

PROJECT RISK MANAGEMENT

Module 9

Project risk management, risk characteristics, and analysis, qualitative and quantitative analysis, case studies in IT projects

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TYPES OF PROJECT RISKS

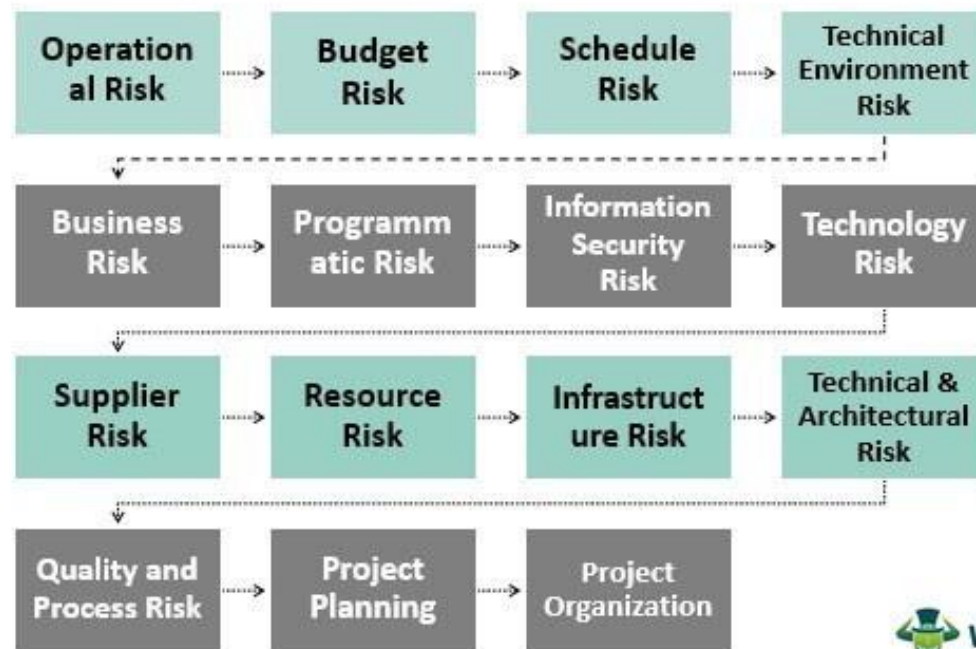
Main types

Cost: Errors in cost estimation

Schedule: The risk of unplanned scheduling conflicts

Performance: The risk of events that cause the project to produce results

Risk Categories



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<https://www.wallstreetmojo.com/risk-categories/>

<https://project-management.com/types-of-risk-in-project-management/>

ALL MAJOR RISKS

Level 1	Level 2	Level 3
All Project Risks	Business Risk	<ul style="list-style-type: none">• Competitors• Suppliers• Cash flow
	Technical Risk	<ul style="list-style-type: none">• Hardware• Software• Network
	Organizational Risk	<ul style="list-style-type: none">• Executive Support• User Support• Team Support
	Project Management Risk	<ul style="list-style-type: none">• Estimates• Communication• Resources

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<https://www.wallstreetmojo.com/risk-categories/>

<https://www.projectengineer.net/parts-of-a-risk-management-plan/>

PROJECT MANAGEMENT METHODOLOGIES

Risk management is the process of risk identifying, analyzing, and controlling, preventing risks to a project that have the potential to impact the project success.

It is a process to:

- Identify all relevant risks
- Assess / rank those risks
- Address the risks in order of priority
- Monitor risks & report on their



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MANAGING RISKS STEP-BY-STEP

5-step outline raises questions to help manage risks

Identify risks – what could go wrong?

Measure the likelihood and impact – how likely will that risk become a problem,

Make a solution – given the risks, do we accept them?

Implement solutions – knowing and accepting the risks, how can we mitigate them?

Monitor the risks – which risks are increasing, and is our plan for that risk updated?



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<https://project-management.com/types-of-risk-in-project-management/>

TECHNIQUES OF RISK IDENTIFICATION

Inputs

- .1 Project management plan
 - Requirements management plan
 - Schedule management plan
 - Cost management plan
 - Quality management plan
 - Resource management plan
 - Risk management plan
 - Scope baseline
 - Schedule baseline
 - Cost baseline
- .2 Project documents
 - Assumption log
 - Cost estimates
 - Duration estimates
 - Issue log
 - Lessons learned register
 - Requirements documentation
 - Resource requirements
 - Stakeholder register
- .3 Agreements
- .4 Procurement documentation
- .5 Enterprise environmental factors
- .6 Organizational process assets

Tools & Techniques

- .1 Expert judgment
- .2 Data gathering
 - Brainstorming
 - Checklists
 - Interviews
- .3 Data analysis
 - Root cause analysis
 - Assumption and constraint analysis
 - SWOT analysis
 - Document analysis
- .4 Interpersonal and team skills
 - Facilitation
- .5 Prompt lists
- .6 Meetings

Outputs

- .1 Risk register
- .2 Risk report
- .3 Project documents updates
 - Assumption log
 - Issue log
 - Lessons learned register

- ❖ Delphi technique
- ❖ SWOT analysis,
- ❖ Documentation reviews,
- ❖ Information gathering techniques,
- ❖ Brainstorming,
- ❖ Root cause analysis,
- ❖ Interviewing,
- ❖ Assumption analysis,
- ❖ Checklist analysis,
- ❖ Risk register,
- ❖ Outputs of risk identification,
- ❖ Impact matrix,
- ❖ Risk data quality assessment,

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<https://www.wallstreetmojo.com/risk-categories/>

<https://www.projectengineer.net/tutorials/pmp-exam-tutorial/project-risk-management/>

PROJECT RISK REGISTER ELEMENTS

Identification number (to quickly refer to or identify each risk)

Name or brief description of the risk

Risk categories (whether it's internal or external, material-related or labor-related, etc.)

