Experiment No.: 7

Title: Risk Analysis and Management

Batch: B–1   **Roll No.: 16010422234**   **Experiment No.: 7**

Aim: To prepare risk analysis and management plan documents.

Resources needed: Internet Explorer, LaTex Editor

Theory

Risk management is the identification, assessment, and prioritization of risks followed by coordinated and economical application of resources to minimize, monitor, and control the probability and/or impact of unfortunate events or to maximize the realization of opportunities. Risks can come from uncertainty in financial markets, threats from project failures (at any phase in design, development, production, or sustainment life-cycles), legal liabilities, credit risk, accidents, natural causes and disasters as well as deliberate attack from an adversary, or events of uncertain or unpredictable root-cause. Several risk management standards have been developed including the Project Management Institute, the National Institute of Standards and Technology, actuarial societies, and ISO standards. The strategies to manage threats (uncertainties with negative consequences) typically include transferring the threat to another party, avoiding the threat, reducing the negative effect or probability of the threat, or even accepting some or all of the potential or actual consequences of a particular threat, and the opposites for opportunities (uncertain future states with benefits). Risk Management's goal is to increase the impact and probability of positive risks and decrease them for negative risks.

Thus, the understanding of risk management methodologies, tools and practices is extremely important for the future industry workforce to ensure better success of IT projects.

Risk management includes six main processes. These are risk management planning, risk identification, risk analysis, risk response planning, and risk monitoring and control.

IT Project Risk Management Processes

Risk Planning:

In the Risk Management Planning process, it is decided how to execute the risk management activities of a project. The level of risk management is decided as it needs to be in line with the risk and importance of the project as a whole.

Risk Identification:

Risk identification refers to the process of identifying dangerous or hazardous situations and trying to characterize it. The two main approaches to the identification of risks are the use of checklists and brainstorming.

Risk Analysis:

A common problem with risk identification particularly for the more anxious is that a list of risks is potentially endless. Some way is therefore needed of distinguishing the more damaging and likely risk using the formula

Risk exposure = (potential impact) X (probability of occurrence)

Once risks have been identified, they must then be assessed as to their potential severity of impact (generally a negative impact, such as damage or loss) and to the probability of occurrence.

Risk Response Planning:

Having identified the major risks and allocated priorities, the task is to decide how to deal with them. The project manager brainstorms and gathers all the positive and negative risks. It is important to note that this list of risks is not every possible thing that could happen, but rather the category of things that could happen. Consider, for example a project to build a house. Risks to consider would be on the order of slow progress, lack of material, lack of money, change of plans. Not run out of wood or the house catches fire. The purpose of risk planning is to have a plan on how to respond to a type of risk, not figure out all possible risks. So when a risk is realized and becomes an issue or problem, the team knows the steps to assess and respond. These risks would then be inputted into a report followed by the likelihood, impact, and rank of each risk.

Risk Monitoring and Control:

The final input for Risk Management would be the control/treatment plans for each risk in case the risk unfolds into the project down the timeline. The Risk Monitoring and Control

process is where the risks are diagnosed with treatment and control plans.

Activity:

1. Identify a list of at least 10 risks using the given checklist, organizing a stakeholders brainstorming session.

2. Estimate the probability of occurrence of each risk on the scale of 1-10, risk impact on the scale of 1-10 and calculate risk exposure.

3. Develop a contingency plan of risk as per the given template in LaTeX.

Template:

Risk Assessment and Risk Management Plan.

Risk #1:

Likelihood of risk: (on the scale of 1-10)

Potential impact on the project: (on the scale of 1-10)
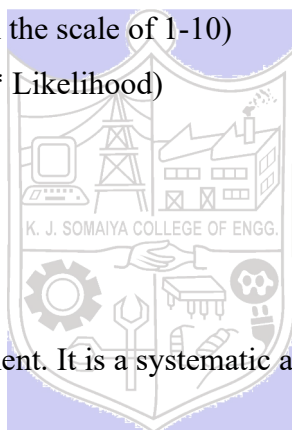
Risk Exposure = (potential impact* Likelihood)

Ways to address this risk:

Risk #2……

Risk #n……

Risk Checklist:

It is the first stage of risk management. It is a systematic attempt to specify possible threats to the project plan.

Risk	Risk Reduction Technique
Personal shortfalls	Staffing with top talent; job matching; team building; training and career development; early scheduling of key personnel
Unrealistic time and cost estimates	Multiple estimation techniques; design to cost; incremental development ;recording and analysis of past projects; standardization of methods
Developing the wrong software function	Improved software evaluation; formal specification methods; user surveys ;prototyping; early user manuals
Developing the wrong user interface	Prototyping ;task analysis; user involvement

| Gold plating	Requirement scrubbing ;cost benefit analysis ;design to cost
Late changes to requirements	Change control procedure; incremental development
Shortfalls in externally supplied components	Quality assurance procedures; competitive design or prototyping; contract incentives
Real-time performance shortfalls	Simulation; benchmarking; prototyping; tuning ;technical analysis
Development technically too difficult	Staff training and development ;prototyping; technical analysis

Results: Risk Management Document in given format.

