IDENTIFYING AND MANAGING RISK

Course Material

Project Risk Management aims to identify and prioritize risks in advance of their occurrence, and provide action-oriented information to project managers. This orientation requires consideration of events that may or may not occur and are therefore described in terms of likelihood or probability of occurrence in addition to their impact on objectives. Project Risk Management is essential to successful project management and should be applied to all projects and included in project plans and operational documents.

The course is designed for project managers or business associates who lead project efforts within their organization.

The goal of this course is to learn risk management processes and use techniques to identify and analyze risks, develop response strategies, and control project risks.

Table of Contents

Course Agenda

Day 1		Day2	
8:30 – 9:00	Personal Introductions	8:30 - 10:00	Analyzing Risk
9:00 - 10:00	Introduction to Risk Management	10:00 - 10:15	BREAK
10:00 - 10:15	BREAK	10:15 - 11:00	Analyzing Risk
10:15 - 12:00	Introduction to Risk Management	11:00 - 12:00	Responding to Risk
12:00 - 1:00	LUNCH	12:00 - 1:00	LUNCH
1:00 - 2:00	Identifying Risk	1:00 - 2:00	Responding to Risk
2:00 - 2:15	BREAK	2:00 - 2:15	BREAK
2:15 - 4:00	Identifying Risk	2:15 - 3:30	Control Risk
		3:30 - 4:00	Exam and Evaluation

LESSON 1: INTRODUCTION TO RISK MANAGEMENT

Topic 1: Definition of Uncertainty and Risk

Topic 2: Stakeholder Risk Tolerance

Topic 3: Definition of Probability and Impact

Topic 4: Preparing a Risk Management Plan

Topic 5: A Risk Management Plan Template

Topic 6: Using a Risk Management Plan

Student Learning Objectives

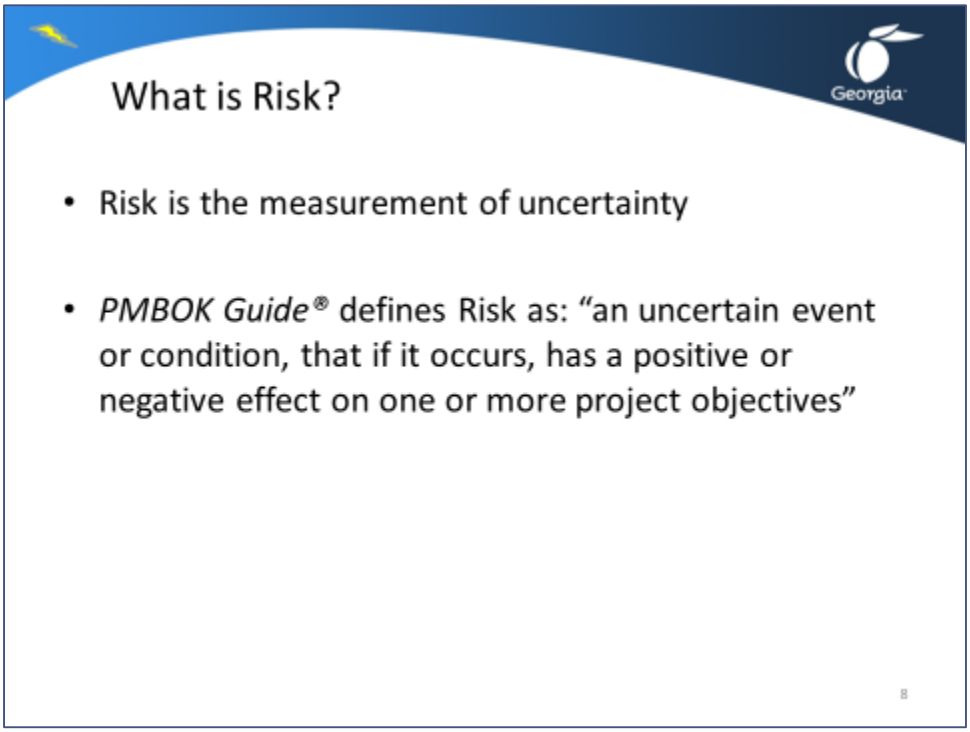
After completing this lesson you should be able to

- Define uncertainty and risk and how they relate to each other
- Describe how project stakeholders' risk tolerance affects project management
- Explain the concepts of probability and impact in risk management
- Identify the elements of a risk management plan
- Prepare and use a risk management plan

Approximate Presentation time: 3.0 hours

Topic 1: Definition of Uncertainty and Risk

Topic 1: Definition of Uncertainty and Risk



Risk
Risk and uncertainty describe the possibility of different potential outcomes. Some projects feature inherent randomness, such as games of chance. In business, the risks and uncertainties reflect unknowns and variability in nature, materials and human systems.

Risk is a means of measuring the quality of the project. It may be that a project is evaluated based on the amount of associated risk. Projects that are high-risk may be avoided. Likewise, low-risk projects may have a lower return than their high-risk counterparts.

Informally, "risk" is used when there is a large, usually *unfavorable,* potential impact. Typically, the contingency event either happens or does not – for example, risk of failure.

