Project Management Professional (PMP)®
Exam Prep
Course 11 - Project Risk Management

Workbook
Project Risk Management
Risk Management

➢ The processes concerned with conducting risk management planning, identification, analysis, responses and monitoring and control on a project.

➢ Updated throughout the project.

➢ Increase the probability and impact of *positive risks* & decrease the probability and impact of *negative risks*.
Risk Management

- **Risk** – an uncertain event or condition that, if realized, has a positive or negative impact on at least one project objective (such as time, cost, scope or quality).

- Risks can have one or more causes and one or more impacts.
Risk Management

- Stakeholder
- Quality
- Budget
- Schedule
- Requirements
- Resources
- Communications
- Risk
- Scope
- Integration

Project Risks
Risk Management

Types of Risks

- **Known Risks** - Can be analyzed, possible to plan. Contingency reserve or other plans.

- **Unknown Risks** - Cannot be managed proactively. General contingency or management reserve.
Risk Management

Key Terms

- Risk Tolerance
- Risk Averse
- Risk Factors
  - Probability & impact
  - The range of possible outcomes
  - Expected timing in the project life-cycle
Risk Management

Key Terms

- **Variability Risk** — Uncertainty exists about some key characteristics of a planned event, activity, or decision. Examples include: productivity being above or below a target, or weather conditions impacting construction.

- **Ambiguity Risk** — What might happen in the future. This risk deals with the fact that there are areas of imperfect knowledge. Examples changes in regulation or law, or inherent systemic complexity.

- **Project Resilience** — Resilience is the ability to overcome unknown risks when they occur.

- **Integrated Risk Management** — Integrated risk management provides a coordinated approach to enterprise-wide risk management to ensure alignment and coherence to ensure risks are managed across all levels of the organization.

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Risk Management
11.1 Plan Risk Management

- The process of deciding how to approach & conduct risk management activities for a project.
- Ensure that the level, type & visibility of risk management are commensurate with both the risk & importance of the project.
- Provide sufficient resources & time for risk management activities.
- Establish an agreed-upon basis for evaluating risks.
Risk Management

11.1 Plan Risk Management

**Inputs**
- 1. Project charter
- 2. Project management plan
- 3. Project documents
- 4. Enterprise environmental factors
- 5. Organizational process assets

**Tools & Techniques**
- 1. Expert judgment
- 2. Data analysis
- 3. Meetings

**Outputs**
- 1. Risk management plan
Risk Management

Included in the Risk Management Plan

- Methodology
- Roles and Responsibilities
- Budgeting
- Timing
- Risk Categories (RBS)
- Revised stakeholder tolerances
- Reporting formats
- Tracking
- Definitions of probability and impact
- Matrices
Risk Management

Sample RBS

Project
Technical
- Requirements
- Subcontractors & Suppliers
- Project Dependencies
- Estimating
- Estimating
External
- Technology
- Regulatory
- Resources
- Planning
Organizational
- Complexity & Interfaces
- Market
- Funding
- Controlling
Project Management
- Performance & Reliability
- Customer
- Prioritisation
- Communication
- Quality
- Weather

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Scales for Impact and Probability

- Linear
  - .1, .3, .5, .7, .9
- Non-Linear
  - .05, .10, .20, .40, .80
- Relative
  - Very low, low, medium, high, very high
Risk Management

Sample Impact Matrix

<table>
<thead>
<tr>
<th>Project Objectives</th>
<th>Very Low / .05</th>
<th>Low / .10</th>
<th>Medium / .20</th>
<th>High / .40</th>
<th>Very High / .80</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Insignificant cost increase</td>
<td>&lt;10% cost increase</td>
<td>10%-20% cost increase</td>
<td>20%-40% cost increase</td>
<td>&gt;40% cost increase</td>
</tr>
<tr>
<td>Time</td>
<td>Insignificant time increase</td>
<td>&lt;5% Time increase</td>
<td>5%-10% Time increase</td>
<td>10%-20% Time increase</td>
<td>&gt;20% Time increase</td>
</tr>
<tr>
<td>Scope</td>
<td>Scope decrease barely noticeable</td>
<td>Minor areas of scope affected</td>
<td>Major areas of scope affected</td>
<td>Scope reduction unacceptable to sponsor</td>
<td>Product of project is effectively unusable</td>
</tr>
<tr>
<td>Quality</td>
<td>Quality degradation barely noticeable</td>
<td>Only very demanding applications are affected</td>
<td>Quality reduction requires sponsor's approval</td>
<td>Quality reduction unacceptable to sponsor</td>
<td>Product of project is effectively unusable</td>
</tr>
</tbody>
</table>

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Risk Management

11.2 Identify Risks

Determine which risks might affect the project and documents their characteristics.

- Project Manager
- Project Team
- Stakeholders
- Subject matter experts
- People outside the project

Planning Process Group

11.1 Plan Risk Management
11.3 Perform Qualitative Risk Analysis
11.2 Identify Risks
11.4 Perform Quantitative Risk Analysis
11.5 Plan Risk Responses

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Risk Management
11.2 Identify Risks

Inputs
1. Project management plan
2. Project documents
3. Agreements
4. Procurement documentation
5. Enterprise environmental factors
6. Organizational process assets

Tools & Techniques
1. Expert judgment
2. Data gathering
3. Data analysis
4. Interpersonal and team skills
5. Prompt lists
6. Meetings

Outputs
1. Risk register
2. Risk report
3. Project documents updates
Risk Management

Brainstorming

- **Quiet Writing** — Individual team members are given time to generate an individual list of ideas before sharing them with the team. This technique has the advantage of limiting peer influence in the initial creation.

- **Round-Robin Brainstorming** — This brainstorming technique requires the team to take turns suggesting one or more ideas to address specific project needs. It is often used in conjunction with the Quiet Writing technique and it continues to the bias towards ensuring each team member actively participates in the process.
Risk Management

Brainstorming

- **Free-For-All** — Most common brainstorming technique. Team members shout out ideas without any rules or constructs. In many cases team members shout out over each other.