Probability (how likely is the risk to occur)

Impact (if the risk takes place, how seriously will it impact your project)

Rating (where does this risk fall on your priority list)

Approach (will you monitor the risk, try to mitigate it, avoid it, etc.)

Action (if you plan to mitigate or avoid the risk, what are the steps involved, and when will they occur)

Person responsible for overseeing or mitigating the risk

Comments

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<https://www.wrike.com/blog/what-is-a-risk-register-project-management/>

<https://www.projectengineer.net/tutorials/pmp-exam-tutorial/project-risk-management/>

RISK REGISTER

Likelihood	Consequences				
	Insignificant <i>Risk is easily mitigated by normal day to day process</i>	Minor <i>Delays up to 10% of Schedule Additional cost up to 10% of Budget</i>	Moderate <i>Delays up to 30% of Schedule Additional cost up to 30% of Budget</i>	Major <i>Delays up to 50% of Schedule Additional cost up to 50% of Budget</i>	Catastrophic <i>Project abandoned</i>
Certain <i>>90% chance</i>	High	High	Extreme	Extreme	Extreme
Likely <i>50% - 90% chance</i>	Moderate	High	High	Extreme	Extreme
Moderate <i>10% - 50% chance</i>	Low	Moderate	High	Extreme	Extreme
Unlikely <i>3% - 10% chance</i>	Low	Low	Moderate	High	Extreme
Rare <i><3% chance</i>	Low	Low	Moderate	High	High

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<https://monday.com/blog/project-management/risk-register/>

<https://www.projectengineer.net/tutorials/pmp-exam-tutorial/project-risk-management/>

Risk Assessment Matrix

5					
4	5	2		1	
3			4		
2	3		2	3	
1		1			1
	1	2	3	4	5
	Likelihood				

Risk Description – Clear description of risk, its cause & consequence

Controls / Actions already in place – List what is actually happening now which reduces the impact of a risk or its likelihood

Impact – scale of 1 to 5 (1 = minor, 5 = catastrophic)
(Note this is to be residual impact only)

Likelihood – scale of 1 to 5 (1 = remote, 5 = unavoidable)
(Note this is to be residual likelihood only)

Weighting – Its Risk Ranking: a calculated figure i.e. impact x likelihood

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<https://monday.com/blog/project-management/risk-register/>

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RISK BREAKDOWN STRUCTURE (RBS)

for risk plan management



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A Guide to the Project Management
Body of Knowledge 4th Edition, Project
Management Institute Inc., © 2008

RISK PLANNING PYRAMID



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PROJECT RISK MANAGEMENT SOFTWARE

For risk planning, project risks are best avoided and handled by choosing project management software that allows managers to see problems in advance and plan accordingly.

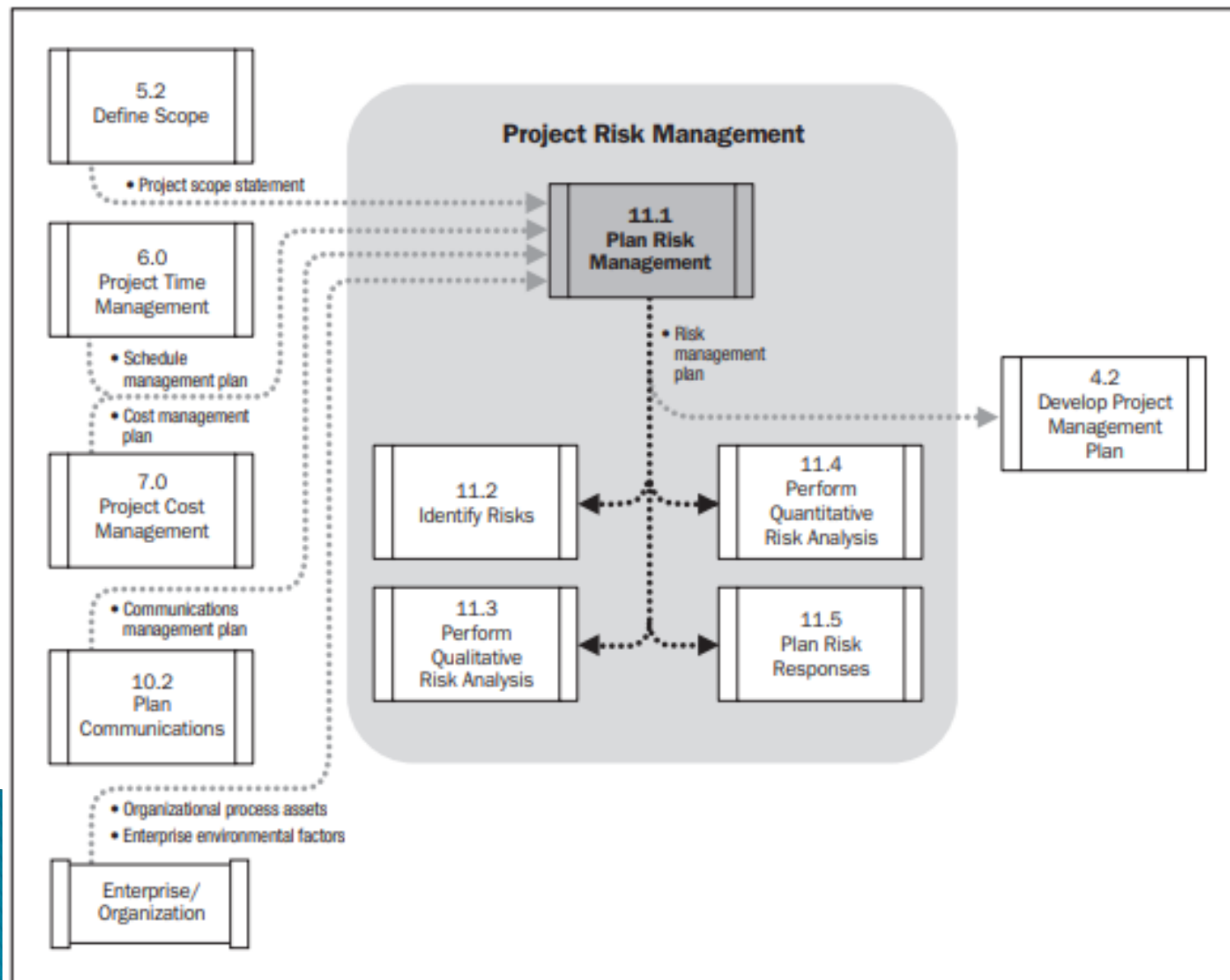
1. Jira : Jira is an agile project management software
 2. Buildertrend: Software for home builders, contractors & remodelers.
 - 3, WorkflowMax: Cloud-based worklow and job management software delivered as Software-as-a-Service.
 4. BuildTools: a web-based, fully integrated construction project management software.
 5. Caspio: Cloud platform for creating business database applications, forms and reports fast and without coding.
 6. Knack: an online database builder that transforms spreadsheets into a web database application.
- Procure: schedules, closes RFIs faster, tracks project emails, archives documents & photos. Manage submittals, daily logs, change orders, job costing and punch lists.
- Brain Sensei-INACTIVE: /

