



Project Risk Management

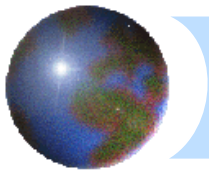




RISK ANALYSIS



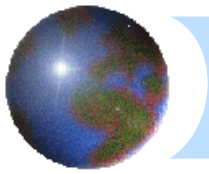
- Risk analysis is a systematic process to estimate the level of risk for identified and approved risks. This involves estimating the probability of occurrence and consequence of occurrence and converting the results to a corresponding risk.
- The approach used depends upon the data available and requirements levied on the project level.



❁ Risk analyses are often based on detailed information that may come from a variety of techniques, including but not limited to:

- ❁ Analysis of plans and related documents
- ❁ Experience and interviewing
- ❁ Relevant lessons-learned studies
- ❁ Results from tests





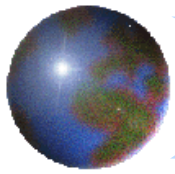
⊕ **There are two methods of risk analysis**

- ⊕ Qualitative approach and
- ⊕ Quantitative approaches

⊕ **Qualitative approach** use the probability of occurrence and consequence of occurrence scales together with a risk mapping matrix to convert the values to risk levels.

⊕ When a qualitative risk analysis is performed, risk ratings can be used as an indication of the potential importance of risks on the program and often expressed as low, medium, and high (or possibly low, medium low, medium, medium high, and high).

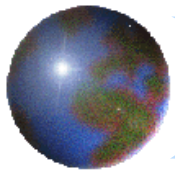
⊕ **Quantitative approaches** use the technique such as expected value ,decision tree analysis, payoff matrices, and modeling and simulation.



Why Do We Manage Risk?

- ✚ Project problems can be reduced as much as 90% by using risk analysis
- ✚ Positives:
 - ▣ More info available during planning
 - ▣ Improved probability of success/optimum project
- ✚ Negatives:
 - ▣ Project cut due to risk level



