Lecture 14
12. Project Risk Management

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Outline

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Risks and Risk Management

- Risk involves changes in mind, opinion, actions or place.
- Risk concerns future happenings.
- Risk contains choice and the uncertainty and that the choice itself entails.
- Hence, risk is certain (like death and taxes) → Robert Charette
- So, we need to Manage Risks.
- Risk management are a series of steps that help a software team to understand and manage Risks.

Risks and Risk Management

- A risk is a potential problem that might happen or not.
- Risk is the possibility of loss or injury.
- It’s better to identify it, assess its probability of occurrence, estimate its impact and establish a contingency plan (when it will occur is determined or estimate in this plan).
- Characteristics of Risks:
  - Loss
  - Uncertainty
- “A Risk is an event that may occur or not, and if occurs generally causes loss.”

Risks and Risk Management

- Risks prevent the project form realizing the expected goals.
- Types of Risks:
  - Project Risks: Caused by technical aspect of work or work product and affect the project schedule or resources or cost.
  - Process Risks: Caused by Formation, processes of the project or methodologies used in the project will be affected
  - *Product Risk or Technical Risks:* affect the quality or performance or even implementation possibilities.
  - *Business Risks:* affect the organization developing or procuring the software.

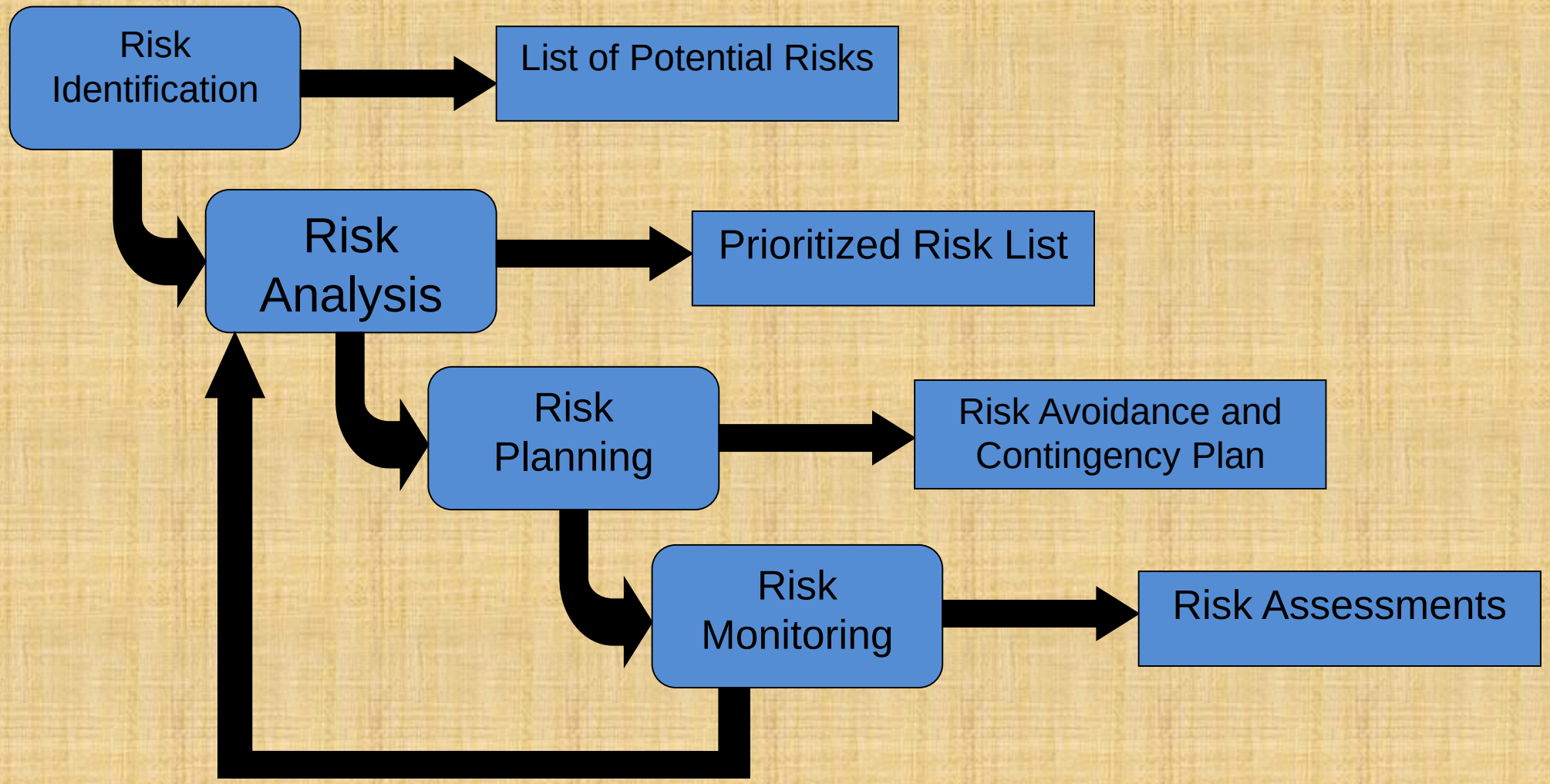
Risks and Risk Management

- *Known Risks:* easily uncover able risks.
- *Predictable Risks:* extrapolated from past project experience.
- *Unpredictable Risks:* May or may not occur and are extremely difficult to identify.