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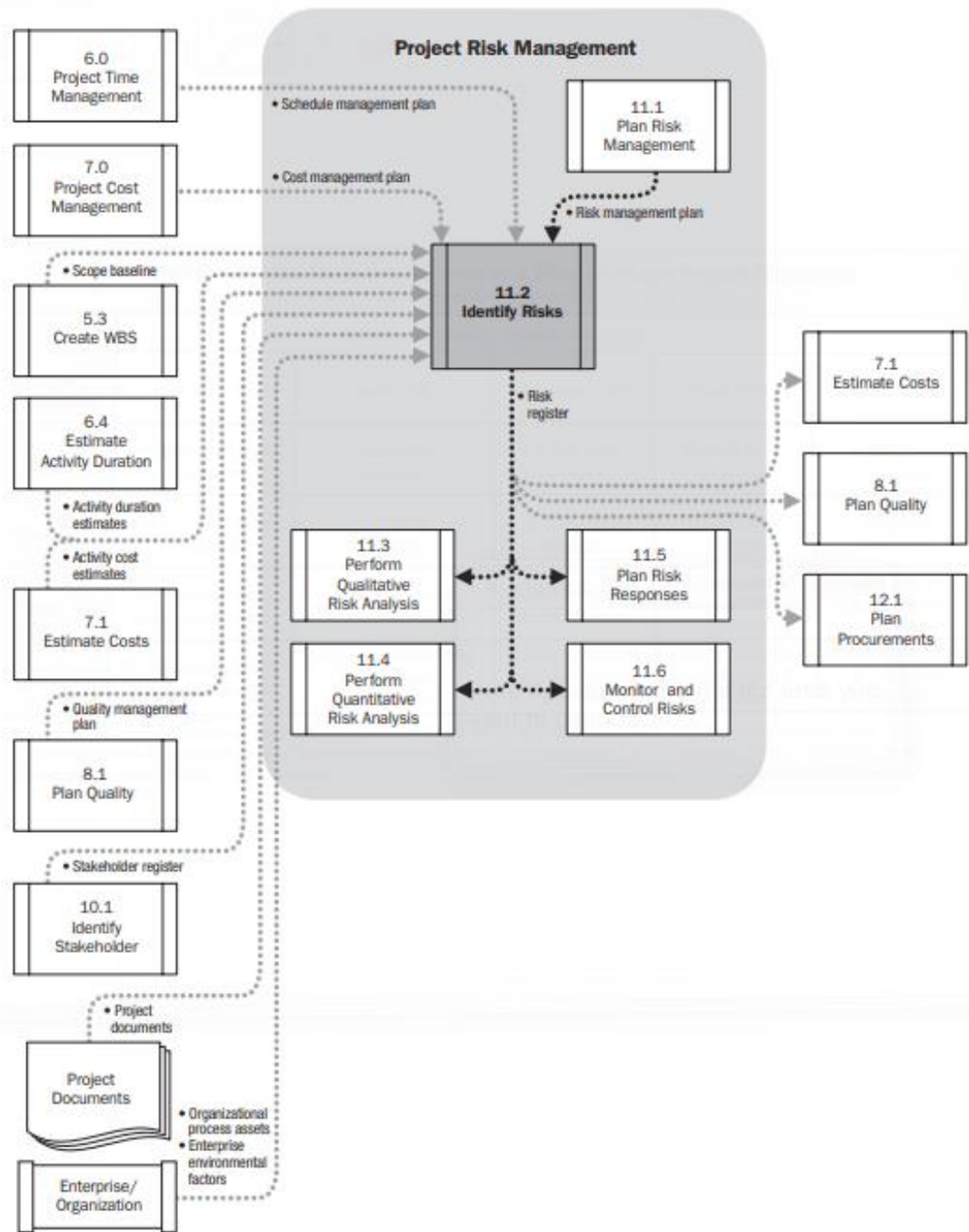
<https://project-management.com/brain-sensei-fun-and-interesting-online-learning-that-works>

A Guide to the Project Management
Body of Knowledge 4th Edition, Project
Management Institute Inc., © 2008

RISK MANAGEMENT PLAN DATA FLOW CHART/SOFTWARE



IDENTIFYING RISKS DATA FLOW DIAGRAM



RISK MANAGEMENT PLAN DATA FLOW CHART

Defined Conditions for Impact Scales of a Risk on Major Project Objectives

(Examples are shown for negative impacts only)