- **Green Zone / Red Zone** — It represents a way of establishing organizational guidelines for positive performance.
  - They take responsibility for the circumstances of their life.
  - They seek to respond to the actions and words of others in a non-defensive manner.
  - Team members seek solutions rather than blame.
  - They welcome feedback.
  - They communicate a caring attitude to the other members and to stakeholders.

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Delphi Technique

- Survey the subject matter experts about the subject in question.
- Aggregate the survey results and feed them back to the experts for review.
- Have the experts consolidate the responses to a consensus opinion.
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SWOT Analysis

Strengths
Weaknesses

Opportunities
Threats

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Prompt Lists

- Predetermined lists of risk categories.
- They provide the team with a head start on the process of brainstorming.
- Often, the lists are based on lessons learned from previous projects, but other are more generic such as:
  - PESTLE — Political, economic, social, technological, legal, environmental.
  - TECOP — Technical, environmental, commercial, operational, political.
  - VUCA — Volatility, uncertainty, complexity, ambiguity.

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The Risk Register

- List of identified risks
- And possibly...
  - List of potential responses
  - Root causes
  - Updated risk categories

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11.3 Perform Qualitative Risk Analysis

- Prioritizing the identified risks for further action (including further analysis or response planning).
- Uses the probability and impact scoring defined in Plan Risk Management.
Risk Management
11.3 Perform Qualitative Risk Analysis

**Inputs**
1. Project management plan
2. Project documents
3. Enterprise environmental factors
4. Organizational process assets

**Tools & Techniques**
1. Expert judgment
2. Data gathering
3. Data analysis
4. Interpersonal and team skills
5. Risk categorization
6. Data representation
7. Meetings

**Outputs**
1. Project documents updates
Risk Management

Risk Parameters

- **Urgency** — The period of time within which a response to the risk is to be implemented in order to be effective. A short period of time indicates high urgency.

- **Proximity** — The period of time before the risk might have an impact on one or more project objectives. A short period indicates high proximity.

- **Dormancy** — The period of time that may elapse after a risk has occurred before its impact is discovered. A short period indicates low dormancy.

- **Manageability** — The ease with which the risk owner (or owning organization) can manage the occurrence or impact of a risk. Where management is easy, manageability is high.

- **Controllability** — The degree to which the risk owner (or owning organization) is able to control the risk’s outcome. Where the outcome can be easily controlled, controllability is high.
Risk Management

Risk Parameters

- Detectability — The ease with which the results of the risk occurring, or being about to occur, can be detected and recognized. Where the risk occurrence can be detected easily, detectability is high.

- Connectivity — The extent to which the risk is related to other individual project risks. Where a risk is connected to many other risks, connectivity is high.

- Strategic impact — The potential for the risk to have a positive or negative effect on the organization’s strategic goals. Where the risk has a major effect on strategic goals, strategic impact is high.

- Propinquity — The degree to which a risk is perceived to matter by one or more stakeholders. Where a risk is perceived as very significant, propinquity is high.
Risk Management
Probability & Impact Matrix

<table>
<thead>
<tr>
<th>Probability</th>
<th>Risk Score = P x I</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.05</td>
</tr>
<tr>
<td>0.9</td>
<td>0.045</td>
</tr>
<tr>
<td>0.7</td>
<td>0.035</td>
</tr>
<tr>
<td>0.5</td>
<td>0.025</td>
</tr>
<tr>
<td>0.3</td>
<td>0.015</td>
</tr>
<tr>
<td>0.1</td>
<td>0.005</td>
</tr>
</tbody>
</table>
Risk Management

11.4 Perform Quantitative Risk Analysis

- Analyzes the effect of those risk events that have been prioritized as potentially and substantially impacting the project’s competing demands, and assigns a numerical rating to those risks.

- Also presents a quantitative approach to making decisions in the presence of uncertainty.
Risk Management

11.4 Perform Quantitative Risk Analysis

**Inputs**
1. Project management plan
2. Project documents
3. Enterprise environmental factors
4. Organizational process assets

**Tools & Techniques**
1. Expert judgment
2. Data gathering
3. Interpersonal and team skills
4. Representations of uncertainty
5. Data analysis

**Outputs**
1. Project documents updates
Risk Management

Influence Diagrams

- Influence diagrams are also called relevance diagrams, decision diagrams, or decision networks.
- They represent project decisions using compact graphical and mathematical representations.
Risk Management
Influence Diagrams
**Risk Management**

**Expected Monetary Value (EMV)**

Calculates the average outcome when future events are uncertain

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Cost</th>
<th>Probability</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimistic Outcome</td>
<td>$150,000</td>
<td>.20</td>
<td>$ 30,000</td>
</tr>
<tr>
<td>Likely Outcome</td>
<td>$225,000</td>
<td>.50</td>
<td>$112,500</td>
</tr>
<tr>
<td>Pessimistic Outcome</td>
<td>$300,000</td>
<td>.30</td>
<td>$ 90,000</td>
</tr>
</tbody>
</table>

**$ 232,500**
Risk Management
Decision Tree Analysis

Choice Event

Event

Outcome | EMV
---|---
$250K | $150K
-$100K | -$40K
-$45K | -$9K
$20K | $16K

Conservative EMV = $7,000
Aggressive EMV = $110,000
Risk Management

A. Cost of Choice
   - OTS
     - Well received: $300K
     - Rejected: $350K
   - Develop
     - Well received: $150K
     - Rejected: $410K

B. Probability & Outcome
   - OTS: 65% $550K
   - Develop: 65% $500K
   - Rejected: 35% $100K
   - OTS: 15% $60K
   - Develop: 15% $61.5K

C. Outcome Minus Cost
   - OTS: $195K
   - Develop: $128K

D. Probability
   - OTS: 65%
   - Develop: 65%
   - Rejected: 35%
   - OTS: 15%
   - Develop: 15%

E. Final Outcomes
   - OTS: $72.5K
   - Develop: $68K
Risk Management

Data Modeling - Simulation

- **Monte Carlo Simulations**
  - **Cost** - Use WBS or similar breakdown
  - **Schedule** - Use PDM

- **Data Modeling - Sensitivity Analysis**
  - Determine the most potential impact.
  - Impact of single element of uncertainty when all other elements are held at baseline.
Risk Management

11.5 Plan Risk Responses

- Developing options and determining actions to enhance opportunities and reduce threats to the project’s objectives.