LaTeX Code:

```
\documentclass{article}
\usepackage{amsmath}
\usepackage{longtable}
\usepackage[a4paper, left=0.5in, right=0.5in, top=0.5in,
bottom=0.5in]{geometry}
\begin{document}
\title{Risk Assessment and Risk Management Plan}
\author{Chandana Galgali}
\date{March 2025}
\maketitle
\section*{Risk #1: Unrealistic time and cost estimates}
\textbf{Likelihood of risk:} 7 (on the scale of 1-10) \\
\textbf{Potential impact on the project:} 9 (on the scale of 1-10) \\
\textbf{Risk Exposure = (Potential Impact * Likelihood) = (9 * 7) = 63} \\
\textbf{Ways to address this risk:}
\begin{itemize}
    \item Use multiple estimation techniques.
    \item Design to cost and incremental development.
    \item Record and analyze past project data.
    \item Standardize estimation methods.
\end{itemize}
\section*{Risk #2: Developing the wrong software function}
\textbf{Likelihood of risk:} 6 (on the scale of 1-10) \\
\textbf{Potential impact on the project:} 8 (on the scale of 1-10) \\
```
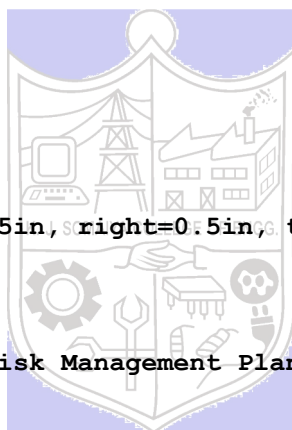
\textbf{Risk Exposure = (Potential Impact * Likelihood) = (8 * 6) = 48} \\

\textbf{Ways to address this risk:}

\begin{itemize}

    \item Improve software evaluation.

    \item Use formal specification methods.

    \item Conduct user surveys and create prototypes.

    \item Provide early user manuals.

\end{itemize}

\section*{Risk #3: Developing the wrong user interface}

\textbf{Likelihood of risk:} 5 (on the scale of 1-10) \\

\textbf{Potential impact on the project:} 7 (on the scale of 1-10) \\

\textbf{Risk Exposure = (Potential Impact * Likelihood) = (7 * 5) = 35} \\

\textbf{Ways to address this risk:}

\begin{itemize}

    \item Use prototyping and task analysis.

    \item Involve users early in the design process.

\end{itemize}

\section*{Risk #4: Shortfalls in externally supplied components (e.g., VR hardware)}

\textbf{Likelihood of risk:} 4 (on the scale of 1-10) \\

\textbf{Potential impact on the project:} 9 (on the scale of 1-10) \\

\textbf{Risk Exposure = (Potential Impact * Likelihood) = (9 * 4) = 36} \\

\textbf{Ways to address this risk:}

\begin{itemize}

    \item Establish quality assurance procedures.

    \item Use competitive design or prototyping.

    \item Provide contract incentives to suppliers.

\end{itemize}

\section*{Risk #5: Gold plating (adding features not required)}

\textbf{Likelihood of risk:} 6 (on the scale of 1-10) \\

\textbf{Potential impact on the project:} 5 (on the scale of 1-10) \\

\textbf{Risk Exposure = (Potential Impact * Likelihood) = (5 * 6) = 30} \\

\textbf{Ways to address this risk:}

\begin{itemize}

    \item Perform requirement scrubbing.

    \item Use cost-benefit analysis.

    \item Design to cost.

