (responsibility to manage risk plan)
  - High-level plans for conducting the Risk Management activities are defined
  - Risk Cost, schedule are developed for inclusion in Project cost, schedule
  - Risk contingency approach established/reviewed
  - Risk Management responsibilities identified
  - Organization templates for Risk Management tailored
Plan Risk Management

• Risk Management Plan
  – Risk Management Plan is part of the Project Management plan and should contain the following information
    • Methodology
    • Roles and responsibilities
    • Budgeting
    • Timing
    • Risk Categories / Risk Breakdown Structure
    • Definition of Risk probability and Impact
    • Probability and Impact Matrix
    • Revised Stakeholders’ tolerances
    • Reporting Formats
    • Tracking
Risk Breakdown Structure (RBS)

- Lists the categories and subcategories with which risk may arise.
- The structure will differ according to the type of Projects or organizations.
- Helps the team to remind the various sources from which risk may arise.
The Risk Breakdown Structure (RBS) lists the categories and sub-categories within which risks may arise for a typical project. Different RBSs will be appropriate for different types of project and different types of organizations. One benefit of this approach is to remind participants in a risk identification exercise of the many sources from which project risk may arise.
IDENTIFY RISK

Planning Process Group

Plan Risk Management

Identify Risks

Perform Qualitative Risk Analysis

Perform Quantitative Risk Analysis

Plan Risk Responses

Control Risks
Identify Risk

- Process of systematic identification of risks and documenting their characteristics
- Participants in risk identification process can include Project Manager, Project team members, sponsor, subject matter experts, customers and risk Management experts
- Is an element of Planning Process Group
Identify Risk

**INPUTS**
- Risk Management Plan
- Cost Management Plan
- Schedule Management Plan
- Quality Management Plan
- Human Resource Management Plan
- Scope baseline
- Activity cost estimates
- Activity duration estimates
- Stakeholder register
- Project documents
- Procurement documents
- Enterprise Environmental factors
- Organizational process assets

**TOOLS and TECHNIQUES**
- Documentation
- Reviews
- Information Gathering Techniques
- Checklist Analysis
- Assumption Analysis
- Diagramming Techniques
- SWOT Analysis
- Expert Judgment

**OUTPUTS**
- Risk Register

Identify Risk – Inputs, Tools and Techniques and Outputs
Identify Risk Inputs

• Risk Management Plan
  Inputs such as roles and responsibilities for carrying out risk processing activities, provision for risk processing activities in budget and schedule and categories of risk will be used from the risk Management plan

• Cost Management Plan
  The Project’s approach to cost Management plan and it’s structure can be a potential source for cost related risks

• Schedule Management Plan
  The Project’s approach to schedule Management plan and it’s structure can be a potential source for schedule related risks

• Quality Management Plan
  The Project’s approach to quality Management plan and it’s structure can be a potential source for quality related risks
Human Resource Management Plan
- How HR should be defined, staffed, managed and eventually released
- Roles and responsibilities, Project org. charts and staffing Management plan

Scope Baseline
- Contains Project assumptions
- Project assumptions are potential sources for risks and must be evaluated
- WBS is also an important source for risks

Activity Cost Estimates
- The activity cost estimates are normally provided in the form of a “range”
- The width of the range can be an indicator of the degree of the risk, suggesting that the estimate is either sufficient or insufficient to carry out the activities.
- Activity Duration Estimates
  - The activity duration estimates are normally provided as a range
  - The width of the range can be an indicator of the degree of the risk, suggesting that the estimate is either sufficient or insufficient to carry out the activity.

- Stakeholder Register
  - Relevant Stakeholders must be involved during the Risk Identification process

- Project Documents
  - Documents that are reviewed for identifying risks include assumptions log, work performance reports, earned value reports, network diagrams, baselines, etc.

- Procurement documents
Identify Risk

Inputs

- Enterprise Environmental factors
  - EEF that can influence this process are commercial databases, academic studies, benchmarks, industry studies, risk attitudes, etc.