- Addresses the risks by their priority, inserting resources and activities into the budget, schedule, and project management plan, as needed.
Risk Management

11.5 Plan Risk Responses

**Inputs**
1. Project management plan
2. Project documents
3. Enterprise environmental factors
4. Organizational process assets

**Tools & Techniques**
1. Expert judgment
2. Data gathering
3. Interpersonal and team skills
4. Strategies for threats
5. Strategies for opportunities
6. Contingent response strategies
7. Strategies for overall project risk
8. Data analysis
9. Decision making

**Outputs**
1. Change requests
2. Project management plan updates
3. Project documents updates

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## Risk Management

### Response Strategies

<table>
<thead>
<tr>
<th>Threats</th>
<th>Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoid</td>
<td>Exploit</td>
</tr>
<tr>
<td>Transfer</td>
<td>Share</td>
</tr>
<tr>
<td>Mitigate</td>
<td>Enhance</td>
</tr>
<tr>
<td>Accept &amp; Escalate</td>
<td></td>
</tr>
</tbody>
</table>
Risk Management

Risk Register Updates

- Impacts to the project
- Owner
- Analysis data
- Selected strategy
- Action items
- Fallback plans

- Symptoms/warning signs (Triggers).
- Budget and schedule updates to be made.
- Contingency requests, requirements, plans.
Risk Management

11.6 Implement Risk Responses

- Found in executing process group.
- This process takes the strategies defined in the last process and puts them into action with its major output being change requests that are run through the integrated change control process.
Risk Management

11.6 Plan Implement Responses

Inputs
- 1. Project management plan
- 2. Project documents
- 3. Organizational process assets

Tools & Techniques
- 1. Expert judgment
- 2. Interpersonal and team skills
- 3. Project management information system

Outputs
- 1. Change requests
- 2. Project documents updates
Risk Management

11.7 Monitor Risks

- Identifying, analyzing, and planning for newly arising risks.
- Keeping track of identified risks and those on the watchlist.
- Monitoring trigger conditions for contingency plans.
- Reviewing the execution of risk responses while evaluating their effectiveness.
- Reanalyzing existing risks.
- Monitoring residual risks.
Risk Management

11.7 Monitor Risks

**Inputs**
1. Project management plan
2. Project documents
3. Work performance data
4. Work performance reports

**Tools & Techniques**
1. Data analysis
2. Audits
3. Meetings

**Outputs**
1. Work performance information
2. Change requests
3. Project management plan updates
4. Project documents updates
5. Organizational process assets updates

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Risk Management

**Project Risk Management – Summary**

- Seven (7) processes.
- Activities in Monitor Risks.
- Eight types of risk responses.
- Risk register.
- Definition of risk, positive and negative.
- Solving & interpreting decision trees & EMV.
Risk Management

Project Risk Management – Summary

- Delphi technique.
- SWOT analysis.
- Risk data quality assessment.
- Sensitivity analysis.
- Qualitative vs. Quantitative analysis.
- Interpret quantitative probability and outcome data chart.
Questions and Answers
Review Questions - Part 1:

1. You have been asked to establish an estimated project cost using Expected Monetary Value (EMV). If the project has a best case estimate of $10,000 with a probability of 20%, a most likely case estimate of $12,000 with a probability of 50%, and a worst case estimate of $14,400 with a probability of 30% what is the EMV for the project?
   A. $12,320  
   B. $12,400  
   C. $13,010  
   D. $13,260

2. You have been asked to establish an estimated project cost using Expected Monetary Value (EMV). If the project has a best case estimate of $15,000 with a probability of 30%, a most likely case estimate of $19,500 with a probability of 50%, and a worst case estimate of $26,325 with a probability of 20% what is the EMV for the project?
   A. $19,190  
   B. $19,515  
   C. $20,110  
   D. $20,350

3. You have been asked to establish an estimated project cost using Expected Monetary Value (EMV). If the project has a best case estimate of $25,000 with a probability of 22%, a most likely case estimate of $31,250 with a probability of 53%, and a worst case estimate of $40,625 with a probability of 25% what is the EMV for the project?
   A. $30,190  
   B. $31,560  
   C. $32,219  
   D. $33,350
4. You have been asked to establish an estimated project cost using Expected Monetary Value (EMV). If the project has a best case estimate of $50,000 with a probability of 25%, a most likely case estimate of $55,000 with a probability of 45%, and a worst case estimate of $68,750 with a probability of 30% what is the EMV for the project?
   A. $55,975
   B. $56,550
   C. $57,125
   D. $57,875

5. You have been asked to establish an estimated project cost using Expected Monetary Value (EMV). If the project has a best case estimate of $75,000 with a probability of 30%, a most likely case estimate of $86,250 with a probability of 40%, and a worst case estimate of $99,188 with a probability of 30% what is the EMV for the project?
   A. $86,756
   B. $87,247
   C. $87,691
   D. $88,121

6. You have been asked to establish an estimated project cost using Expected Monetary Value (EMV). If the project has a best case estimate of $30,000 with a probability of 24%, a most likely case estimate of $34,500 with a probability of 56%, and a worst case estimate of $45,540 with a probability of 20% what is the EMV for the project?
   A. $35,121
   B. $35,628
   C. $36,222
   D. $36,920

7. You have been asked to establish an estimated project cost using Expected Monetary Value (EMV). If the project has a best case estimate of $35,000 with a probability of 15%, a most likely case estimate of $40,250 with a probability of 60%, and a worst case estimate of $54,338 with a probability of 25% what is the EMV for the project?
   A. $41,652
   B. $42,111
   C. $42,984
   D. $43,596
8. You have been asked to establish an estimated project cost using Expected Monetary Value (EMV). If the project has a best case estimate of $20,000 with a probability of 10%, a most likely case estimate of $23,200 with a probability of 65%, and a worst case estimate of $32,480 with a probability of 25% what is the EMV for the project?
   A. $23,950
   B. $24,220
   C. $24,880
   D. $25,200