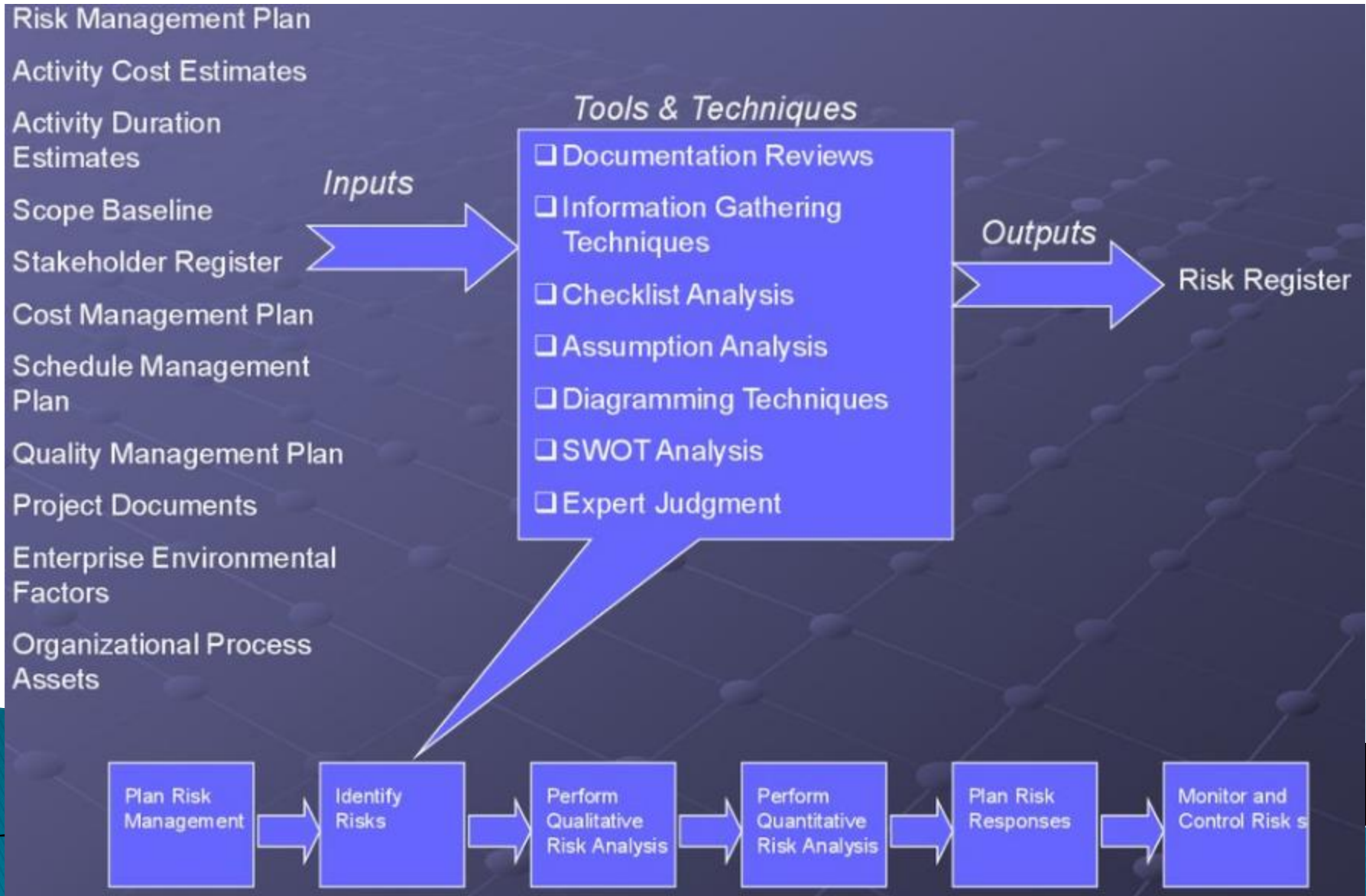
Project Objective	Relative or numerical scales are shown				
	Very low /.05	Low /.10	Moderate /.20	High /.40	Very high /.80
Cost	Insignificant cost increase	<10% cost increase	10-20% cost increase	20-40% cost increase	>40% cost increase
Time	Insignificant time increase	<5% time increase	5-10% time increase	10-20% time increase	>20% time increase
Scope	Scope decrease barely noticeable	Minor areas of scope affected	Major areas of scope affected	Scope reduction unacceptable to sponsor	Project end item is effectively useless
Quality	Quality degradation barely noticeable	Only very demanding applications are affected	Quality reduction requires sponsor approval	Quality reduction unacceptable to sponsor	Project end item is effectively useless

This table presents examples of risk impact definitions for four different project objectives. They should be tailored in the Risk Management Planning process to the individual project and to the organization's risk thresholds. Impact definitions can be developed for opportunities in a similar way.