Because there is no good antonym in English for a "good risk," many of us allow risk to encompass undesirable or desirable outcomes, or both.

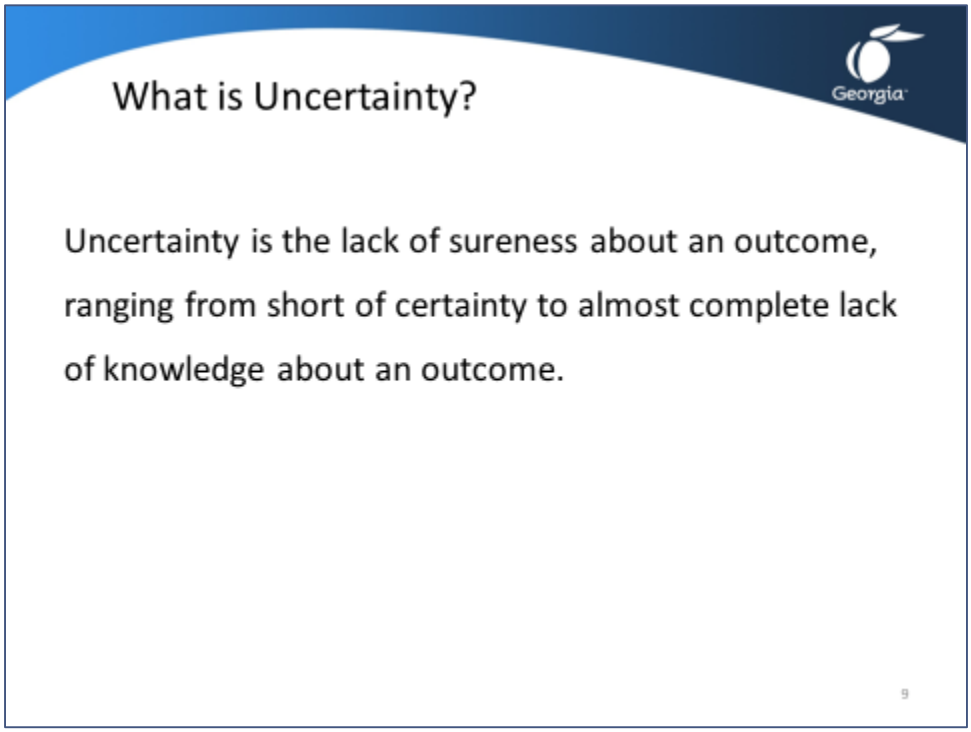
Risk outcomes are measured using

- **probability** of an uncertain event occurring or the likelihood of occurrence
- **impact** that the event will have on the project

Risk and uncertainty can have a positive (opportunity) and a negative (threat) outcome. **Pure risk** is associated with the analysis of events that provide projects with both opportunities and threats.

Risk management is identified as a core function of project management because of the presence of uncertainty and the need to measure it.

Topic 1: Definition of Uncertainty and Risk



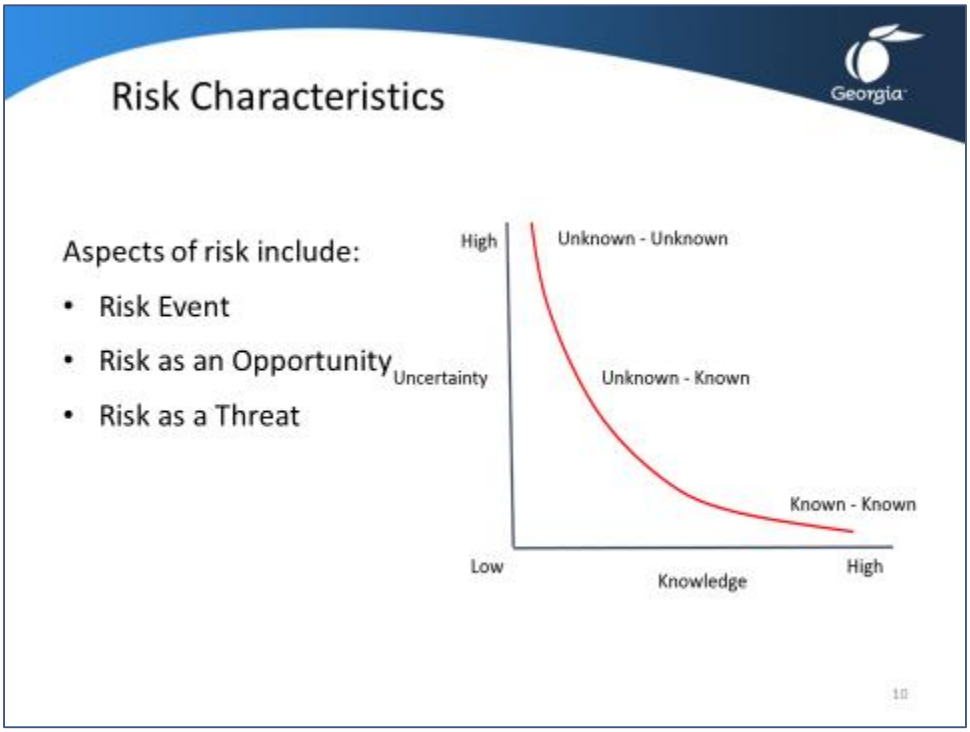
Uncertainty

Uncertainty is the variability in a value and gives rise to opportunity and risk. For example, when dealing with foreign currency exchange rates, we know there is going to be a rate against the dollar. The uncertainty is what the rate will be at future points in time.