9. You have been asked to establish an estimated project cost using Expected Monetary Value (EMV). If the project has a best case estimate of $5,000 with a probability of 30%, a most likely case estimate of $5,900 with a probability of 45%, and a worst case estimate of $8,024 with a probability of 25% what is the EMV for the project?
   A. $6,161
   B. $6,437
   C. $6,918
   D. $7,020

10. You have been asked to establish an estimated project cost using Expected Monetary Value (EMV). If the project has a best case estimate of $7,500 with a probability of 20%, a most likely case estimate of $9,150 with a probability of 55%, and a worst case estimate of $11,529 with a probability of 25% what is the EMV for the project?
    A. $8,919
    B. $9,126
    C. $9,415
    D. $9,783
Review Questions - Part 2:

1. Which of the following is an input to the identify risks process?
   A. Project management plan
   B. SWOT analysis
   C. Risk related contracts
   D. Technical performance measurements

2. Which of the following is NOT a tool or technique used in the identify risks process?
   A. Data gathering
   B. Data analysis
   C. Risk categorization
   D. Prompt list

3. Which of the following is a tool or technique used in the perform qualitative risk analysis process?
   A. Risk response analysis
   B. Risk prioritization
   C. Project management information system
   D. Risk categorization

4. Which of the following is NOT an input to the perform quantitative risk analysis process?
   A. Organizational process assets
   B. Agreements
   C. Project management plan
   D. Project documents

5. Which of the following is NOT a tool or technique used in the perform quantitative risk analysis process?
   A. Prompt lists
   B. Representations of uncertainty
   C. Interpersonal and team skills
   D. Expert judgment
6. Which of the following is a tool or technique used in the perform quantitative risk analysis process?
   A. Representations of uncertainty
   B. Risk categorization
   C. Meetings
   D. Project management information system

7. Which of the following is a tool or technique used in the plan risk responses process?
   A. Risk response analysis
   B. Risk response planning
   C. Contingent response strategies
   D. Strategic risk response planning

8. Which of the following is NOT a tool or technique used in the plan risk response process?
   A. Strategies for negative risks or threats
   B. Strategies for positive risks or opportunities
   C. Expert judgment
   D. Contingency reserve analysis

9. Which of the following is NOT an tool and technique to the monitor risks process?
   A. Risk urgency assessment
   B. Risk audits
   C. Status meetings
   D. Technical performance measurement

10. Which of the following is a tool or technique used in the monitor risks process?
    A. Audits
    B. Interpersonal and team skills
    C. Expert judgment
    D. Decision making

11. Which of the following is NOT a tool or technique used in the implement risk responses process?
    A. Expert judgment
    B. Interpersonal and team skills
    C. Technical performance measurements
    D. Project management information system
12. Which of the following is a tool or technique used in the implement risk responses process?
   A. Data gathering and representation techniques
   B. Project management information systems
   C. Risk data quality assessment
   D. Planning meetings and analysis

13. You are acting as the portfolio manager and must select a project to execute from a pool of three choices. Each of the choices has an expected payout of $20,000 and an equal 75% chance of succeeding. In this situation what does $15,000 represent?
   A. Net present value
   B. Risk value
   C. Expected monetary value
   D. Simple interest

14. You are leading a large complex project within your organization that is forecast to continue for ten more months. The project has an 18% chance of being impacted in a given month by a particular risk. What is the probability that the project will be impacted by the risk in the 3rd month?
   A. 18%
   B. 36%
   C. 54%
   D. 72%

15. You are acting as an outside project management expert consultant for a struggling project. The project is important to the chief executive officer who is concerned the project is not going to hit its schedule date. Which of the following is most likely to impact achieving the schedule target?
   A. Significant increases in component costs.
   B. Delays in obtaining required sponsor approvals.
   C. Date slippages as stakeholders fail to attend sprint reviews.
   D. Disputes with contractors over increase costs.
16. You have been asked to select one of four projects for your organization to execute. The organization is very risk adverse. If you assume the ends of a range of estimates are +/- 3 sigma from the mean, which of the following range estimates involves the least risk?
   A. Mean of 33 days.
   B. 40 days plus or minus 8 days.
   C. 32 - 46 days.
   D. Optimistic = 33 days, most likely 40 days, pessimistic 46 days.

17. You have been asked to select one of four projects for your organization to execute. The organization is very risk adverse. If you assume the ends of a range of estimates are +/- 3 sigma from the mean, which of the following range estimates involves the least risk?
   A. Optimistic = 21 days, most likely 27 days, pessimistic = 32 days.
   B. 26 days plus or minus 5 days.
   C. 20 - 33 days.
   D. Mean of 26 days.

18. Which of the following is not a factor in the assessment of project risk?
   A. Transference costs
   B. Risk probability
   C. Value at stake
   D. Risk event

19. You take over a project from a previous project manager. As part of the turnover process they hand you a risk watch list. What should be done with the risks on the watch list?
   A. Add the information to your takeover report.
   B. Add them to the lessons learned for future projects.
   C. Read over the watch list as they are already covered in the properly completed contingency plans.
   D. Read over the watch list then revisit during monitoring and controlling.

20. Which of the following is not always an input to the risk management process?
   A. Work breakdown structure
   B. Lessons learned
   C. Project status reports
   D. Historical information
21. It is very important that the project manager determine risk tolerances in order to help:
   A. The sponsor understand how the resource managers will act.
   B. Schedule the project.
   C. Rank the project risks.
   D. Estimate the project duration.

22. Which of the following is not a common result of risk management?
   A. The communications management plan is changed.
   B. The project charter is changed.
   C. The schedule management plan is changed.
   D. The project management plan is changed.