- Organizational process assets
  - OPA include risk statement templates, lessons learned, historical information related actual risks occurred, etc.
Documentation Reviews
- Project documents can provide insights into the sources and nature of potential risks

Information Gathering Techniques
- Brainstorming
- Delphi Technique
- Interviewing
- Root cause analysis

Checklist Analysis
- Risk checklist can be used to identify risks
Identify Risk
Tools and Techniques

- **Assumption Analysis**
  - Analyzing assumptions can help the Project team to identify risks
  - Assumptions reflect the incompleteness, inaccuracy, instability and inconsistency in Projects, assumptions are a good source for identifying Project risks.

- **Diagramming Techniques**
  - Cause and Effect diagrams (also known as Ishikawa or fishbone diagrams)
  - System or process flow charts and
  - Influence diagrams
SWOT Analysis

- Analyzing Strength, Weaknesses, Opportunities and Threats
- SWOT analysis further proceeds to maximize the opportunities that arise from strengths and minimize threats that arise from weaknesses.

Expert Judgment

- Experts who have relevant experience in similar Projects can be invited to identify risks in a Project
Risk Register

- Risk register is the key output of this process
- Gets detailed in all the subsequent processes as understanding of Project risks improves
- A risk register contains the following essential elements:
  - List of identified risks
  - List of potential responses
PERFORM QUALITATIVE RISK ANALYSIS

Planning Process Group

- Plan Risk Management
- Identify Risks
- **Perform Qualitative Risk Analysis**
- Perform Quantitative Risk Analysis
- Plan Risk Responses
- Control Risks
Perform Qualitative Risk Analysis

- Process of prioritizing risks, based on the probability of occurrence and impact
- The levels of probability and impact established in the Identification of Risks process enables prioritizing without bias
- Is an element of Planning Process Group
PerformQualitative Risk Analysis

Inputs
- Risk Management Plan
- Scope Baseline
- Risk Register
- Enterprise environmental factors
- Organizational Process Assets

Tools and Techniques
- Risk Probability and Impact Assessment
- Probability and Impact Matrix
- Risk data quality assessment
- Risk categorization
- Risk urgency assessment
- Expert Judgment

Outputs
- Project Documents updates
Perform Qualitative Risk Analysis

**Inputs**

- **Risk Management Plan**
  - Risk Management plan contains
    - Roles and responsibilities for conducting risk Management activities,
    - budget and schedule activities for risk Management
    - categories of risk
    - definitions of probability and impact

- **Scope Baseline**
  - Project using state-of-art or first-of-its-kind technology and high complex Projects, tend to have more uncertainty.
Perform Qualitative Risk Analysis

- **Risk Register**
  - Information assess and prioritize risks

- **Enterprise Environmental Factors**
  - Factors may provide insight and context to the risk assessment such as
    - Industries studies of similar Projects
    - Risk database (industry or proprietary sources)

- **Organizational Process Assets**
  - Information relevant to Perform Qualitative Risk Analysis include
    - Information from similar, past Projects
    - Risk databases from industry sources
    - Studies of similar Projects by risk specialists
Perform Qualitative Risk Analysis
Tools and Techniques

- **Risk Probability and Impact Assessment**
  - The probability of occurrence and the impact on the Project objectives are assessed for each identified risk.
  - The assessment results are documented with supporting details, such as any underlying assumptions made for assigning levels to the probability and impact.
  - Probabilities and impact are rated and those with lower ratings are put on a watch list for future monitoring.
Perform Qualitative Risk Analysis

Tools and Techniques

- **Probability and Impact Matrix**
  - A probability and impact matrix helps the Project team to prioritize risks
  - The matrix contains ratings for specific combinations of probability and impact for each risk
  - The risks can be prioritized as low, moderate and high
  - Risk rating helps the team derive appropriate responses for risks