\end{itemize}

\section*{Risk #6: Late changes to project requirements}

\textbf{Likelihood of risk:} 8 (on the scale of 1-10) \\

\textbf{Potential impact on the project:} 8 (on the scale of 1-10) \\

\textbf{Risk Exposure = (Potential Impact * Likelihood) = (8 * 8) = 64} \\
\textbf{Ways to address this risk:}
\begin{itemize}
    \item Implement a change control procedure.
    \item Use incremental development.
\end{itemize}
\section*{Risk #7: Development technically too difficult (complex algorithms for VR generation)}
\textbf{Likelihood of risk:} 7 (on the scale of 1-10) \\
\textbf{Potential impact on the project:} 8 (on the scale of 1-10) \\
\textbf{Risk Exposure = (Potential Impact * Likelihood) = (8 * 7) = 56} \\
\textbf{Ways to address this risk:}
\begin{itemize}
    \item Provide staff training and development.
    \item Use prototyping and technical analysis.
\end{itemize}
\section*{Risk #8: Real-time performance shortfalls in VR rendering}
\textbf{Likelihood of risk:} 5 (on the scale of 1-10) \\
\textbf{Potential impact on the project:} 9 (on the scale of 1-10) \\
\textbf{Risk Exposure = (Potential Impact * Likelihood) = (9 * 5) = 45} \\
\textbf{Ways to address this risk:}
\begin{itemize}
    \item Use simulation and benchmarking.
    \item Prototype and tune performance parameters.
\end{itemize}
\section*{Risk #9: Personal shortfalls (team members lacking VR expertise)}
\textbf{Likelihood of risk:} 6 (on the scale of 1-10) \\
\textbf{Potential impact on the project:} 7 (on the scale of 1-10) \\
\textbf{Risk Exposure = (Potential Impact * Likelihood) = (7 * 6) = 42} \\
\textbf{Ways to address this risk:}
\begin{itemize}
    \item Staff with top talent.
    \item Match job roles to skillset.
    \item Invest in team building and training.
\end{itemize}
\section*{Risk #10: Insufficient user testing for VR visualization}
\textbf{Likelihood of risk:} 5 (on the scale of 1-10) \\
\textbf{Potential impact on the project:} 8 (on the scale of 1-10) \\
\textbf{Risk Exposure = (Potential Impact * Likelihood) = (8 * 5) = 40} \\
\textbf{Ways to address this risk:}

```
\begin{itemize}
    \item Involve users early for feedback.
    \item Conduct thorough user acceptance testing (UAT).
\end{itemize}
\section*{Risk Checklist}
\begin{longtable}{|p{7cm}|p{11cm}|}
\hline
\textbf{Risk} & \textbf{Risk Reduction Technique} \\
\hline
\endfirsthead
\hline
\textbf{Risk} & \textbf{Risk Reduction Technique} \\
\hline
\endhead
\hline
Personal shortfalls & Staffing with top talent, job matching, team
building, training, career development \\
Unrealistic time and cost estimates & Multiple estimation techniques,
incremental development, recording and analyzing past projects \\
Developing the wrong software function & Improved software evaluation,
formal specification methods, prototyping \\
Developing the wrong user interface & Prototyping, task analysis, user
involvement \\
Gold plating & Requirement scrubbing, cost-benefit analysis, design to
cost \\
Late changes to requirements & Change control procedure, incremental
development \\
Shortfalls in externally supplied components & Quality assurance
procedures, competitive design, contract incentives \\
Real-time performance shortfalls & Simulation, benchmarking, technical
analysis \\
Development technically too difficult & Staff training, prototyping,
technical analysis \\
\hline
\end{longtable}
\end{document}
```

Output:

Risk Assessment and Risk Management Plan

Chandana Galgali

March 2025

Risk 1: Unrealistic time and cost estimates

Likelihood of risk: 7 (on the scale of 1-10)
Potential impact on the project: 9 (on the scale of 1-10)
Risk Exposure = (Potential Impact * Likelihood) = (9 * 7) = 63
Ways to address this risk:

- Use multiple estimation techniques.
- Design to cost and incremental development.
- Record and analyze past project data.
- Standardize estimation methods.

Risk 2: Developing the wrong software function

Likelihood of risk: 6 (on the scale of 1-10)
Potential impact on the project: 8 (on the scale of 1-10)
Risk Exposure = (Potential Impact * Likelihood) = (8 * 6) = 48
Ways to address this risk:

- Improve software evaluation.
- Use formal specification methods.
- Conduct user surveys and create prototypes.
- Provide early user manuals.

Risk 3: Developing the wrong user interface

Likelihood of risk: 5 (on the scale of 1-10)
Potential impact on the project: 7 (on the scale of 1-10)
Risk Exposure = (Potential Impact * Likelihood) = (7 * 5) = 35
Ways to address this risk:

- Use prototyping and task analysis.
- Involve users early in the design process.

Risk 4: Shortfalls in externally supplied components (e.g., VR hardware)

Likelihood of risk: 4 (on the scale of 1-10)
Potential impact on the project: 9 (on the scale of 1-10)
Risk Exposure = (Potential Impact * Likelihood) = (9 * 4) = 36
Ways to address this risk:

- Establish quality assurance procedures.
- Use competitive design or prototyping.
- Provide contract incentives to suppliers.

Risk 5: Gold plating (adding features not required)

Likelihood of risk: 6 (on the scale of 1-10)
Potential impact on the project: 5 (on the scale of 1-10)
Risk Exposure = (Potential Impact * Likelihood) = (5 * 6) = 30
Ways to address this risk:

- Perform requirement scrubbing.

- Use cost-benefit analysis.

- Design to cost.