WAYS OF RISK IDENTIFICATION

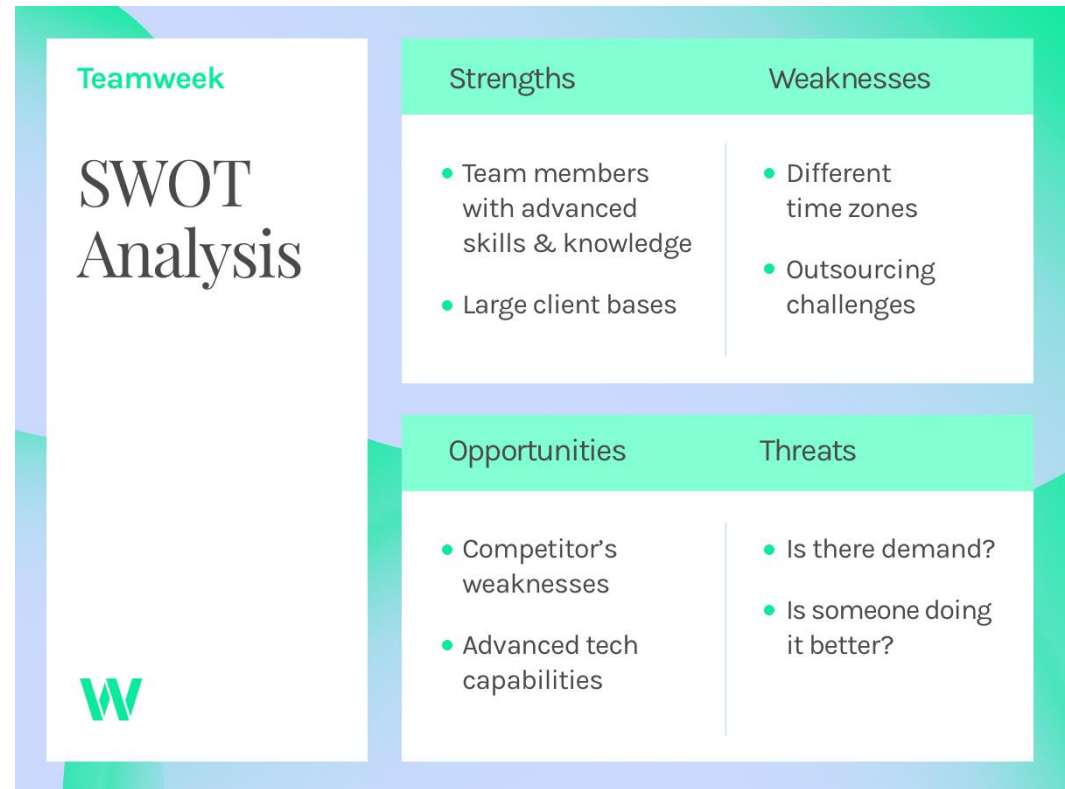
Features of Large Project	Specific Risk Management Approaches
Large Number of Tasks; Complex Precedence Network	<ul style="list-style-type: none">• Risk are assigned to multiple risks for schedule risk analysis; risk assignment need to be visualized• Schedule diagnostics is performed prior to risk analysis
Large Number of Risks in Risk Register	<ul style="list-style-type: none">• Hierarchical Risk Register: Risk Breakdown Structure• Multiple Risk Dashboards• Risk Register diagnostics, verification, and reviews• Risk authorization process• Sensitivity Analysis and Risk Ranking
Long Project Duration: long and complex project monitoring and control process	<ul style="list-style-type: none">• Well-defined risk monitoring and control process• Risk mitigation and response planning process; scheduling and managing risk mitigation plans
Integrated Project Schedule with Sub Schedules	<ul style="list-style-type: none">• Well-defined risk monitoring and control process• Risk mitigation and response planning process• Risk reviews; risk history logs
Multiples Resources of Different Types; Large Organizational Structure (OBS)	<ul style="list-style-type: none">• Risks are assigned to resources• Risk are presented and analyzed for different levels of OBS

INFORMATION GATHERING TECHNIQUES



INFORMATION GATHERING TECHNIQUES

- ❖ Delphi technique
- ❖ SWOT analysis,
- ❖ Brainstorming,
- ❖ Root cause analysis,
- ❖ Interviewing,
- ❖ Assumption analysis,
- ❖ Checklist analysis,
- ❖ Risk register,
- ❖ Outputs of risk identification,
- ❖ Impact matrix,
- ❖ Risk data quality assessment,
- ❖ Simulation technique, etc.