<table>
<thead>
<tr>
<th>Probability</th>
<th>Threats</th>
<th>Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.9</td>
<td>0.05</td>
<td>0.18</td>
</tr>
<tr>
<td>0.7</td>
<td>0.04</td>
<td>0.07</td>
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<tr>
<td>0.5</td>
<td>0.03</td>
<td>0.05</td>
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<tr>
<td>0.3</td>
<td>0.02</td>
<td>0.03</td>
</tr>
<tr>
<td>0.1</td>
<td>0.05</td>
<td>0.01</td>
</tr>
<tr>
<td>0.005</td>
<td>0.01</td>
<td>0.02</td>
</tr>
</tbody>
</table>

- Cost: Insignificant cost impact
- Schedule: Insignificant schedule impact
- Scope: Barely noticeable
- Quality: Barely noticeable

For more details, please refer to the full document.
Perform Qualitative Risk Analysis
Tools and Techniques

- **Risk data quality assessment**
  - It is important to evaluate and understand the quality of the risk data.
  - The risk data should have accuracy, quality and integrity and should be unbiased.
  - If these qualities are missing, it may be necessary to gather better quality data.

- **Risk categorization**
  - Grouping risks can help in deriving effective risk responses.
  - Risks can be categorized using a [Risk Breakdown Structure (RBS)](https://example.com).
    - According to the source of risks.
    - According to the areas of the Project or.
    - According to other useful categories.
Perform Qualitative Risk Analysis
Tools and Techniques

- Risk urgency assessment
  - Risks should be assessed to decide if any of them require a short-term response
  - The risk urgency assessment is combined with the rating given using the probability and impact matrix to arrive at a final risk rating.

- Expert Judgment
  - Can be used in deciding the priority of risks
Perform Qualitative Risk Analysis

Outputs

- Project Documents updates
  - Risk Register updates
    - The risk register which is created during the Identify Risk process, is updated with the following items
      - Priority list of Project risks
      - Risks grouped by categories
      - Causes of risks or Project areas requiring particular attention
      - List of risks requiring response in the near-term
      - Watch lists of low-priority risks
      - Trends in qualitative risk analysis results
  - Assumptions log updates
PERFORM QUANTITATIVE RISK ANALYSIS

Planning Process Group

Plan Risk Management
Identify Risks
Perform Qualitative Risk Analysis
**Perform Quantitative Risk Analysis**
Plan Risk Responses
Control Risks
Perform Quantitative Risk Analysis

- Process of numerical analysis of risks, which are prioritized in Perform Qualitative Risks Analysis process.
- Leads to a numerical rating for risks, which indicates the effects of the risks on the Project objectives.
Perform Quantitative Risk Analysis

**INPUTS**
- Risk Management Plan
- Cost Management Plan
- Schedule Management Plan
- Risk Register
- Enterprises Environmental factors
- Organizational Process Assets

**TOOLS and TECHNIQUES**
- Data gathering and representation techniques
- Quantitative Risk Analysis and modeling techniques
- Expert Judgment

**OUTPUTS**
- Project documents updates

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

Inputs

- Risk Management Plan
- Cost Management Plan
  - May decide the approach for the quantitative analysis of the cost related risks
- Schedule Management Plan
  - May decide the approach for the quantitative analysis of the schedule related risks
- Risk Register
- Enterprise Environmental factors
  - Industry studies of similar Project by risk specialists
  - Risk databases (Industry or proprietary sources)
- Organizational Process Assets
  - OPA that can be used are
    - Information from similar past Projects
    - Risk databases from industry sources
Data gathering and representation techniques

- Interviewing
  - This involves interviewing the relevant Stakeholders to collect data to quantify the probability and impact of risks on Project objectives
  - data is collected on the optimistic (low), pessimistic (high) and most likely scenarios for some commonly used distributions

- Probability Distribution
  - Continuous Distributions are commonly used in modeling and simulation.
  - They represent the uncertainty in values such as duration of schedule activities and costs.
Quantitative Risk Analysis and modeling techniques

- Sensitivity Analysis
  - helps to examine the impact of one risk event on the Project objectives, when all the other risks are held stable. A tornado diagram (similar to Pareto chart) graphically displays which risk has the most impact when all the other risks are held constant.