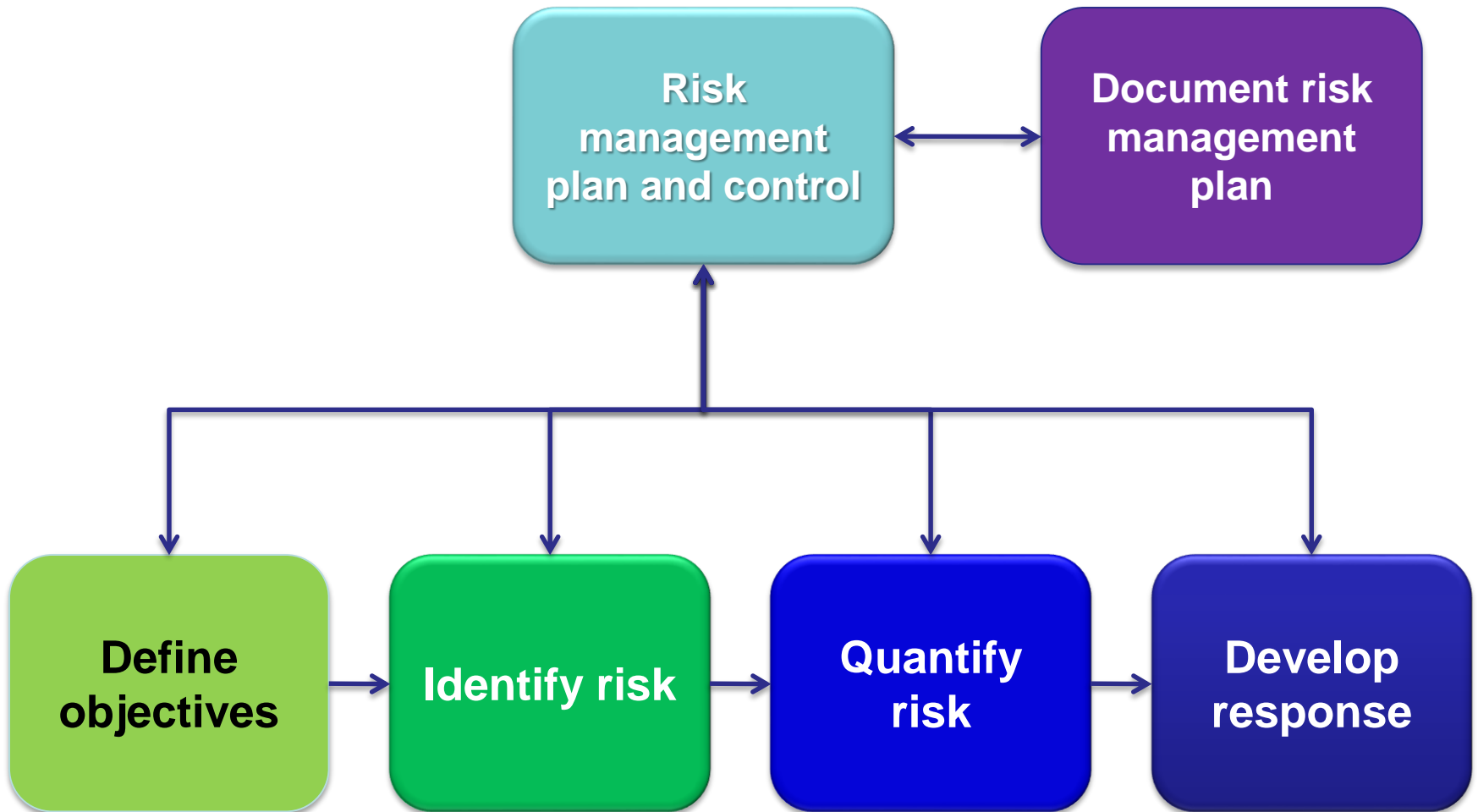


Goals of Risk Assessment

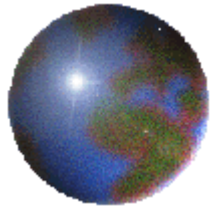


- ✦ Risks have been thoroughly examined and included in project plans, resulting in risk reduction. Information about possible risks is available throughout the project, resulting in a better decision-making process
- ✦ Project objectives might be affected by certain risks, allowing the objectives to be improved
- ✦ Many of the project weaknesses have been identified in advance and are incorporated into the project plan.
- ✦ Decrease the number of changes made to the project plan during project execution, resulting in higher chances of project success

Risk Management Process

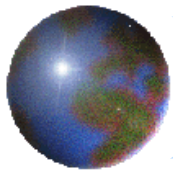


Benefits of Risk Assessment



- **Protects project investments**
- **Proactive management – early warning**
- **Achieve project objectives**

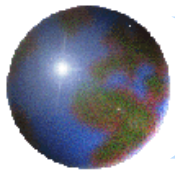
**Ignoring Risk doesn't
make the risk go
away!**