Project uncertainty is the likelihood of an event occurring when project uncertainty is prevalent throughout the lifecycle. This **uncertainty can be both positive** (events that will advance the project and enhance the product) and **negative** (events that will detract from the objective of the project).

Uncertainty is present throughout a project. Risk management attempts to measure uncertainty and identify appropriate measures to deal with it.

Topic 1: Definition of Uncertainty and Risk



Organizations consider risk in terms of threats to project success or opportunities to enhance the chance of project success. Risks that threaten the project outcome may be accepted if the risk may also result in a reward. For example, adopting a fast track schedule that may not be met is sometimes a risk worth taking to achieve an earlier completion date.

Risk Event

A **risk event** is a discrete occurrence that may affect the project positively or negatively.

Risk as Opportunity

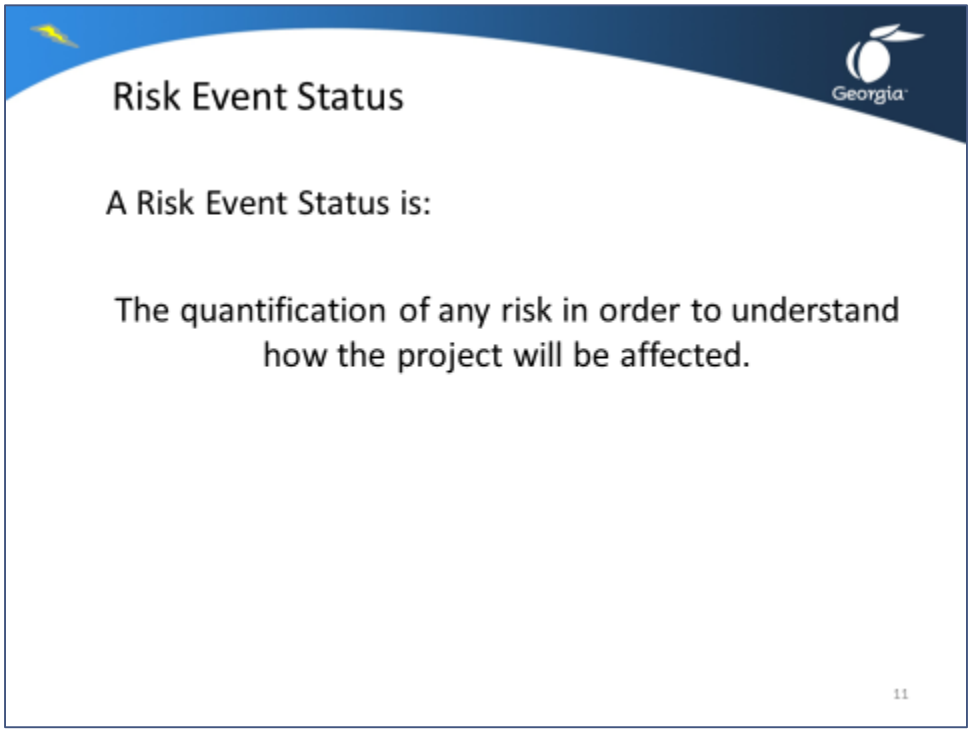
When the possible occurrence of an event has an outcome that is favorable, the **risk is a potential opportunity**.

Risk as Threat

When the possible occurrence of an event has an outcome that is unfavorable, the **risk is a potential threat**. This is measured through likely impact.

Project risks may be known or unknown. Known risks have been identified and analyzed, and it may be possible to plan for them. Unknown risks cannot be managed, although general contingency plans based on previous experience can be helpful.

Topic 1: Definition of Uncertainty and Risk



Project risk is an uncertain event that can have a positive or negative effect on a project objective. Risks have causes and, if they occur, consequences. For example, in a building demolition project, a cause may be requiring a permit or having limited machinery resources assigned to the project.

The risk event is that the permit may take much longer than expected, or that available machinery may not be adequate for the task. If either or both of these uncertain events take place, there will be a consequence on the project cost, schedule, and quality. Risk conditions could include such factors as poor project management practices or dependency on external participants or resources that cannot be controlled.

Remember that project risk also includes opportunities to improve on project objectives. For example, the cost of procuring machinery may prove to be much lower than planned for, which will positively impact the final project cost.

Identifying the **risk event status provides quantification of any risk**, which enables you to understand the level of associated opportunity or threat. The risk event status is the measure of severity that the risk could have on the project.

Topic 1: Definition of Uncertainty and Risk

Topic 1: Definition of Uncertainty and Risk

Recognize the Value of Risk Management - Project Risk Management should be recognized as a valuable discipline that provides a positive potential return on investment for organizational management, project stakeholders (both internal and external), project management, and team members.

Individual Commitment/Responsibility - Project participants and stakeholders should all accept responsibility for undertaking risk-related activities as required. Risk Management is everybody's responsibility.

