**Project Risk Management**

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*“Project risk management is concerned with identifying, analyzing, and responding to project risk.”*

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|  | **Project Risk Management** | **Process Groups** | | | | |
|  | **Major Processes** | Initiating | Planning | Executing | Monitoring &  Controlling | Closing |
| 🡪 | Plan Risk Management |  | 1 |  |  |  |
| **🡪** | Identify Risks |  | 2 |  |  |  |
| **🡪** | Perform Qualitative Risk Analysis |  | 3 |  |  |  |
| **🡪** | Perform Quantitative Risk Analysis |  | 4 |  |  |  |
| 🡪 | Plan Risk Responses |  | 5 |  |  |  |
| 🡪 | Control Risks |  |  |  | 6 |  |

**Risk & Utility**

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| Risk= [Probability & Outcome] or [Likelihood & Consequence] |
| Utility= Attitude toward risk. (Risk-neutral, Risk-averse, Risk-prone) |

**Plan Risk Management.**

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| Risk Management Plan (RBS, Approach, Components) |
| RBS: Risk Breakdown Structure (Identify Risk Categories) |

**Identify Risks**. Create a Risk Register of risk events.

**Risk Analysis.**

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| Perform Qualitative Risk Analysis. 🡪 Risk Ranking.  (Matrix, Risk Factor, Top Ten Tracking, Watch List.) |
| Perform Quantitative Risk Analysis. 🡪 Risk Evaluation.  (Stochastic Utility Analysis, Decision Analysis, PERT/CPM Analysis, Simulation.) |

**Plan Risk Responses.**

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| Risks with Positive and Negative Consequences. |
| Additional Risks and Plans. |

**Control Risks**

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| Conduct risk audits and reviews |
| Analyze triggers, trends, patterns. |

**Risk & Utility**

**Risk= [Probability & Outcome] or [Likelihood & Consequence]**

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| **Levels of Risk** | low consequence | high consequence |
| high probability | moderate risk | high risk |
| low probability | low risk | moderate risk |

**Utility= Attitude toward risk. (Risk-neutral, Risk-averse, Risk-prone)**

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| Risk Prone |  | Stakeholders |
| Risk Neutral | 🡨can apply to🡪 | Project Team |
| Risk Averse |  | Organization |

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| **Terminology** | | |
| **Measured Risk** | **vs** | **Perceived Risk** |
| ***Risks*** | ***vs*** | ***Barriers*** |
| ***Risk Management*** | ***vs*** | ***Crisis Management*** |

***Consider the ‘Reference Lottery’***

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|  |  |  |  |  |  | |  |  |
|  |  |  |  | (0.5) | Win | | $1 |  |
|  | Risky Decision 🡪 | GO | ($0) |  |  | |  |  |
|  |  |  |  | (0.5) | Lose | | –$1 |  |
|  | Certain Decision 🡪 | NOGO |  |  |  | | $0 |  |
|  |  |  |  |  |  | |  |  |
|  | ↑ | | ↑ ↑ | | | ↑ | | |
|  | Decision  Node | | Chance Probability Outcome  Node | | | | | |
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***Keys to Project Risk Management***

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|  | **Planning** |  | **Responding** |  | **Closure** |  |
|  | \*Balance  \*Project Importance |  | \*Cost-Benefit  \*Be results driven  \*Stakeholders |  | \*Communications  \*Lessons Learned |  |
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**Plan Risk Management**.

**Risk Management Plan (RBS, Approach, Components)**

**RBS: Risk Breakdown Structure (Identify Risk Categories)**

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| ***Organize Sources of Risk*** | | | |
| Project   * Scope * Time * Cost * Quality | Phases   * Phase I * Phase II * Phase III | Business   * Market * Financial * Technology * People | Applications   * Event * Construction * IT * SCM |

**Identify Risks**. Create a Risk Register of risk events.

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| ***Risk Register*** | | | | | |
| ***Category–WBS*** | ***Risk Name***1 | ***Description***2 | ***Source***3 | ***Level***4 | ***Comments***5 |
| ***1.1*** |  |  |  |  |  |
| ***1.2*** |  |  |  |  |  |
| ***2.1*** |  |  |  |  |  |
| ***2.2*** |  |  |  |  |  |
| ***- - -*** |  |  |  |  |  |
| 1**Risk Name**. Name of risk, ID, etc.  2**Description**. The event, series of events, consequences, impact, etc.  3**Source**. Internal, External, Business, Project, etc.  4**Level**. High, Medium, Low  5**Comments**. Triggers, trends, patterns, possible responses, possible secondary or residual risks, etc. | | | | | |

**Risk Analysis**.

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| **Perform Qualitative Risk Analysis**. 🡪 Risk Ranking.  (Matrix, Risk Factor, Top Ten Tracking, Watch List.) |
| **Perform Quantitative Risk Analysis**. 🡪 Risk Evaluation.  (Stochastic Utility Analysis, Decision Analysis, PERT/CPM Analysis, Simulation.) |

Failure Mode Effect Analysis (FMEA)