Level of Occurrence

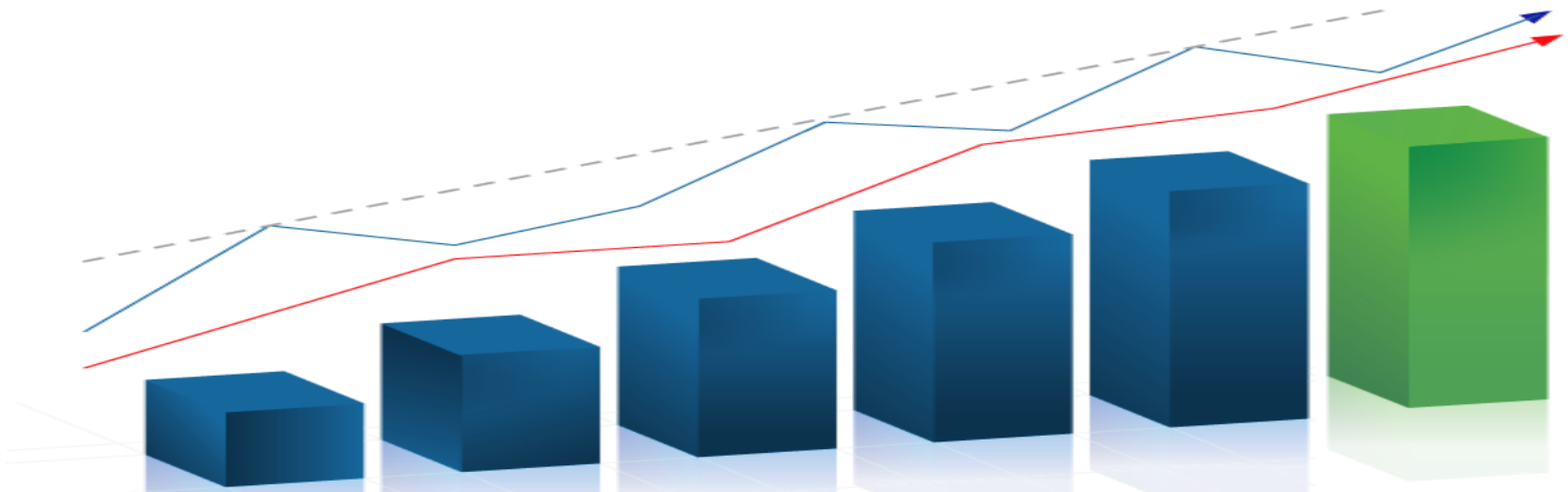


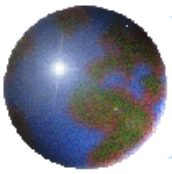
- ❑ **High Risk:** Substantial impact on cost, technical performance, or schedule. Substantial action required to alleviate issue. High-priority management attention is required.
- ❑ **Medium Risk:** Some impact on cost, technical performance, or schedule. Special action may be required to alleviate issue. Additional management attention may be needed.
- ❑ **Low Risk:** Minimal impact on cost, technical performance, or schedule. Normal management oversight is sufficient.



Quantitative risk analysis outputs are

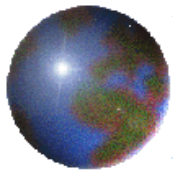
1. Prioritized risk lists,
2. Probabilistic cost estimates at completion per project phase and probabilistic schedule estimates for key milestones to help the project manager allocate reserve accordingly,
3. Probabilistic estimates of meeting desired technical performance parameters and validating technical performance of key components





4. Estimates of the probability of meeting cost, technical performance, and schedule objectives (e.g., determining the probability of achieving the planned estimate at completion)
 - Updated Risk Register
 - Probabilistic analysis for project success (time and cost)
 - Updated priority of risk events
 - Trends in risk analysis





Quantitative Risk Analysis tools

Interviewing

***Decision Tree
Analysis***

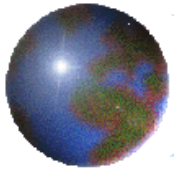
***Monte Carlo
Simulation***

The Monte Carlo Process



- The Monte Carlo process is an attempt to create a series of probability distributions for potential risks, randomly sample the distributions, and transform the numbers into useful information that reflects quantification of the associated cost, technical performance or schedule risks.



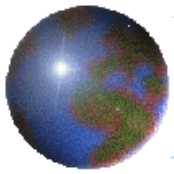


Uses of Monte Carlo simulation

☐ Monte Carlo simulations used to

- ❖ Estimate risk in the design of service centers;
- ❖ Measure time to complete key milestones in a project;
- ❖ Estimate the cost of developing, fabricating, & maintaining an item.