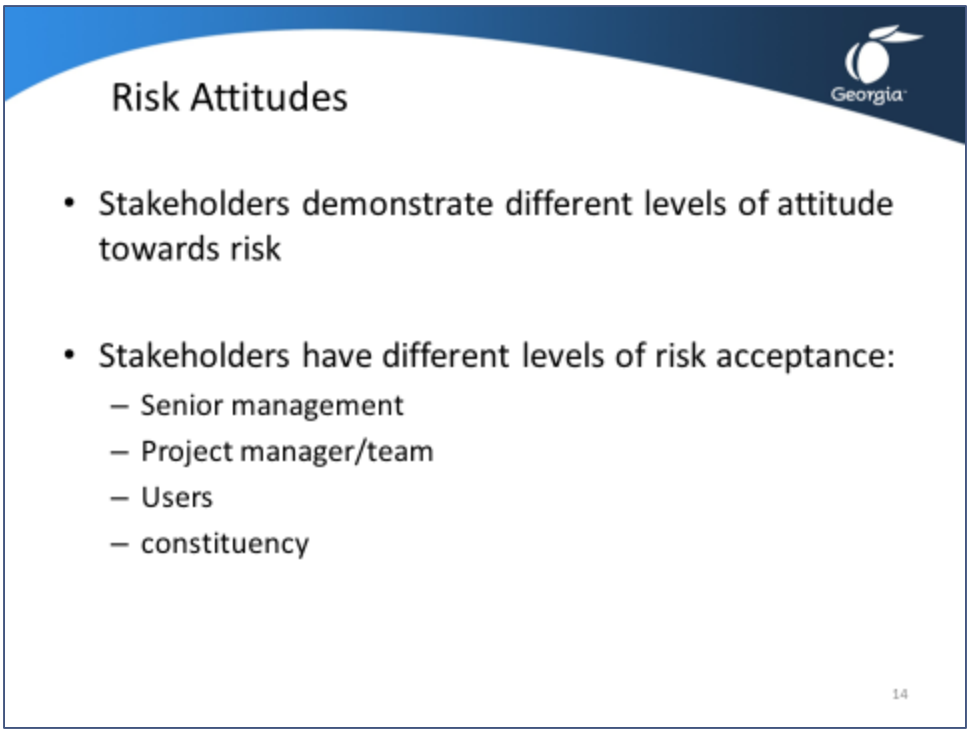
Open and Honest Communication - Everyone should be involved in the Project Risk Management process. Any actions or attitudes that hinder communication about project risk reduce the effectiveness of Project Risk Management in terms of proactive approaches and effective decision-making.

Organizational Commitment - This can only be established if risk management is aligned with the organizational goals and values. Project Risk Management may require a higher level of managerial support than other project management disciplines because handling some of the risks will require approval of or responses from others at levels above the project manager.

Risk Effort Scaled to Project - Project Risk Management activities should be consistent with the value of the project to the organization and with its level of project risk, its scale, and other organizational constraints. In particular, the cost of Project Risk Management should be appropriate to its potential value to the project and the organization.

Integration with Project Management - Project Risk Management does not exist in a vacuum, isolated from other project management processes. Successful Project Risk Management requires the correct execution of the other project management processes.

Topic 2: Stakeholder Risk Tolerance

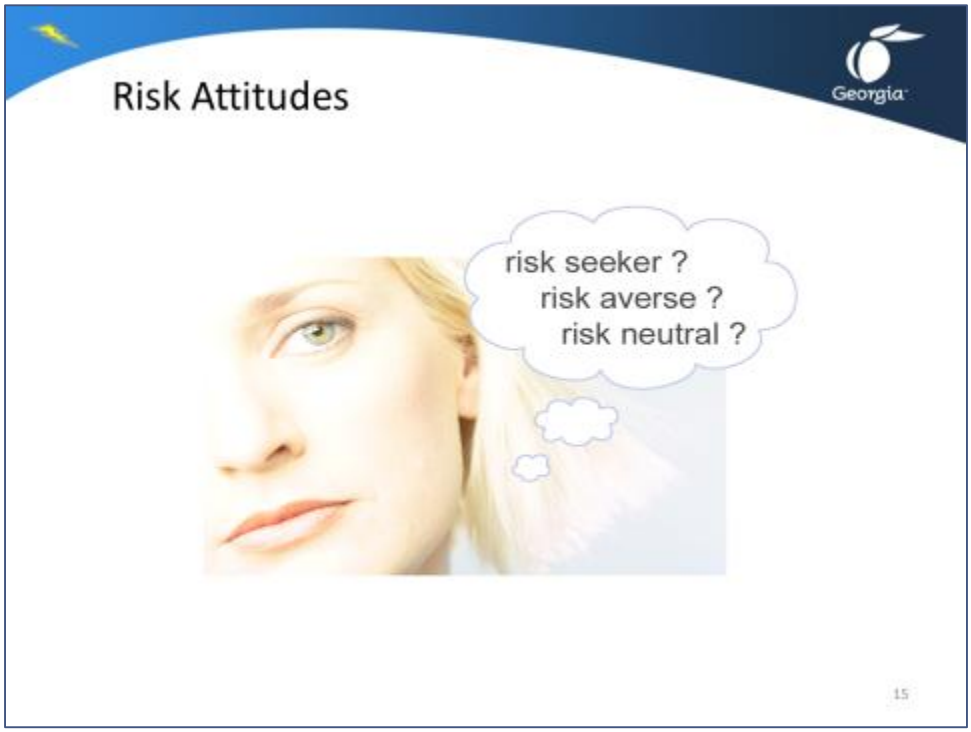


Understanding individuals' and organizations' attitudes to risk is an important part of project management, enabling better project evaluation, decisions, and negotiations.