- Modeling and Simulation
  - Using simulation, a Project model is computed several times, with the input values chosen at random for each iteration from the probability distribution of these variables.

Perform Quantitative Risk Analysis

Tools and Techniques
• Expected Monetary Value Analysis

- A decision tree is a common technique that applies the EMV method. EMV calculates the average value of an outcome when the future includes scenarios that may or may not happen.

• Expert Judgment
  useful in identifying appropriate inputs for the tools and interpreting the outcome of the tools
Perform Quantitative Risk Analysis

 Outputs

- Project Documents updates
  - Risk Register updates
    - The following are added to the risk register in this process:
      - Probabilistic analysis of the Project.
      - Probability of achieving cost and time objectives
      - Prioritized list of quantified risks
      - Trends in quantitative risk analysis
PLAN RISK RESPONSES

Planning Process Group

Plan Risk Management
Identify Risks
Perform Qualitative Risk Analysis
Perform Quantitative Risk Analysis
Plan Risk Responses
Control Risks
Plan Risk Responses

- Process of planning actions to address opportunities and threats that are faced by the Project
- Involves identifying resources to execute the action plan, inserting resources and activities into the budget, schedule and Project Management plan, as needed
- Risk responses must be appropriate for the risk, depending upon the priority and urgency
Plan Risk Responses

Inputs
- Risk Management Plan
- Risk Register

Tools and Techniques
- Strategies for negative risks or threats
- Strategies for positive risks or opportunities
- Contingent response strategies
- Expert Judgment

Outputs
- Project Management plan updates
- Project document updates
Plan Risk Responses

- **Risk Management Plan**
  - Contains information on roles and responsibilities, risk analysis definitions, timing for reviews and risk thresholds for low, moderate and high risks.
Plan Risk Responses

Inputs

- Risk Register
  - The following items from a risk register are used during this process:
    - The list of prioritized risks
    - Symptoms and warning signs
    - Risk owner and responsibility
    - Lists of risks requiring response in the near term
    - Lists of risks for additional analysis and response
    - Trends in quantitative risk analysis
    - Watch-list of low-priority risks
Strategies for negative risks or threats
- Four strategies are normally followed for negative risks. They are
  - Avoid
  - Transfer
  - Mitigate
  - Accept

Strategies for positive risks or opportunities
- Four strategies are normally followed for positive risks. They are
  - Exploit
  - Accept
  - Share
  - Enhance
Plan Risk Responses
Tools and Techniques

- **Contingent response strategies**
  - These are response actions that are executed only if certain predefined conditions occur for certain risks
  - if it is believed that there is sufficient warning to implement the plan.

- **Expert Judgment**
  - Advice can be sought from people who have experience, skill or training in gaining strategies for responding to risk events.
Plan Risk Responses

Outputs

- Project Management plan updates
  - The following elements of the Project Management plan may get updated:
    - Schedule Management Plan
    - Cost Management Plan
    - Quality Management Plan
    - Procurement Management Plan
    - Human resource Management plan
    - Work Breakdown Structure
    - Schedule Baseline
    - Cost baseline
Plan Risk Responses

Outputs

- Project documents updates
  - Assumptions log updates
  - Technical Documentation Updates
  - Change requests
Summary – Risk Response

- Risk Response - Key
  - Determine what should be done to reduce the overall risk of the Project
  - 3 Levels of risk Response
    - Response to eliminate the risk before it happens
    - Response if the risk happens: Contingency Plan
    - Response if Contingency Plan fails: Fallback Plan
  - Options for response planning
    - ATMA (Avoid; Transfer; Mitigate; Accept) for Risk
    - EASE (Exploit; Accept; Share; Enhance) for Opportunity
  - Secondary Risk – generated by a response to another risk
  - Residual Risk – one that remains after risk response planning
  - Reserve – amount of time or cost added to the Project
## Risk Response - Examples