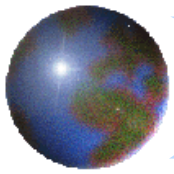




Impact/Probability Matrix

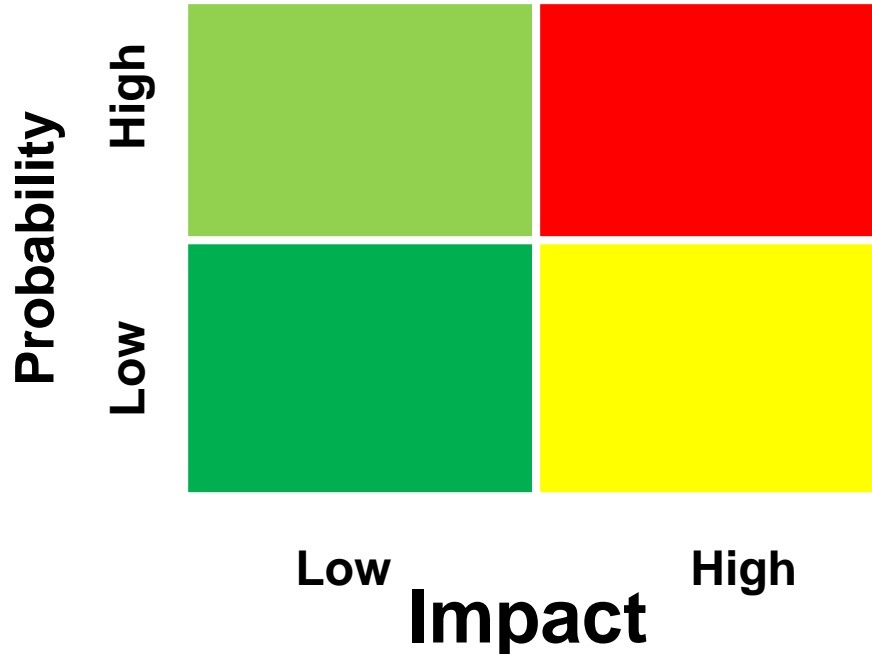
- ❑ A common method/tool to determine whether a risk is considered low, moderate, or high by combining the two dimensions of a risk:
 - ❖ its probability of occurrence, and
 - ❖ its impact on objectives if it occurs.

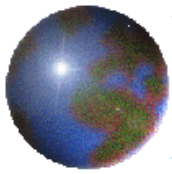




2x2 Impact/Probability Matrix

- ⊕ **Green: Low Risk (Passive Acceptance – workarounds)**
- ⊕ **Yellow: Moderate Risk (Active Acceptance – contingency)**
- ⊕ **Red: High Risk (Risk Response Planning)**





Probability and Impact Matrix

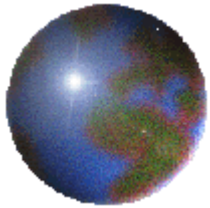
Impact Scale

Consequence	Health and Safety
Extreme	Fatality or multiple fatalities expected
High	Severe injury or disability likely; or some potential for fatality
Moderate	Lost time or injury likely; or some potential for serious injuries; or small risk of fatality
Low	First aid required; or small risk of serious injury
Negligible	No concern

Probability Scale

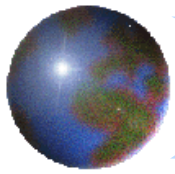
Likelihood Class	Likelihood of Occurrence (events/year)
Not Likely (NL)	<0.01% chance of occurrence
Low (L)	0.01 - 0.1% chance of occurrence
Moderate (M)	0.1 - 1% chance of occurrence
High (H)	1 - 10% chance of occurrence
Expected (E)	>10% chance of occurrence

Quantitative Risk Analysis



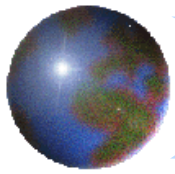
- ❑ The process of numerically analyzing the effect of identified risks on the project's objectives. In particular, the project schedule and the project costs.





Quantitative Risk Analysis

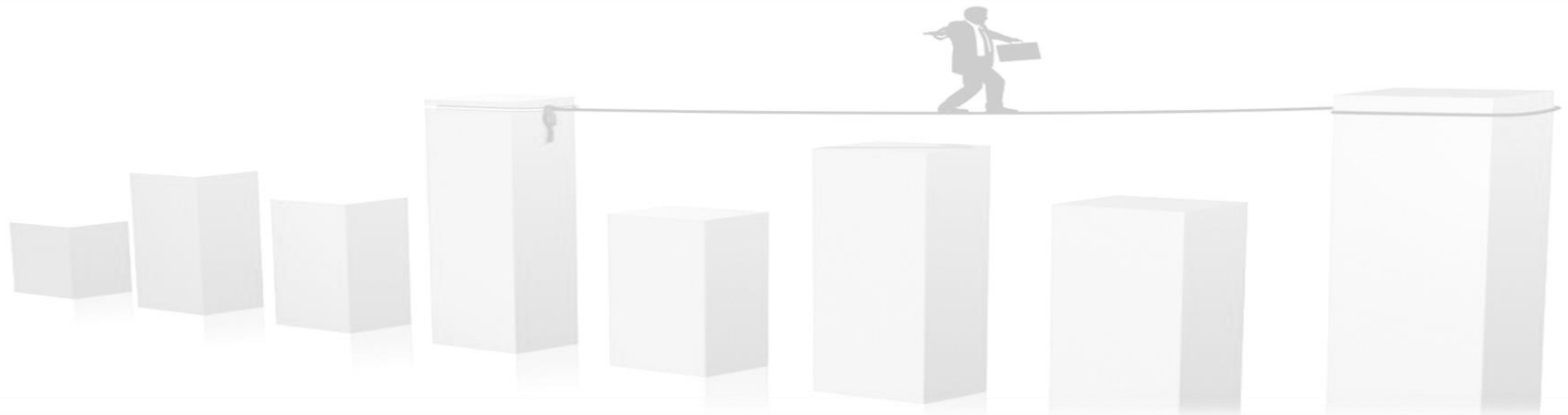
- ❖ **Quantify possible outcomes for the project**
- ❖ **Assess probability of achieving specific project objectives**
- ❖ **Identify risks requiring most attention**
- ❖ **Identify realistic and achievable cost, schedule, or scope targets, given project risks**
- ❖ **Determine best management decision when conditions or outcomes are uncertain**