Project stakeholders that exhibit excessive conservatism with regard to risk may make choices that are inconsistent with their long-term objectives. However, better stakeholder risk management and analysis can enable organizations to better balance risk and objectives.

Organizations need to decide the level of risk that is appropriate on a project-by-project basis. One way of deciding how much risk is appropriate for an organization is to compare the possible project outcomes to the collective net worth of the stockholders. When the project's value is large in comparison to the outcomes of a particular decision, the project manager generally will be better off using a neutral attitude toward risk when evaluating alternatives.

Topic 2: Stakeholder Risk Tolerance



The three types of stakeholder attitudes toward risk are

- **risk seeker –** a willingness to take risks – and accept the outcome – in anticipation of positive outcomes
- **risk averse –** a reluctance to take risks or to expose projects to the possible adverse consequences of unplanned events or conditions
- **risk neutral –** an indifference to risk whereby it does not play a role in decision making

The following example illustrates these different stakeholder attitudes.

A **government project** needs to have an expensive component manufactured by a supplier, and there is a substantial manufacturing contingency that potentially will quadruple the component's manufacturing work and cost.

Assume that there is a cost-plus contract in place so that the government as buyer will bear the cost risk. The risk is a 90% chance of the project costing $1 million and a 10% chance of it costing $4 million. The expected cost is $1.3 million.

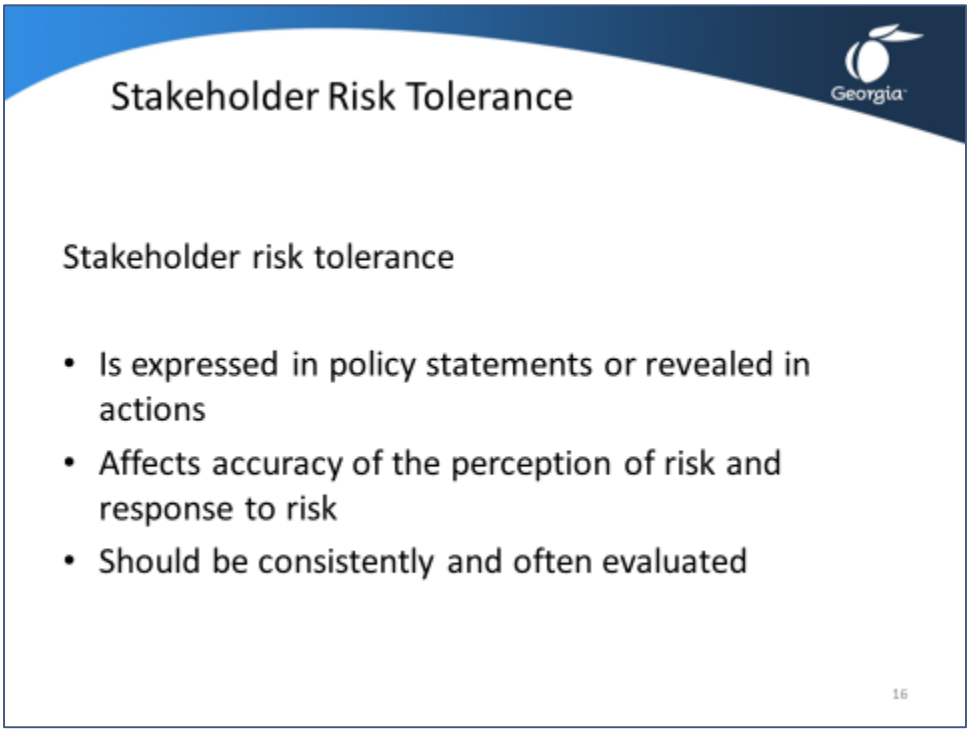
Before the company closes the deal, the supplier offers to change from a cost-plus contract to a fixed-cost contract. What fixed price should the company agree to pay, given its knowledge of the cost risks using a cost-plus contract?

The answer depends on the project's attitude towards risk:

- The **risk-neutral company** would be indifferent to paying a fixed $1.3 million or accepting the cost-plus contract risks.
- The **risk-averse company** would be willing to pay somewhat more than the $1.3 million expected cost.
- The **risk-seeking company** would stick with the cost-plus contract.

For large, public projects, risks are shared by many investors and so risk seeking may be appropriate. However, for individuals and small private projects, a conservative risk attitude is more suitable.