23. Which of the following risk strategies is represented by insurance?
   A. Avoidance
   B. Acceptance
   C. Transfer
   D. Mitigation

24. It is your first day at a new job and you are asked to evaluate the risks on a large project managed by the PMO. Unfortunately, you cannot evaluate the exact cost impacts of the risks you are analyzing. Based on this situation you should evaluate the risks on a:
   A. Statistical basis
   B. Qualitative basis
   C. Quantitative basis
   D. Mathematical basis

25. In which of the following risk management processes are you most likely to be required to find workarounds?
   A. Monitor risks
   B. Plan risk responses
   C. Identify risks
   D. Quantitative risk analysis
26. You have just determined that you need to transfer a risk. In which of the following risk management processes are you?
   A. Identify risks
   B. Plan risk responses
   C. Monitor and control risks
   D. Perform quantitative risk analysis

27. You are acting as the project manager for a large project $1,500,000 within your organization. You have just finished the risk response plan for your project. Which of the following should you probably do next?
   A. Begin a project risk reassessment.
   B. Begin to analyze the risks that appear in major project documents.
   C. Complete the work breakdown structure.
   D. Determine the overall risk rating for the project.

28. You are in the process of quantifying risks on a project you are leading. Several of your key resources are non-collocated and have needed input. How can this be done?
   A. Make use of the Delphi technique.
   B. Make use of Monte Carlo analysis.
   C. Make use collaboration software.
   D. Apply critical chain modeling.

29. During the plan risk management process the project team you are leading discovers 387 risks and 32 major causes of those risks. The project is part of a major program within the organization and must be completed. Your team is very experienced and has worked together for several years. You have also worked with the sponsor for several years as well, and they are very supportive of your efforts. Significant time has been spent to ensure the project scope and WBS is complete and it has been signed off by all the key stakeholders. Unfortunately, your team has not been able to determine an effective way to mitigate or insure against the one of those major risks. It is something that must be done by the internal team and cannot be outsourced. It also cannot be deleted from the project. What would be the best solution?
   A. Determine a way to transfer the risk
   B. Determine a way to avoid the risk
   C. Continue to investigate ways to mitigate the risk
   D. Accept the risk
30. You are the project manager on a large IT project. You have assembled your team, identified the major risks on the project, determined what would trigger those risks, rated the risks on a rating matrix, tested the major risk assumptions, and assessed the quality of the data used. The team is continuing to move through the risk management process. What have you forgotten to do?
   A. Involve other stakeholders.
   B. Use a Monte Carlo simulation.
   C. Mitigate the risks.
   D. The overall risk ranking for the project.

31. You have worked with different stakeholders to determine the probability and impact of a project’s risks. You have also analyzed the assumptions. Before you move on to the next step in the risk management process, what do you need to do?
   A. Identify and evaluate triggers.
   B. Develop your risk rating matrix.
   C. Evaluate the trends in risk analysis.
   D. Create a contingency plan.

32. You apply for a job with a large consulting company. As part of the interview process you are provided with a sample project charter and asked to provide an analysis of the project risks. Which of the following would best help you complete the exercise?
   A. The PMBOK Guide.
   B. A discussion with several team members within the organization from a similar project that failed in the past.
   C. The scope statement from the project planning process.
   D. The resource plan from the project planning process.

33. You are working as a project manager on a large new product development project. While preparing your risk responses your team identifies additional risks. What should you do?
   A. Get management to allocate another 5% to the project budget to cover the risks.
   B. Determine the risk events and the associated cost, then add the cost to the project budget as a reserve.
   C. Document the risks, and calculate the expected monetary value based on the PI score that result from the risk occurrence.
   D. Add reserves to the project to accommodate the new risks and notify management.
34. You are leading a project that has an SPI of 0.69 and a CPI of .71. The project has more than 1,000 work packages, and it is being completed over three years. The team has not worked together before, and the project has not been well supported. Which of the following is the best thing to do?
   A. Update the risk register with any new risks and analysis.
   B. Examine the WBS for unnecessary work packages.
   C. Examine the RAM for necessary changes.
   D. Examine the budget for necessary changes.

35. Your project is very close to completion when an unidentified risk occurs. This risk could affect the project's overall ability to deliver. What should you do first?
   A. Develop a risk response plan.
   B. Develop a workaround.
   C. Alert the project sponsor to the potential impacts to the schedule, costs, and scope of the project.
   D. Qualify the risk.

36. You are the project manager on a multi-year facilities development project. Significant spring rains caused major flooding that caused power outages and the loss of all project records not stored on your laptop. What should have been done to prevent this problem?
   A. Approve a larger contingency reserve.
   B. Plan for a larger management reserve.
   C. Maintain the records outside a flood plain.
   D. Monitor the weather and have a contingency plan.

37. You have been asked to lead a mission-critical project for your organization. The project is very large, will take approximately 3 years, and will be highly visible to the senior leadership of the organization. Unfortunately, your company does not have a very good track record at handling risks and rarely seems to follow its risk management policies and procedures. You have less than a month until your first major milestone. If senior management is expecting to see an analysis of the project's risks and response strategies which of the following groups or individuals is least important?
   A. The sponsor.
   B. The project team members.
   C. The individuals responsible for the risk policies and procedures.
   D. Key stakeholders.
38. You are leading a high technology product development project that was originally scheduled to take 18 months. The project has faced significant problems and has had to use all its reserves. You currently have an SPI of 0.68 and a CPI of 0.73. There are only six deliverables left and three of them are on the critical path. The project sponsor has just told you that you only have four weeks to finish the project or risk losing all funding and support. This is three weeks faster than your current ETC. In response, you send out an RFP to four vendors for some of the work that the internal team was going to perform hoping an external organization could get the work done faster. This can best be described as an effort on the part of the project manager to work with:
   A. Contingencies
   B. Threats
   C. Opportunities
   D. Reserves

39. Which of the following is a primary characteristic of the Delphi Technique?
   A. Expert opinion.
   B. Simulation modeling in a hierarchical process.
   C. Use of heuristic analysis.
   D. Extrapolation from historical documents.

40. You are leading a large IT project that is nearing completion. Your sponsor requests a change to the project that would increase the project risk. What should you do first?
   A. Update the risk register.
   B. Gain an understanding of why the sponsor wants the change.
   C. Analyze the impacts of making the change with the project team.
   D. Calculated the EMV of the risk and create a new cost estimate.