Business risks

- *Market:* business excellent product that no one wants.
- *Strategic:* product that doesn't fit into business strategy.
- *Sales:* product that is next to impossible to sell.
- *Management:* losing management support due to focus / policy change
- *Budget:* losing budgetary or personal commitment

Risk Management



Risk Management Planning Process

- How to plan for risks in the project?
- Process of deciding how to approach and plan risk management activities for a project.
- It’s a part of Project Planning.

Risk Management Planning Process

Risk Management Planning Overview		
Inputs	Tools and Techniques	Outputs
1. Enterprise Environmental Factor 2. Organizational Process Assets 3. Project Scope Management 4. Project Management Plan	1. Planning Meeting and Analysis	1. Risk Management Plan

Risk Management Planning Process

- Questions Addressed in Risk Management Plan:
  - What is it important to take/ not take " this risk" in relation to the project objective?
  - What is the specific risk, and what are the risk mitigation deliverables?
  - How is risk going to be mitigated?
  - What approach is to be used?
  - Who are the individuals responsible for implementing risk management plan?
  - When will the project milestone associated with the mitigation approach occur?
  - How much is required in terms of resources to mitigate this particular risk?

Risk Triangle

- Risk Triangle represents impact of project’s risk and issues on project schedule.

Enterprise Environmental Factor

- The attitudes toward risk and risk tolerance of organizations and people involved in the project will influence the project management plan.
- Common risk related environmental factors are:
  - Customer/Sponsor: decision related risk
  - Customer organization: business process related risk
  - External environment: Industry practice, competition related risk

Understanding “Project Risks”

- Skills/ Expertise: scarcity related risks
- Commitment of Resources: commitment failure related risk
- Timeline: schedule baseline related risk
- Project Schedule: schedule management related risk
- Technology: failure of choosing appropriate technology related risk
- Clarity of Requirements/ Scope: requirement elicitation related risk
- Financials: costing and fund related risk
- Methodology/ Process: development methodology related risk
- External Environment: industry practice & competition related risk

Risk Management Plan

- Components of Risk Management Plan
  - Methodology used
  - Role and Responsibilities of Different Stakeholders
  - Budgeting for Risk Management
  - Timing/Scheduling for Risk Management Activities
  - Risk Categories
  - Determining Risk Probabilities and Impact
  - Probability and Impact Matrix
  - Revised stakeholders' tolerances
  - Reporting formats
  - Tracking of related tasks and issues

Risk Identification

Risk Identification Overview		
Inputs	Tools and Techniques	Outputs
1. Risk Management Plan 2. Enterprise Environmental Factor 3. Organizational Process Assets 4. Project Scope Management 5. Project Management Plan	1. Documenting Review 2. Information Gathering 3. Checklists 4. Assumptions 5. Diagramming Techniques	1. Risk Register

Risk Identification Techniques

- Brainstorming: Jot down thoughts
- Wideband Delphi Technique: Discuss between experts without biasing
- Nominal Group Technique: Expert reviewing different ideas
- SWOT Analysis
- Interviewing

Risk Register

- Contains the outcomes of the risk management processes as they are conducted.
- Risk register contains:
  - List of identified risks
  - List of potential responses
  - Root causes of risk
  - Updated risk categories
- Risk database is the electronic form of risk register.
- Checklist could be used for identification process.

Risk Analysis

- Analyzing the identified risks, their probability of occurrence and their impacts.
- Results in updated risk register containing the priority of risk to be dealt with.
- Two methods of Analysis:
  - Qualitative Risk Analysis
  - Quantitative risk Analysis

Qualitative Risk Analysis Process

- Process of assessing the impact and likelihood of identified risks.
- It prioritizes risks according to their potential effect on the project.
- Risks are analyzed on qualitative factors only.

Qualitative Risk Analysis

Qualitative Risk Analysis Overview		
Inputs	Tools and Techniques	Outputs
1. Organizational Process Assets 2. Project Scope Management 3. Risk Management Plan 4. Risk Register	1. Risk Probability and Impact Assessment 2. Probability and Impact Matrix 3. Risk Data Quality Assessment 4. Risk Categorization 5. Risk Urgency Plan	1. Updated Risk Register

Probability Impact Matrix

- A tabular representation of degree of risk derived from its probability of occurrence and possible adverse impact on project normal state.
- Risk Data Quality Assessment: A qualitative risk assessment requires accurate and unbiased data. Analysis of the quality of risk data is a technique to evaluate the degree to which the data about the risks is useful for risk management. It involves examining the degree to which the risk is understood and accuracy, quality, reliability, and integrity of the data about the risk.