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RISK ANALYSIS TECHNIQUES

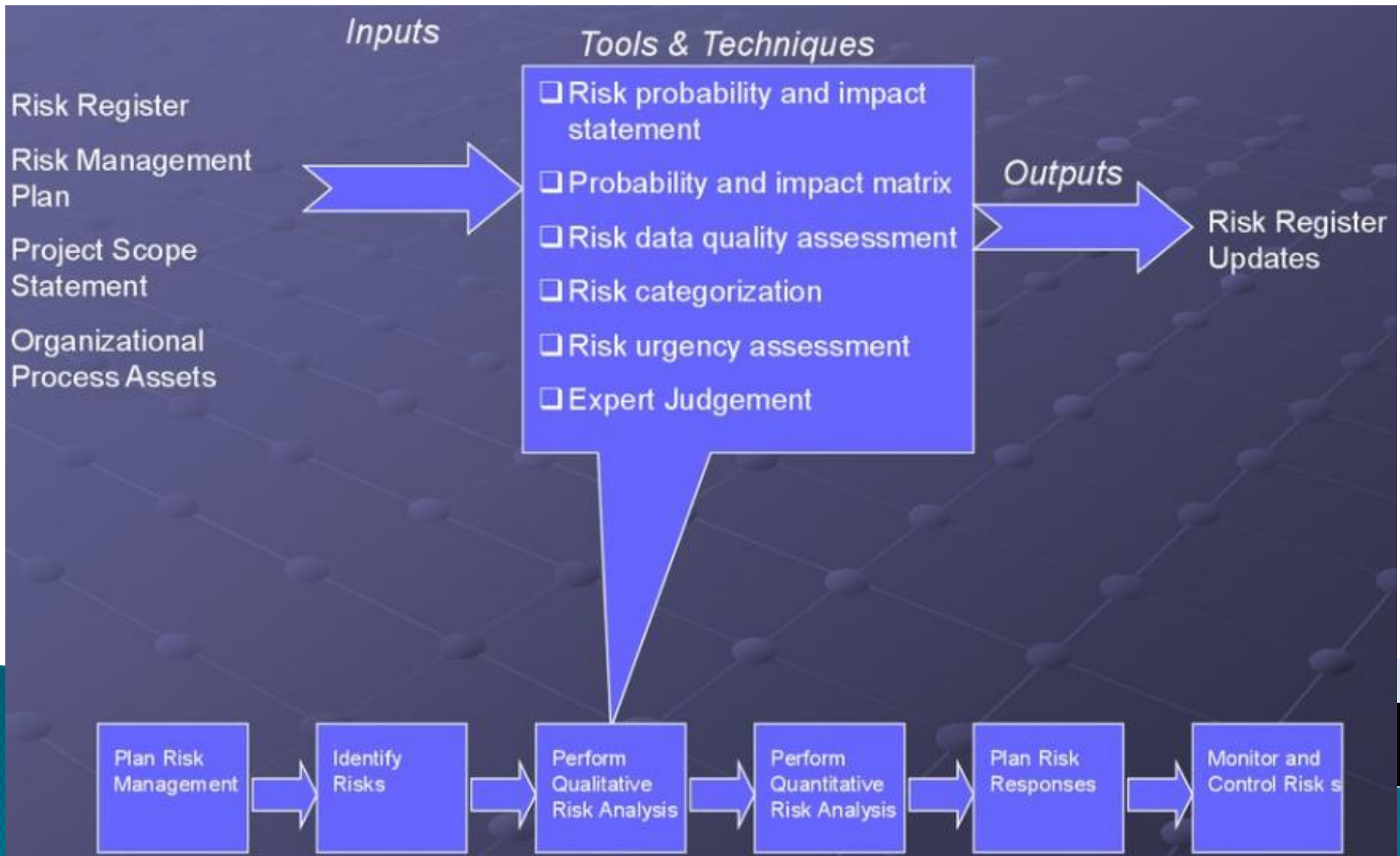
❖ Qualitative Risk Analysis

❖ Quantitative Risk Analysis

While qualitative risk analysis should generally be performed on all risks, for all projects, quantitative risk analysis has a more limited use, based on the type of project, the project risks, and the availability of data to use to conduct the quantitative analysis.

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QUALITATIVE RISK ANALYSIS



QUANTITATIVE RISK ANALYSIS



- .1 Risk management plan
- .2 Scope baseline
- .3 Risk register
- .4 Enterprise environmental factors
- .5 Organizational process assets



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QUALITATIVE RISK ANALYSIS: PROBABILITY AND IMPACT MATRIX

Based on failure modes and effect analysis

Impact Scale

Probability 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

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

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<https://project-management.com/types-of-risk-in-project-management/>

QUANTITATIVE RISK ANALYSIS

Sensitivity analysis.

Determines the uncertainty of each project element affects the objective being examined in baseline values. The results is in the form of a **tornado diagram**.

Expected Monetary Value (EMV) analysis.

A statistical technique that calculates the average outcome. A common use of this technique is within **decision tree analysis**.

Decision tree analysis.

A diagramming and calculation presents uncertainty.

Simulation.

A simulation uses a project model that translates the uncertainties, typically performed by using Monte Carlo analysis.

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DECISION TREE QUANTITATIVE RISK ANALYSIS

Four main elements:

Decision Nodes:

A decision node, on the diagram as a square, indicates a choice that needs to be made.

Chance Nodes:

A chance node signifies uncertain outcomes are used when future results are not guaranteed.

End Nodes:

End nodes, like the name suggests, represent the end of a diagram and presents a final outcome.

Branches:

Branches are what connect the nodes together for potential choice, clearly labeled.

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QUANTITATIVE RISK ANALYSIS

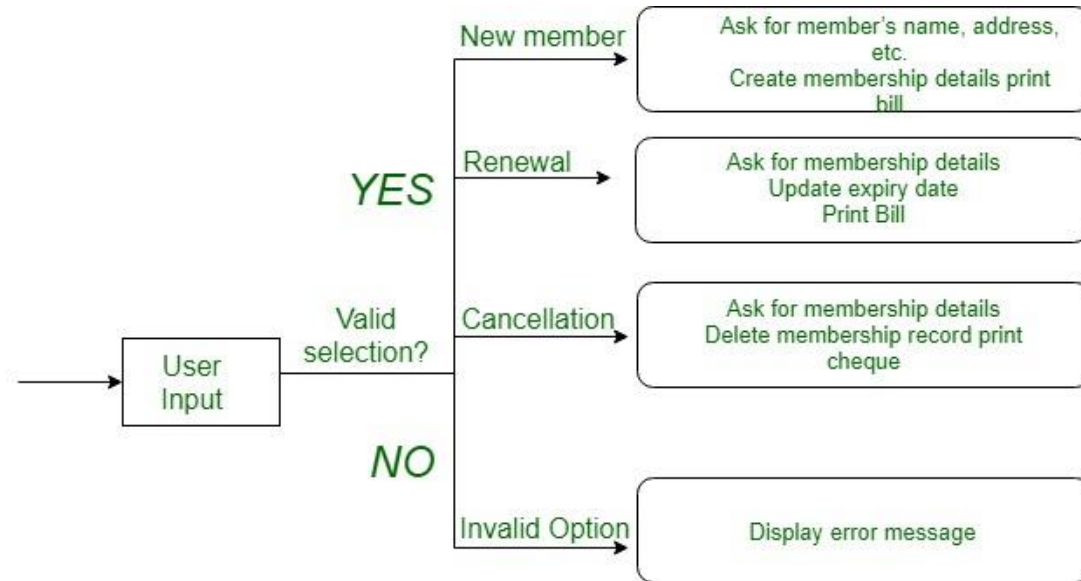
Library Membership Automation Software (LMS) supports the 4 options.