Taking risks stage by stage

➤ Risks during the Project/idea Initiation phase:

- **Unavailable subject matter experts**
- **Poor definition of problem or project**
- **No feasibility study**
- **No or unclear objectives**



Taking....cont'd

❑ Risks during the Project Planning phase:

- No risk management plan
- Spotty planning
- Underdeveloped requirements and specifications
- Unclear statement of work
- No management or stakeholder support
- Poor role definition
- Inexperienced team
- Lack of skills



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□ Risks during the Project Execution phase

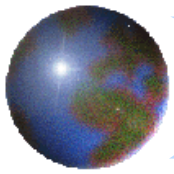
- ✓ Changes in schedule
- ✓ No control systems in place
- ✓ Unskilled labour
- ✓ Material availability or poor quality material
- ✓ Unreliable suppliers
- ✓ Unexpected price increase (not budget for it)
- ✓ Strikes
- ✓ Weather
- ✓ Regulatory requirements

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➤ **Risks during the Project Close-out / termination phase:**

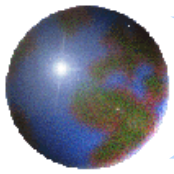
- ❖ **Unacceptable to customer**
- ❖ **Poor quality product/project**
- ❖ **Budget problems**
- ❖ **Penalties to be paid for exceeding the time parameter of the project**



The basics of risk management

- ❖ **Identify the risk**
- ❖ **Analyse the probability the risk will occur and the potential impact of the risk**
- ❖ **Determine the overall severity of the risk**
- ❖ **Determine which risks are the most important for further action**
- ❖ **Document a response plan for the risk**
 - **Accept the risk**
 - **Avoid the risk**
 - **Monitor the risk**
 - **Transfer the risk**





Project standards for risk management

Risk Management Plan

Procurement

Contingency Reserves

Alternative Strategies

Insurance

Project Reserves



❖ Management Reserves

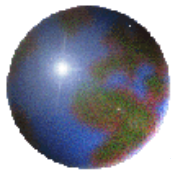
- Created for unpredictable risks

❖ Contingency Reserves

- Created for predictable risks

□ Approaches used for developing contingency allowances:

- ✓ Budgeting a standard allowance for contingencies and applying it to all projects.
- ✓ Identifying a percentage of additional cost or time needed, based on past experience.
- ✓ Pinpointing the most likely risks for a project, assessing the probability that they will occur, identifying the possible consequences, and then allotting contingencies based on these results.



Strategies of Risk Management

▶ Positive Risks (or Opportunities)

- Exploit
- Share
- Enhance
- Acceptance

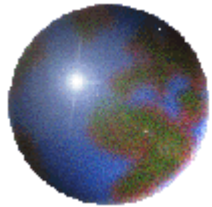


▶ Negative Risks (or Threats)

- Avoid
- Transfer
- Mitigate
- Acceptance



Questions the project team should ask when determining a risk:-



- ❑ **Why should the risk be accepted?**
- ❑ **What are the potential benefits?**
- ❑ **Are the potential benefits worth the risk?**
- ❑ **What are the potential losses?**
- ❑ **What is the possibility of failure?**