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Response Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove a task from the Project</td>
<td>Avoidance</td>
</tr>
<tr>
<td>Assign a team member to visit the sellers place to know about the delivery problems ASAP</td>
<td>Mitigation</td>
</tr>
<tr>
<td>Notify Management of major cost increase as no action is taken to prevent the risk</td>
<td>Acceptance</td>
</tr>
<tr>
<td>Remove a troublesome resource from Project</td>
<td>Avoidance</td>
</tr>
<tr>
<td>Ask the client to handle some work</td>
<td>Transference</td>
</tr>
</tbody>
</table>
CONTROL RISKS

Monitoring and Controlling Process Group

Plan Risk Management
Identify Risks
Perform Qualitative Risk Analysis
Perform Quantitative Risk Analysis
Plan Risk Responses
Control Risks
Control Risks

- An iterative process of executing the risk response plan, tracking identified risks, monitoring residual risks, evaluating risk process effectiveness and identifying new risks throughout the Project life cycle.
Control Risks – Inputs, Tools and Techniques and Outputs

**INPUTS**
- Project Management Plan
- Risk Register
- Work Performance data
- Work Performance Reports

**TOOLS and TECHNIQUES**
- Risk reassessment
- Risk audits
- Variance and trend analysis
- Technical performance measurement
- Reserve analysis
- Meetings

**OUTPUTS**
- Work performance information
- Change requests
- Project Management plan updates
- Project document updates
- Organizational Process assets updates

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Control Risks
Control Risks

Inputs

- **Project Management Plan**
  - Contains the risk Management plan, which includes risk tolerances, protocols and assignment of resources.

- **Risk Register**
  - Contains identified risks, roles and responsibilities, risk response plans, symptoms and warning signs of risks, a watch list of low-priority risks and contingency reserves.
Control Risks

Inputs

- Work Performance data
  - Performance information with respect to
    - Deliverable status
    - Schedule progress
    - costs incurred

- Work Performance Reports
  - provide data in trend analysis, variance analysis, forecasting data and earned value using information from performance measurements.
Control Risks
Tools and Techniques

- **Risk reassessment**
  - Reassessments should be regularly done to
    - Identify new risks
    - Close any risks that are not relevant and
    - Reassess current risks

- **Risk audits**
  - Examine the effectiveness of the risk Management processes, as well as the effectiveness of the risk responses

- **Variance and trend analysis**
  - Variance and trend analysis and earned value analysis should be reviewed for monitoring and controlling risk events.
Control Risks
Tools and Techniques

- Technical performance measurement
  - When compared against the Project’s targets, can help to determine and forecast the
    - Degree of success and
    - May expose the degree of technical risk the Project is facing

- Reserve analysis
  - Analyzing whether the remaining contingency reserves are adequate to cover the remaining risks.

- Meetings
  - Periodic meetings to discuss the risk status
Control Risks

Outputs

- Work Performance Information
  - Provides a mechanism to communicate and support Project decision making

- Change requests
  - Implementing risk response plans can result in change requests
  - These change requests can be either corrective or preventive actions
    - Recommended Corrective actions
    - Recommended Preventive actions

- Project Management plan updates
  - If the change requests are approved, then the Project Management plan has to updated to reflect the approved changes
Control Risks

Outputs

- Project document updates
  - Outcomes of risk reassessments, risk audits and periodic risk reviews
  - Actual outcomes of the Project’s risk and of the risk responses
- Organizational Process assets updates
  - Updates to
    - Templates for risk Management plan, risk register and probability and impact matrix
    - Risk Breakdown structure
    - Lessons learned from Project risk Management activities
Group Activity

Prepare a Risk Register and Risk a Response Plan for a live project which you have worked on..
Summary

- Discussion topics
- Q and A