Decision:

Once the 'new member' possibility is chosen, the software system asks for details concerning the member just like the member's name, address, number, etc.

Action:

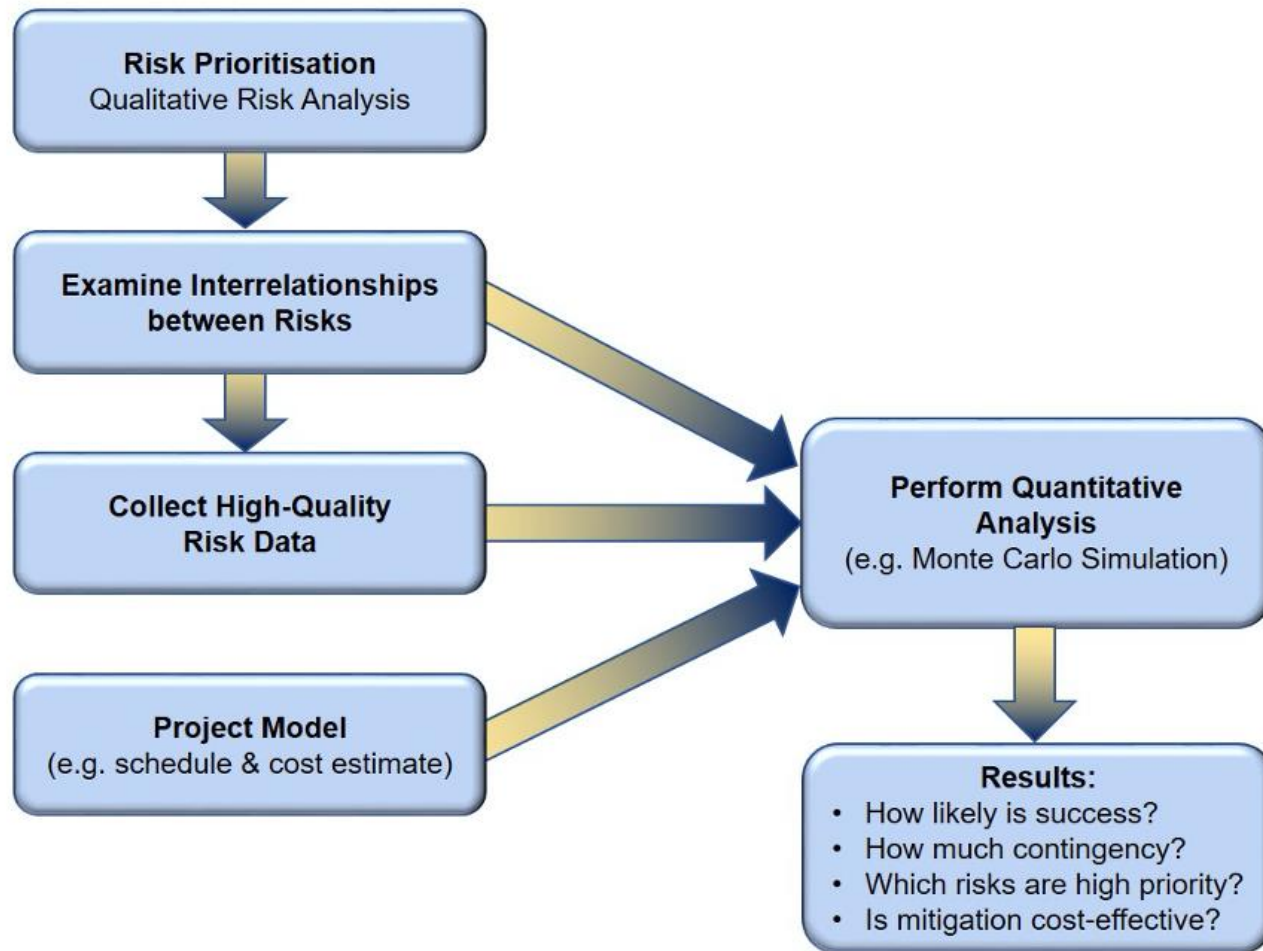
If correct info is entered then a membership record for the member is made and a bill is written for the annual membership charge and the protection deposit collectible.



Decision tree for LMS

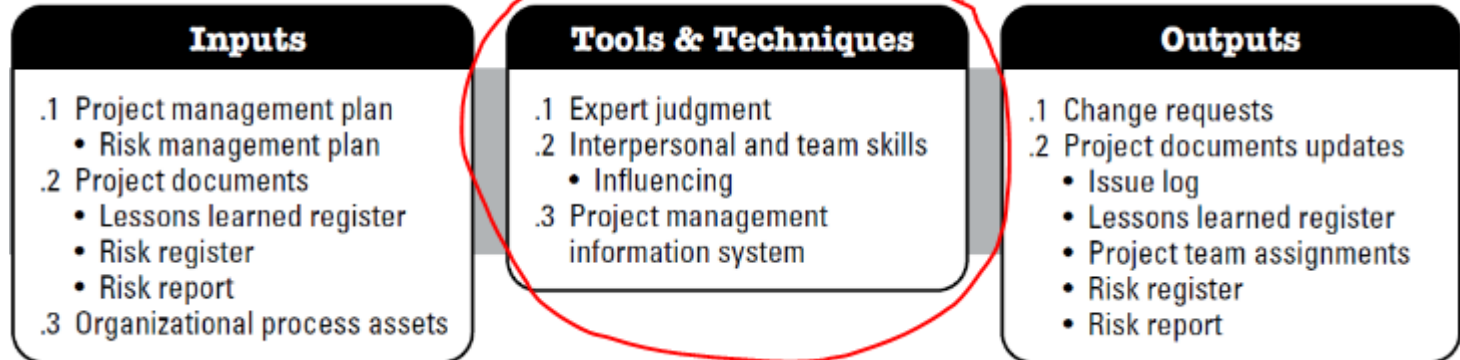
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RELATIONSHIP BETWEEN QUANTITATIVE VS QUALITATIVE RISK ANALYSIS