Probability Impact Matrix

Probability\Impact	Very Low	Low	Moderate	High	Very High
Very High	Medium	Medium	High	High	High
High	Low	Medium	Medium	High	High
Moderate	Low	Medium	Medium	Medium	High
Low	Low	Low	Low	Medium	High
Very Low	Low	Low	Low	Medium	High

Quantitative Risk Analysis Process

- Determining numerically the probability of each risk and its consequences of project objectives.
- Identifying risk requiring the most attention.
- Quantifies risk exposure and determines the size of cost and schedule contingency reserves that may be needed.

Quantitative Risk Analysis Process

Qualitative Risk Analysis Overview		
Inputs	Tools and Techniques	Outputs
1. Organizational Process Assets 2. Project Scope Management 3. Risk Management Plan 4. Risk Register 5. Project Management Plan 6. Project Schedule 7. Project Cost Plan	1. Data gathering and Representation techniques 2. Quantitative Risk Analysis and Modeling Techniques	1. Updated Risk Register

Calculating Risk Exposure

- Determine probability of occurrence for each risk component
- Determine the impact for each component based on the criteria shown from the table
- Prepare a risk table and analyze the result i.e. overall risk exposure :: RE = P*C : where, P is probability and C is cost to the project should the risk occur

Ex: Find RE, if Risk Chance = 70%, Risk probability = 80% (assume), Risk Impact→60 components were there i.e. 70% of 60 = 42, so, 18 components to be built.

If components → 100 LOC and LOC cost → Rs 100,

Then overall cost = 18*100*100

= Rs 180000

Now, Risk Exposure (RE) = 80% of 180000 = Rs 144000

Quantitative Risk Analysis and Modelling Techniques

- Sensitivity Analysis
  - Deterministic Modeling Technique used to test impact of change in a value of independent variable on the dependent variable.
- Expected Monetary Value
  - Study of decision making criteria for each decision event combination along with the associated probabilities of different profit conditions.
  - Decision Tree and Risk Exposure methods
- Monte Carlo Approach
  - Simulation and Modeling

Risk Response Planning

- Process of developing options to enhance opportunities and reduce threads to projects objectives, ultimately reducing overall risk.’
- Explains how to deal when risks occur.

Risk Response Planning

Risk Response planning overview		
Inputs	Tools & techniques	Outputs
1. Risk management plan 2. Risk register	1. Strategies for dealing risks 2. Contingent response strategy	1. Updates risk register 2. Updated project management plan 3. Risk related contractual aggrements

Resolution of Risks

- Once risks are identified and analyzed they are prioritized and now they are to be redefined with some definite action to be taken on their occurrence
- Typical risk resolution actions are:
  - Research and review
  - Eliminate and review
  - Reduce and protect
  - Accept and protect

Strategies for Threats

- Risk avoidance: eliminating a risk by avoiding its cause
- Risk transference: shifting the consequences of a risk and responsibility for its management through outsourcing
- Risk mitigation: on occurrence of risk, reduce the impact of risk
- Also try to reduce the occurrence of the risk through prevention

Strategies for Opportunities

- Exploit
  - Enhance plan to ensure that the opportunity is realized
  - Eliminate uncertainty to ensure opportunity occurs
- Share
  - Involve third party who could better realize the opportunity
- Enhance
  - Modifies the size of opportunity by increasing probability and maximizing the key drivers of positive impact risk

Strategies for Both Threats and Opportunities

- Risk acceptance
  - Allowing the consequences should a risk occur in a known and controlled manner
  - Live with consequences
- Contingent response strategies
  - Develop contingency plan
  - Create contingency allowance procedure
  - Plan for alternative development

Risk Monitoring and Control Process

- Process of keeping track of identified risks
- Monitoring residual risks
- Executing risk plans
- Evaluating the effectiveness of reducing risks

- Monitoring risks involves knowing their status
- Controlling risks involves carrying out the risk management plan as risks occur

Risk Monitoring and Control Process

Risk monitoring and control overview		
Inputs	Tools and techniques	Outputs
1. Risk management plan 2. Risk register 3. Approved change requests 4. Work performance information 5. Performance report	1. Risk reassessment 2. Risk audit 3. Variance and trend analysis 4. Technical performance measurement 5. Reserve analysis 6. Status meeting/review meeting	1. Updated risk register 2. Requested changes 3. Recommended corrective actions 4. Recommended preventive actions 5. Updated organizational process assets 6. Updated PM plan

Risk Audit

- Risk audit examines and documents the effectiveness of risk response in dealing with “Identified risks and their root causes”
- It also examines the overall effectiveness of risk management process
- It can be performed as a part of regular quality assurance audit

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Thank You

“Not all Risk are bad, but we still need to plan.”