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| Risk | S | L | D | RPN |  | Definitions |
| #1 | 8 | 5 | 6 | 240 |  | S=Severity |
| #2 | 7 | 6 | 5 | 210 |  | L=Likelihood |
| #3 | 5 | 3 | 8 | 120 |  | D=Detectability |
| --- | --- | --- | --- | --- |  | RPN=Risk Priority Number=S\*L\*D |

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|  |  |  | **Probability and Impact Matrix** | | | | | | | | | |  |
|  | Likelihood | Probability | Threat | | | | | Opportunity | | | | |  |
|  | Very High | 0.9 | 0.09 | 0.27 | 0.45 | 0.63 | 0.81 | 0.81 | 0.63 | 0.45 | 0.27 | 0.09 |  |
|  | High | 0.7 | 0.07 | 0.21 | 0.35 | 0.49 | 0.63 | 0.63 | 0.49 | 0.35 | 0.21 | 0.07 |  |
|  | Moderate | 0.5 | 0.05 | 0.15 | 0.25 | 0.35 | 0.45 | 0.45 | 0.35 | 0.25 | 0.15 | 0.05 |  |
|  | Low | 0.3 | 0.03 | 0.09 | 0.15 | 0.21 | 0.27 | 0.27 | 0.21 | 0.15 | 0.09 | 0.03 |  |
|  | Very Low | 0.1 | 0.01 | 0.03 | 0.05 | 0.07 | 0.09 | 0.09 | 0.07 | 0.05 | 0.03 | 0.01 |  |
|  |  | Probability | 0.1 | 0.3 | 0.5 | 0.7 | 0.9 | 0.9 | 0.7 | 0.5 | 0.3 | 0.1 |  |
|  |  | Impact | Very  Low | Low | Moderate | High | Very  High | Very  Low | Low | Moderate | High | Very  High |  |
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| **Decision Tree** | | | | | | | |
|  |  |  |  |  |  |  |  |
|  |  |  |  | Strong | 0.6 | +$200M |  |
|  |  | Build | $36M |  |  |  |  |
|  |  | Cost=$120M | [ 36=(0.6\*200+0.4\*90) – 120] | Weak | 0.4 | +$90M |  |
|  | Decision |  |  |  |  |  |  |
|  |  |  |  | Strong | 0.6 | +$120M |  |
|  |  | Upgrade | $46M |  |  |  |  |
|  |  | Cost=$50M | [ 46=(0.6\*120+0.4\*60) – 50] | Weak | 0.4 | +$60M |  |
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| **Decision Table** | | | | | | |
|  |  |  |  |  |  |  |
|  |  |  | Demand | |  |  |
|  | Decision | Cost | Strong | Weak | EMV |  |
|  | Build | $120M | $200M | $90M | $36M |  |
|  | Upgrade | $50M | $120M | $60M | $46M |  |
|  |  |  | 0.6 | 0.4 |  |  |
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**Plan Risk Responses**.

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| **Risks with Negative Consequences.**  Avoidance – Eliminate risk.  Acceptance – Do nothing.  Transference – Sharing consequence or outcome.  Mitigation – Reducing likelihood impact of outcome. |

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| **Risks with Positive Consequences.**  Exploitation – Ensuring the realization of an opportunity.  Enhancement – Modifying probability, consequence, drivers, or triggers to increase likelihood of opportunity.  Sharing – Sharing consequence or outcome for mutual benefit. |

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| **Additional Risks.**  Residual Risks – Risks remaining after response measures.  Secondary Risks – Additional risks introduced by response measures. |

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| **Additional Plans.**  Contingency Plans – Planned responses to risk occurrences.  Fallback Plans – Planned responses to failed primary responses. |

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| **Contingency Planning**. High risk potential events or predictable surprises.  ADPEU: Anticipate 🡪 Design 🡪 Prepare 🡪 (Event) 🡪 Execute 🡪 Update  Identification. Failures due to: Scanning, Information, Incentive, Learning  Scanning – Lack of ability to access the information  Information – Lack of ability to understand the information  Incentive – Lack of ability to recognize the importance of the information  Learning – Lack of ability to communicate the information  Contingent Resources. Flexibility Principle.  Flexible supply contracts. – Requires understanding impact of source characteristics  Multisourcing. – Requires understanding locations of needed redundancy  Reserve shipping capacity. – Requires efficient utilization and communication  Temporary workers. – Requires prior planning of needs and procedures |

**Control Risks**.

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| **Conduct risk audits**  Examine effectiveness of procedures. |

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| **Conduct risk reviews**  Evaluate current risks or identify new risks. |

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| **Analyze triggers, trends, patterns**. |

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| **Crisis Management**. Triggers, Trends, Patterns.   |  |  | | --- | --- | | **Contingency Planning** | **Crisis Management** | | Proactive | Reactive | | Planning | Process |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  | |  |  |  | Awareness |  |  |  | |  |  |  |  |  |  |  | |  | Flexibility |  | Organizational  Preparedness |  | Empowerment |  | |  |  |  |  |  |  |  | |  |  |  | Communication |  |  |  | |  |  |  |  |  |  |  | |