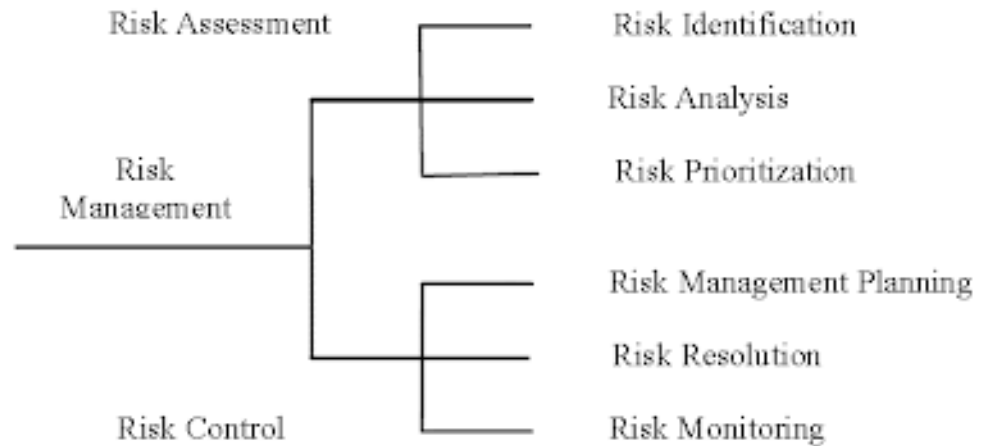
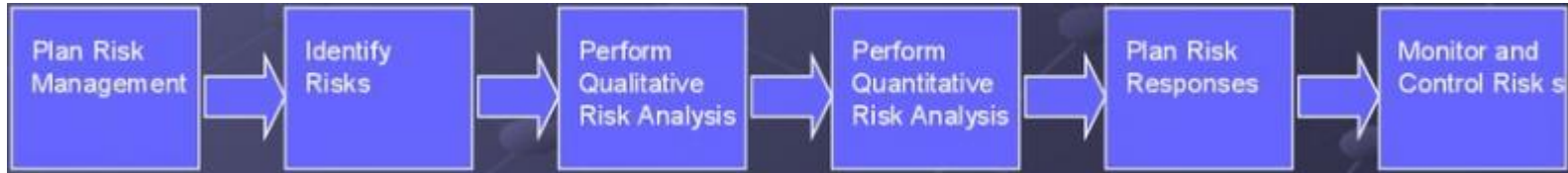
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RISK RESPONSES ANALYSIS



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RISK RESPONSES ANALYSIS

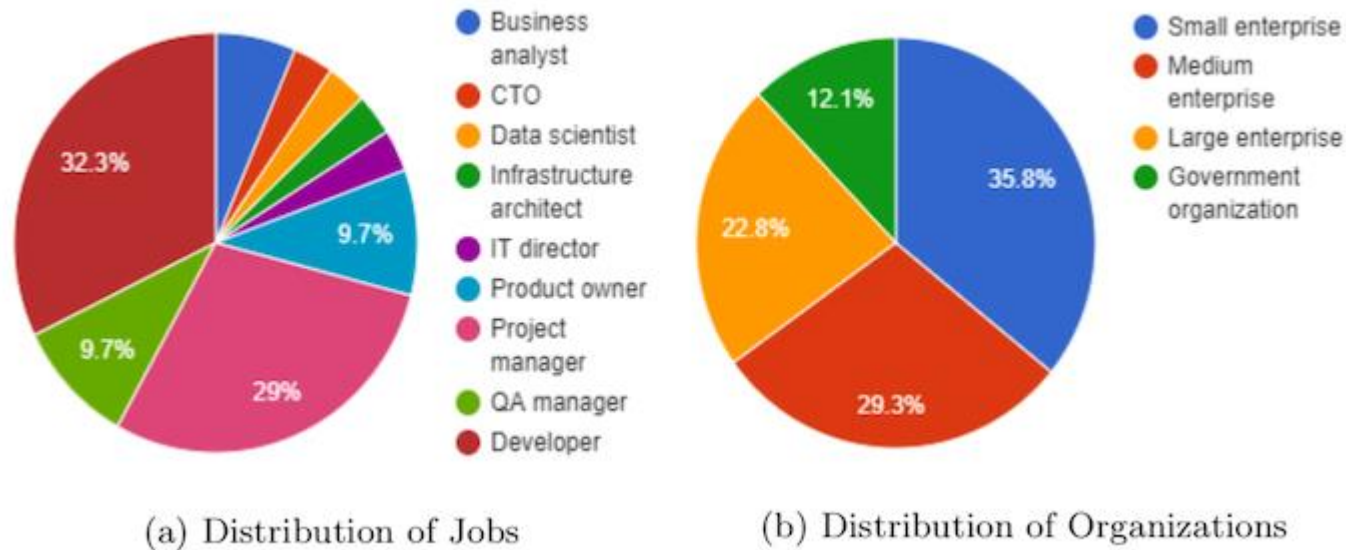


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Boehm's top 10 development risks

<i>Risk</i>	<i>Risk reduction techniques</i>
Personnel shortfalls	Staffing with top talent; job matching; teambuilding; 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 functions	Improved software evaluation; formal specification methods; user surveys; prototyping; early user manuals
Developing the wrong user interface	Prototyping; task analysis; user involvement

RISK ANALYSIS PARTICIPANTS



For the 37 risks occur in practice. Each participant indicated how often the risk occurred in projects they have been involved in.

<https://ictinstitute.nl/project-risk-management-thesis/>

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THANK YOU

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