41. You are leading a major construction project. During project execution a major problem occurs that does not appear in the risk register. What should you do first?
   A. Inform the project stakeholders.
   B. Look for secondary risks.
   C. Exam the identify risks process for flaws.
   D. Create a workaround.
42. You are leading a research and development project. You are in the executing process group when one of your senior resources identifies a risk that is not listed in the risk register. What should you do?
   A. Determine how the team member identified the risk.
   B. Analyze the risk.
   C. Inform the sponsor and key stakeholders of the risk.
   D. Place the risk in the risk register.

43. You are taking over a $50,000 IT project for your organization. The project is entering its third phase. Although there appear to be many risks on the project, no one has evaluated them to assess the range of possible impacts. What needs to be done?
   A. Perform qualitative risk analysis
   B. Plan risk management
   C. Plan risk responses
   D. Monitor risks

44. Which of the following best describes a heuristic?
   A. An advanced statistical calculation used to model risks.
   B. A simulation used to model risks.
   C. A rule of thumb.
   D. A calculation used to produce a weighted measure of risk.

45. Monte Carlo analysis is used to:
   A. Get an indication of the risk involved in a project.
   B. Simulate the order in which activities occur.
   C. Estimate an activity's length.
   D. Measure project risk level.

46. You are working with your team to complete the risk response plan. However, every time the team develops a risk response, another risk is identified as being caused by the suggested response. Which of the following is the best thing for the project manager to do?
   A. Return to the identify risks process as something is amiss.
   B. Document the new risks and continue the plan risk responses process.
   C. Return to the define scope process to determine what is missing.
   D. Get more stakeholders involved in the identify risks process as so many were missed.
47. From which of the following processes would you expect to generate a watch list?
   A. Plan risk management
   B. Identify risks
   C. Perform qualitative risk analysis
   D. Plan risk responses

48. Which of the following must be an agenda item at all team meetings?
   A. Review of project issues
   B. Identification of new assignments
   C. Status of all activities
   D. Discussion of project risks

49. Which of the following is not always an input to the risk management process?
   A. Project status reports
   B. Historical information
   C. Lessons learned
   D. The work breakdown structure

50. You are struggling to evaluate the exact cost impact of risks on your project. You would be advised to evaluate on a:
   A. Qualitative basis
   B. Quantitative basis
   C. Numeric basis
   D. Cost basis

51. You have just finished the risk response plan for your US $250,000 information technology project. Which of the following should you probably do next?
   A. Determine the overall risk rating for the project.
   B. Add needed work packages to the work breakdown structure.
   C. Hold a project risk reassessment.
   D. Begin to analyze the risks that appeared in the technical design.
52. You have just completed the determination of probability and impact of your defined project risks. You have also analyzed the assumptions and are ready to move on to the next step of risk management, but based upon the information what have you forgotten to do?
   A. Identify triggers.
   B. Evaluate trends in the risk analysis.
   C. Create a fallback plan.
   D. Provide a standardized risk rating matrix.

53. As the project manager you have assembled your team and identified more than 100 risks on your project. You and the team have rated them on a risk rating matrix, tested their assumptions, and assessed the quality of the data used. The team is continuing to move through the risk management process, but what have you forgotten to do?
   A. Risk mitigation.
   B. Overall risk ranking for the project.
   C. Involve other stakeholders.
   D. Monte Carlo analysis.

54. Your team has come up with 521 risks and 42 major causes of those risks. Your team has worked on several projects together and your project sponsor is both influential and supportive. You and your team have invested significant time to make sure the project work was completed and signed off by all key stakeholders. However, during the planning phase, the team was unable to come up with an effective way to mitigate or ensure against a particular risk. The work cannot be outsourced or deleted from the project. Which of the following represents the best solution?
   A. Accept the risk.
   B. Look for ways to transfer the risk.
   C. Look for ways to avoid the risk.
   D. Continue to look for ways to mitigate the risk.
55. You are leading a large, multi-year engineering project designed to impact multiple locations within your company. A tornado destroys the headquarters location and all the project records including all project reporting and historical information with no way of recovering the information. What should have been done to prevent this problem?
   A. Purchase insurance.
   B. Monitor the weather and have a contingency plan.
   C. Plan a reserve fund.
   D. Schedule the installation outside of tornado season.

56. During the project execution phase of a project you are leading one of your subject matter experts identifies a risk that is not in the risk register. What should you do?
   A. Disregard the risk because it was not identified in risk identification
   B. Inform the sponsor of the risk
   C. Analyze the risk
   D. Discuss with the resource how they identified the risk to ensure others were not missed

57. Which of the following is a chief characteristic of the Delphi Technique?
   A. A bottoms up approach
   B. Analytical heuristic analysis
   C. Expert opinion
   D. Extrapolation from historical records of previous projects

58. You are leading a multi-year project that is almost complete. You have five deliverables left and have used up almost all the reserves. You sponsor informs you that the project must be completed two weeks earlier than previously forecasted. In response you send out an RFP to several potential vendors to outsource three of the remaining deliverables. This is an example of the project manager attempting to work with what?
   A. Reserves
   B. Opportunities
   C. Threats
   D. Strengths
59. During the identify risks process, a project manager made a long list of risks identified by all the stakeholders using various methods. She then made sure all the risks were understood and that triggers had been identified. Later, in the plan risk responses process, she took all the risks that had been identified and determined ways to mitigate them. What has she done wrong?
   A. The project manager should have waited until the perform qualitative risk analysis process to get the stakeholders involved.
   B. The project manager should have created workarounds.
   C. More people should be involved in the plan risk response process.
   D. Triggers are not identified until the identify risks process.