Risk 6: Late changes to project requirements

Likelihood of risk: 8 (on the scale of 1-10)
Potential impact on the project: 8 (on the scale of 1-10)
Risk Exposure = (Potential Impact * Likelihood) = (8 * 8) = 64
Ways to address this risk:

- Implement a change control procedure.

- Use incremental development.

Risk 7: Development technically too difficult (complex algorithms for VR generation)

Likelihood of risk: 7 (on the scale of 1-10)
Potential impact on the project: 8 (on the scale of 1-10)
Risk Exposure = (Potential Impact * Likelihood) = (8 * 7) = 56
Ways to address this risk:

- Provide staff training and development.

- Use prototyping and technical analysis.

Risk 8: Real-time performance shortfalls in VR rendering

Likelihood of risk: 5 (on the scale of 1-10)
Potential impact on the project: 9 (on the scale of 1-10)
Risk Exposure = (Potential Impact * Likelihood) = (9 * 5) = 45
Ways to address this risk:

- Use simulation and benchmarking.

- Prototype and tune performance parameters.

Risk 9: Personal shortfalls (team members lacking VR expertise)

Likelihood of risk: 6 (on the scale of 1-10)
Potential impact on the project: 7 (on the scale of 1-10)
Risk Exposure = (Potential Impact * Likelihood) = (7 * 6) = 42
Ways to address this risk:

- Staff with top talent.

- Match job roles to skillset.

- Invest in team building and training.

Risk 10: Insufficient user testing for VR visualization

Likelihood of risk: 5 (on the scale of 1-10)
Potential impact on the project: 8 (on the scale of 1-10)
Risk Exposure = (Potential Impact * Likelihood) = (8 * 5) = 40
Ways to address this risk:

- Involve users early for feedback.

- Conduct thorough user acceptance testing (UAT).

Risk Checklist

Risk	Risk Reduction Technique
Personal shortfalls	Staffing with top talent, job matching, team building, training, career development
Unrealistic time and cost estimates	Multiple estimation techniques, incremental development, recording and analyzing past projects
Developing the wrong software function	Improved software evaluation, formal specification methods, prototyping
Developing the wrong user interface	Prototyping, task analysis, user involvement
Gold plating	Requirement scrubbing, cost-benefit analysis, design to cost
Late changes to requirements	Change control procedure, incremental development
Shortfalls in externally supplied components	Quality assurance procedures, competitive design, contract incentives
Real-time performance shortfalls	Simulation, benchmarking, technical analysis
Development technically too difficult	Staff training, prototyping, technical analysis

Questions:

1. Explain RMMM plan.

The **Risk Mitigation and Management Plan (RMMM)** outlines how an organization or project team identifies, evaluates, and handles potential risks throughout the life cycle of the project. This plan is an essential part of the overall project management strategy to ensure that risks are minimized, and any adverse effects are controlled or mitigated.

Key components of an RMMM plan include:

- **Risk Identification:** Identifying potential risks that may affect the project, such as financial uncertainties, technical failures, natural disasters, or even unforeseen challenges like personnel changes.

- **Risk Analysis:** Assessing the likelihood and impact of each identified risk using the formula:

  Risk Exposure = (Potential Impact) × (Likelihood of Occurrence)

  This analysis helps prioritize which risks should be addressed first.

- **Risk Response Planning:** Creating strategies for addressing high-priority risks. **These strategies can involve:**
  - **Avoidance:** Taking steps to eliminate the risk.
  - **Mitigation:** Reducing the likelihood or impact of the risk.
  - **Transfer:** Passing on the risk to a third party (e.g., through insurance).
  - **Acceptance:** Acknowledging the risk and planning for it should it occur.

- **Risk Monitoring and Control:** Continuously tracking the identified risks and applying the mitigation plans if any risk materializes. This process ensures that the project stays on track, even when faced with unforeseen events.

The RMMM plan aims to ensure that risks are managed proactively, with proper strategies in place to reduce the likelihood and impact of adverse events.

Outcomes: CO2 — Describe software planning and management

Conclusion:

Risk management is crucial for the success of any project. By identifying potential risks early on and developing strategies to address them, projects are more likely to stay on track and avoid significant setbacks. The RMMM plan serves as a structured approach to managing uncertainties and ensuring that resources are used efficiently to control risks. Having a well-defined risk management process in place allows project managers to focus on opportunities for improvement while minimizing negative impacts, leading to better outcomes for the project.

Grade: AA / AB / BB / BC / CC / CD / DD

Signature of faculty in-charge with date

References:

Books / Websites:

1. Roger S. Pressman, Software Engineering: A practitioners Approach, 7th Edition, McGraw Hill, 2010.
2. Technical report on Guidelines for Documents Produced by Student Projects In Software Engineering based on IEEE standards
3. https://www.pmi.org/learning/library/risk-analysis-project-management-7070