Topic 2: Stakeholder Risk Tolerance



Stakeholder Risk Tolerance

Different individuals and organizations have different tolerances for and **attitudes toward risk** – risk seeking, risk averse, risk neutral – and these may be expressed in policy statements or revealed in actions. These varying tolerances and attitudes affect both the accuracy of the perception of risk and the way organizations respond to risk.

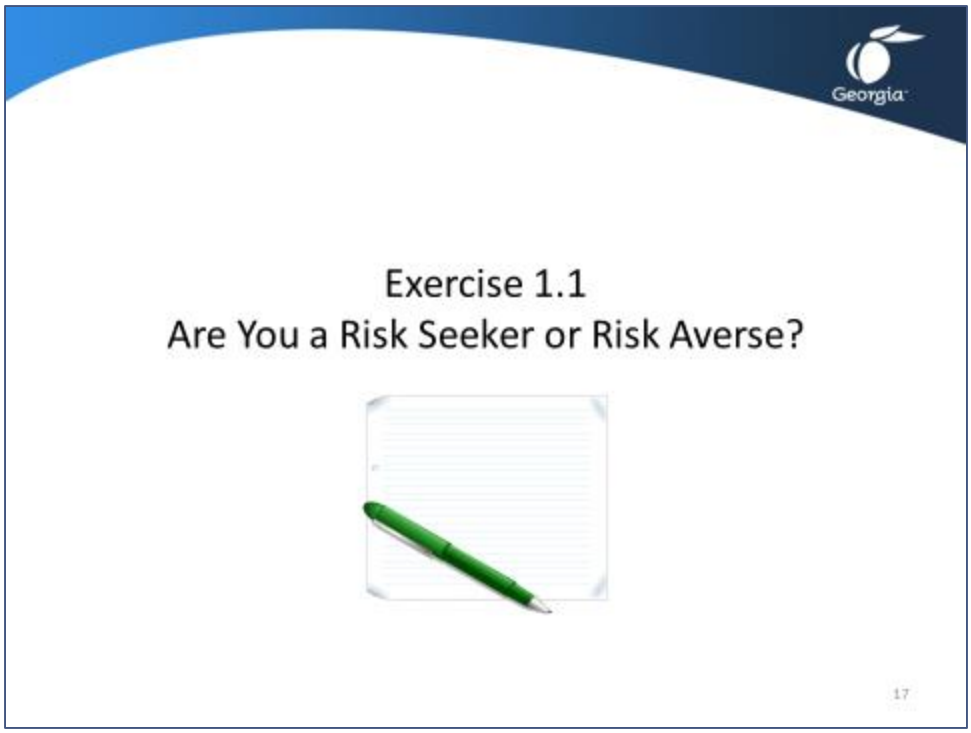
Remember that organizations consider risk in terms of threats to project success or opportunities to enhance chances of project success. Organizations may accept risks that threaten the project outcome if the risk is potentially rewarding.

Where possible, **attitudes about risk should be made explicit**. In addition, a consistent approach to risk that fulfils an organization's requirements should be developed for every project, and communication about risk and its handling should be open and honest.

Laws and regulations also contribute to stakeholders' tolerance for risk. In particular, government projects operate under practices and tolerances established by voters through their elected representatives.

These practices and **tolerances cover such issues as air and water quality, noise prevention, or archeological protection**. These types of issues are often addressed collectively in environmental protection laws – which are effectively risk management laws that inform project managers about the limitations on projects and the risks the voters will not accept.

Exercise 1.1: Are you a risk seeker or risk averse?



Instructions:

Read the excerpts that follow and decide which option you would choose.

A project manager is sourcing equipment for a new IT project. The project has to choose between two vendors, Best Retailer IT and New Retailer IT. To simplify the problem, the project manager decides to estimate the potential profit of these vendors on the basis of product reliability.

- Through research and talking to other project managers, the manager finds that Best Retailer IT has a 60% chance of providing reliable equipment, and its parts cost $300,000 (this includes costs of installations and maintenance).
- There is, however, a 40% chance that the equipment will fail – in which case, costs can increase to $850,000.
- On the other hand, if New Retailer IT is chosen, there is an 80% chance of high reliability at a cost of $750,000 and a 20% chance of failure.
- New Retailer IT provides lifelong guarantees and maintenance services.

Would you choose Best Retailer IT or New Retailer IT?