60. Which of the following is the existence of an uncertainty about some key characteristics of a planned event, activity, or decision?
   A. Variability Risk
   B. Ambiguity Risk
   C. Project Resilience
   D. Integrated Risk Management
Answer Key - Part 1:

1. A  
   Answer A. The formula to get the correct answer is: $(10,000 \times 20\%) + (12,000 \times 50\%) + (14,400 \times 30\%) = 12,320$

2. B  
   Answer B. The formula to get the correct answer is: $(25,000 \times 22\%) + (31,250 \times 53\%) + (40,625 \times 25\%) = 19,515$

3. C  
   Answer C. The formula to get the correct answer is: $(15,000 \times 30\%) + (19,500 \times 50\%) + (26,325 \times 20\%) = 32,219$

4. D  
   Answer D. The formula to get the correct answer is: $(50,000 \times 25\%) + (55,000 \times 45\%) + (68,750 \times 30\%) = 57,875$

5. A  
   Answer A. The formula to get the correct answer is: $(75,000 \times 30\%) + (86,250 \times 40\%) + (99,188 \times 30\%) = 86,756$

6. B  
   Answer B. The formula to get the correct answer is: $(30,000 \times 24\%) + (34,500 \times 56\%) + (45,540 \times 20\%) = 35,628$

7. C  
   Answer C. The formula to get the correct answer is: $(35,000 \times 15\%) + (40,250 \times 60\%) + (54,338 \times 25\%) = 42,984$

8. D  
   Answer D. The formula to get the correct answer is: $(20,000 \times 10\%) + (23,200 \times 65\%) + (32,480 \times 25\%) = 25,200$

9. A  
   Answer A. The formula to get the correct answer is: $(5,000 \times 30\%) + (5,900 \times 45\%) + (8,024 \times 25\%) = 6,161$
10.C

Answer C. The formula to get the correct answer is: \((7,500 \times 20\%) + (9,150 \times 55\%) + (11,529 \times 25\%) = 9,415\)
Answer Key - Part 2:

1. A
   Answer A. PMBOK Guide p. 396 - The inputs to the identify risks process includes:
   - Project management plan
   - Project documents
   - Agreements
   - Procurement documentation
   - Enterprise environmental factors
   - Organizational process assets

2. C
   Answer C. PMBOK Guide p. 396 - The tools and techniques of the identify risks process include:
   - Expert judgment
   - Data gathering
   - Data analysis
   - Interpersonal and team skills
   - Prompt lists
   - Meetings

3. D
   Answer D. PMBOK Guide p. 396 - The tools and techniques used in the perform qualitative risk analysis include:
   - Expert judgment
   - Data gathering
   - Data analysis
   - Interpersonal and team skills
   - Risk categorization
   - Data representation
   - Meetings

4. B
   Answer B. PMBOK Guide p. 396 - The inputs to the perform quantitative risk analysis process include:
   - Risk management plan
   - Cost management plan
   - Schedule Management Plan
   - Risk register
- Enterprise environmental factors
- Organizational process assets

5. A
Answer A. PMBOK Guide p. 396 - The tools and techniques used in the perform quantitative risk analysis process include:
- Expert judgment
- Data gathering
- Interpersonal and team skills
- Representations of uncertainty
- Data analysis

6. A
Answer A. PMBOK Guide p. 396 - The tools and techniques used in the perform quantitative risk analysis process include:
- Expert judgment
- Data gathering
- Interpersonal and team skills
- Representations of uncertainty
- Data analysis

7. C
Answer C. PMBOK Guide p. 396 - The tools and techniques used in the plan risk responses process include:
- Expert judgment
- Data gathering
- Interpersonal and team skills
- Strategies for negative risks or threats
- Strategies for positive risks or opportunities
- Contingent response strategies
- Strategies for overall project risks
- Data analysis
- Decision making

8. D
Answer D. PMBOK Guide p. 396 - The tools and techniques used in the plan risk responses process include:
- Expert judgment
- Data gathering
- Interpersonal and team skills
- Strategies for negative risks or threats
- Strategies for positive risks or opportunities
- Contingent response strategies
- Strategies for overall project risks
- Data analysis
- Decision making

9. A
   Answer A. PMBOK Guide p. 396 - The tools and techniques used in the monitor risks process include:
   - Data analysis
   - Audits
   - Meetings

10. A
    Answer A. PMBOK Guide p. 396 - The tools and techniques used in the monitor risks process include:
    - Data analysis
    - Audits
    - Meetings

11. C
    Answer C. PMBOK Guide p. 396 - The tools and techniques used in the implement risk responses process include:
    - Expert judgment
    - Interpersonal and team skills
    - Project management information system

12. B
    Answer B. PMBOK Guide - The tools and techniques used in the implement risk responses process include:
    - Expert judgment
    - Interpersonal and team skills
    - Project management information system

13. C
    Answer C. The expected monetary value is calculated by multiplying the probability times the impact of any event.
14. A
Answer A. Many people miss this question. Remember, each month in the scenario is independent. So if the probability is 18% in one month and the probability is equal, it is 18% in all months.

15. B
Answer B. Only delays in obtaining sponsor approvals are guaranteed to cause delays. The other alternatives might cause a delay (except the post implementation review meeting).

16. D
Answer D. This question is actually much easier than it first appears. Because we are assuming a range of estimates that is +/- 3 sigma, meaning it is a normal distribution, all you have to do is determine which range estimate has the smallest difference or variance. The 3 point estimate has a range of 13, the 33-46 days is a range of 13, and 40 +/- 8 days is 16.

17. B
Answer B. This question is actually much easier than it first appears. Because we are assuming a range of estimates that is +/- 3 sigma, meaning it is a normal distribution, all you have to do is determine which range estimate has the smallest difference or variance. The 3 point estimate has a range of 11 days. The plus or minus 5 days is a range of 10 and 20-33 days is 13.

18. A
Answer A. "Transference costs" is a fancy way of saying insurance premiums. These do not come into play until you are evaluating the risk responses.

19. B
Answer B. A good project manager is constantly monitoring the identified risks on a project. In this question you do not know where the watch list came from.

20. C
Answer C. Although project status reports can be a vital input to the risk management process, they are usually not available during the risk planning process and are therefore not always an input to the risk management process.

21. C
Answer C. Risk tolerances, or how much risk various stakeholders are willing to accept. This is a critical piece of information used to rank the project risks.
22. B
   Answer B. Of the choices the project charter is the least likely to be changed because of the risk management process. Remember, the charter authorizes the project.

23. C
   Answer C. Insurance is the most common type of risk transfer. It is making the risk someone else’s problem.

24. B
   Answer B. The question tells you that you cannot find the exact impacts. This excludes statistical, quantitative and mathematical basis of measure. You are left with qualitative such as high, medium and low.

25. A
   Answer A. Workarounds—by definition—are responses created for risks not included in the risk register.

26. B
   Answer B. Be careful here. The question states you have just determined that you NEED to transfer a risk. This is done in the plan risk response process.

27. C
   Answer C. Finishing the risk response plan is done in the planning process group. The only of the options that is also in the planning process group is the completion of the work breakdown structure.

28. A
   Answer A. The Delphi Technique is specifically designed to survey your experts, aggregate their responses and then feed the aggregated result back to them for confirmation. This is the best option in a situation where the resources are not all together.

29. D
   Answer D. There are two important aspects to this question. Firstly, did you notice that everything but the last four sentences is unnecessary? Secondly, this question really reflects the real world. The question excludes everything but acceptance. Sometimes in the real world all you can do is accept a risk.
30. A
Answer A. There is nothing wrong with this process. It simply needs to be continued. The best answer in this case is to involve other stakeholders.

31. B
Answer B. Before you can move on to the next step in the process you need a definition for how you will be rating the risks.

32. B
Answer B. This question centers on imagining where you are in the project. The question gives you a charter and nothing else. Therefore, you must assume you are in the initiating process. Two of the other choices say they are from the planning process and therefore not available. The PMBOK Guide is a nice framework, but remember PMI suggests the situation is critical.

33. C
Answer C. Before you can determine the appropriate response you have to determine the value or cost of the risk as well as the impacts. Only then can you determine if you or management needs to add reserves or another response is needed.

34. A
Answer A. To answer this question correctly you had to notice the project is already significantly over budget and behind schedule. Changing the WBS, RAM, or budget should only happen in response to risks that occur. So you should start there.

35. D
Answer D. The first thing you always do is analyze the situation and develop alternatives. Only then do you proceed.

36. D
Answer D. With the information provided you do not know what the best solution would have been. The only thing you can say for sure is that you should have had a contingency plan—oh, and watching the weather probably wasn't a bad idea either.
37. A
   Answer A. Although sponsors are often involved in the identification of risks, they are usually not as involved in the development of response plans. All the other answers are key resources in the development of response plans.

38. C
   Answer C. This is a bad situation, but that does not impact the answer. Only the last three sentences matter. You are trying to gain an opportunity to do the project more quickly.

39. A
   Answer A. The Delphi Technique is a process where you survey your subject matter expert, aggregate their responses, and then feed back the aggregation for confirmation.

40. C
   Answer C. According to PMI, the first thing you must do in any situation is understand the impacts. Only then can you devise the correct response.

41. D
   Answer D. This is a risk that has already happened. The first thing you need to do is deal with the problem and then take the workaround to the sponsor and key stakeholders.

42. B
   Answer B. The first thing you always do is analyze the risk. Only then can you determine what should be done next.

43. B
   Answer B. The project has started, and it should complete the risk management process. That process begins by planning risk management. Since that step has not already occurred it needs to be completed first.

44. C
   Answer C. A heuristic is simply a rule of thumb. There is no calculations involved.

45. A
   Answer A. Several of these answers are partially correct. The Monte Carlo Analysis could help you know that an activity needs to change, but not what the estimate should be. The Monte Carlo analysis is a simulation tool, but it typically
is used to simulate time or cost and not ordering of the activities. It can also be used to measure the probabilities of risk or the likelihood of being on the critical path. However, the best answer is getting an overall analysis of the project risk.

46. B
Answer B. Don't get misled by the fact that the process generated so many new risks. The key is that you follow your process. In this case it is working as it should. You should expect the identify risk responses process to generate new risks.

47. C
Answer C. A watch list is made up of low priority risks that, in the perform qualitative risk analysis process, were determined to be too low priority or low impact to move further in the risk process.

48. D
Answer D. According to PMI, risks are a critical area that impacts all other areas of project management. It is so important it should be discussed at every meeting.

49. A
Answer A. Although project status reports can be an important input to the risk management process, when you are first completing the process you likely will not have any status reports yet.

50. A
Answer A. If you cannot determine the exact costs of a risk you should use qualitative estimates such as low, medium and high.

51. B
Answer B. Based upon the description, this situation is in the planning process group. You must complete the planning before moving on. The only process in planning is adding work packages to the WBS.

52. D
Answer D. In this case you are in the Perform Qualitative Risk Analysis process. There are two key activities in this process: assumption testing and probability and impact matrix development. The matrix is missing. All the other options will occur later in risk management.
53. C
Answer C. You might look at this question as a trick of sorts. The process described is fine. The only issue is you have not involved other stakeholders to identify more risks.

54. A
Answer A. Most of this question is useless. You cannot remove the work nor can you insure or outsource it to transfer the risk. The only option left is acceptance.

55. B
Answer B. The risk is the loss of the data due to the weather. Purchasing insurance does nothing to mitigate the problem. Creating a reserve fund is a form of risk acceptance. Avoiding the tornado by scheduling the project when it wasn't tornado season could negatively impact the project. The best choice is to monitor the weather and know when to implement the contingency plan.

56. C
Answer C. This is another example of those "what would you do first?" questions. As always, the right answer is analyze the situation.

57. C
Answer C. The Delphi Technique uses expert judgment to build a consensus opinion. The expert judgment is its key feature.

58. B
Answer B. The ability to potentially outsource some of the deliverables is an example of taking advantage of an opportunity.

59. C
Answer C. The plan risk responses processes should include the involvement of all the risk response owners and possibly other stakeholders.

60. A
Answer A. Variability Risk - Uncertainty exists about some key characteristics of a planned event, activity, or decision. Examples include: productivity being above or below a target, or weather conditions impacting construction.