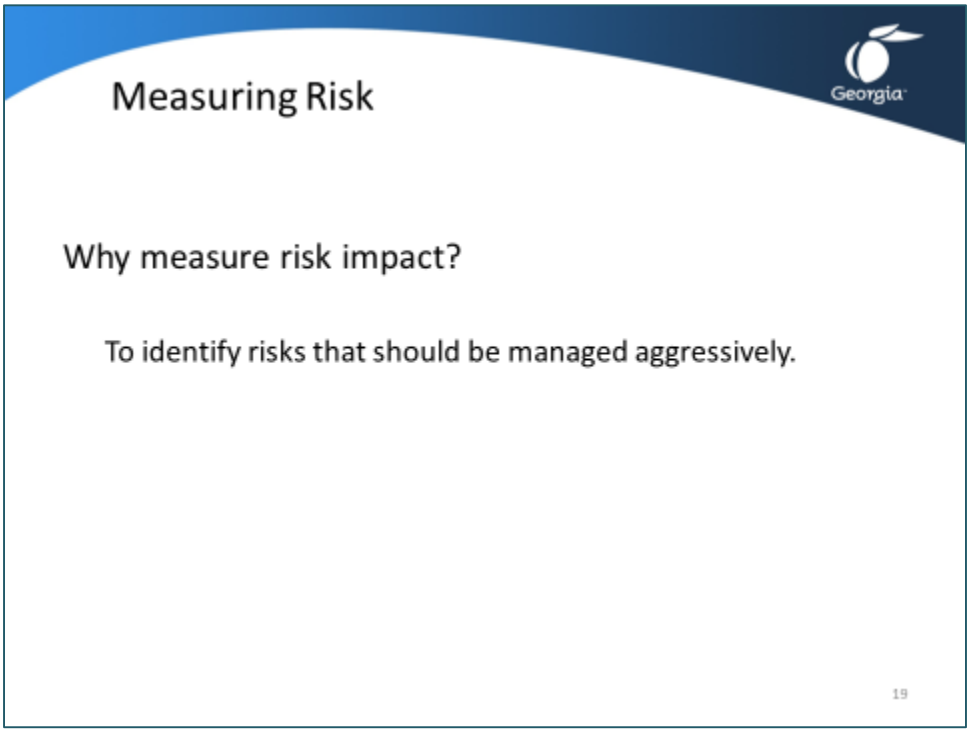
Exercise 1.1: Are you a risk seeker or risk averse? Worksheet

Topic 3: Definition of Probability and Impact

Risk Becomes a Balancing Act

- Contingency is a balance between the amount of money that can or should be spent and the amount of risk that a project is willing to accept.
- Risk measurement is the analysis of the potential consequences that risks may have on the project (i.e. costs).
- In order to measure risk we must consider the event, the probability, and the impact.
- The probability of occurrence and the impact if the event occurs can be expressed:
  a) qualitatively: using adjectives to describe the probability of occurrence and/or impact – high, medium, low
  b) quantitatively: using numerical values to describe the probability of occurrence and/or impact in the even the event were to occur - 80% probability

Topic 3: Definition of Probability and Impact



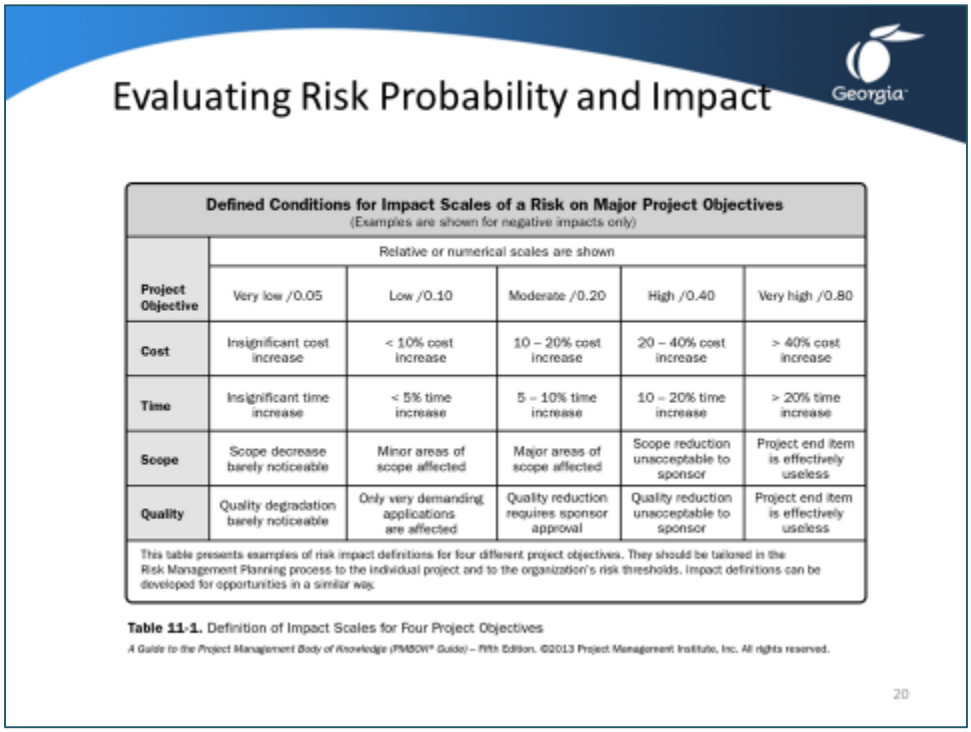
Why Measure Risk?

Risk probability is the likelihood that a risk will occur, whereas risk consequence is the effect on project objectives if the risk event occurs, and risk impact is a measure of the risk.

Risk probability and **risk consequences**, which are applied to specific risk events rather than to the overall project, may be described in qualitative terms, such as very high, high, moderate, low, and very low.

Analyzing risks using these two dimensions helps identify which risks should be managed aggressively.

Topic 3: Definition of Probability and Impact



Evaluating Risk Probability and Risk Impact

To evaluate risk probability and impact, project managers often use a matrix that assigns risk ratings (very low, low, moderate, high, and very high) to risks or conditions based on a combination of probability and impact scales. The risk rating is determined using a matrix and risk scales for each risk.

A risk's probability scale naturally falls between 0.0 (no probability) and 1.0 (certainty), and the risk's impact scale reflects the severity of its effect on the project objective.

Impacts can be ordinal (rank-ordered values, such as low or moderate) or cardinal (numerical values assigned to impacts), depending on the culture of the organization conducting the analysis. Cardinal values are generally linear (for example, 0.1, 0.3, 0.5, 0.7, 0.9), but they can be non-linear (for example, 0.05, 0.1, 0.2, 0.4, 0.8), reflecting the imperative to avoid high-impact risks.

The slide illustrates an example of evaluating risk impacts by project objective, using both the ordinal and cardinal approaches. These scaled descriptors of relative impact should be prepared before the project commences.

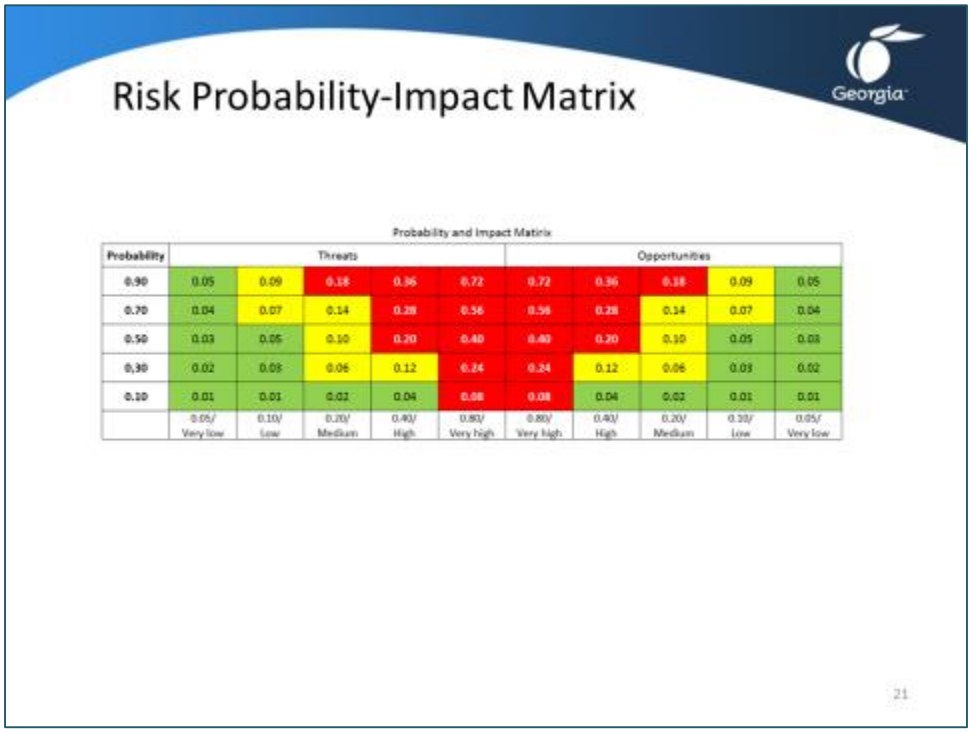
Defined Conditions for Impact Scales of a Risk on Major Project Objectives
(Examples are shown for negative impacts only)

Project Objective	Relative or numerical scales are shown				
	Very low /0.05	Low /0.10	Moderate /0.20	High /0.40	Very high /0.80
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.

Table 11-1. Definition of Impact Scales for Four Project Objectives

Topic 3: Definition of Probability and Impact



This slide presents a **Probability-Impact (P-I) matrix** illustrating the simple multiplication of the scale values that are assigned to estimates of probability and impact. This is a common way to combine these two dimensions in order to determine whether a risk is considered low, moderate, or high.

Each risk is rated on its probability of occurring and the impact if it does occur. The risk thresholds – **low (down diagonal background pattern), moderate (vertical background pattern), or high (up diagonal background pattern)** – determine the risk's scores.

The risk event status is the value derived from a combination of the probability and impact. Using the matrix in the slide, if a risk event has a 0.9 probability of occurrence and a 0.4 impact on the project objective, the risk event status is 0.36. Given that this status is in the high threshold, it can be labeled as a high (red) risk.

Probability and Impact Matirix

Probability	Threats					Opportunities				
0.90	0.05	0.09	0.18	0.36	0.72	0.72	0.36	0.18	0.09	0.05
0.70	0.04	0.07	0.14	0.28	0.56	0.56	0.28	0.14	0.07	0.04
0.50	0.03	0.05	0.10	0.20	0.40	0.40	0.20	0.10	0.05	0.03
0,30	0.02	0.03	0.06	0.12	0.24	0.24	0.12	0.06	0.03	0.02
0.10	0.01	0.01	0.02	0.04	0.08	0.08	0.04	0.02	0.01	0.01
	0.05/ Very low	0.10/ Low	0.20/ Medium	0.40/ High	0.80/ Very high	0.80/ Very high	0.40/ High	0.20/ Medium	0.10/ Low	0.05/ Very low

Topic 4: Preparing a Risk Management Plan

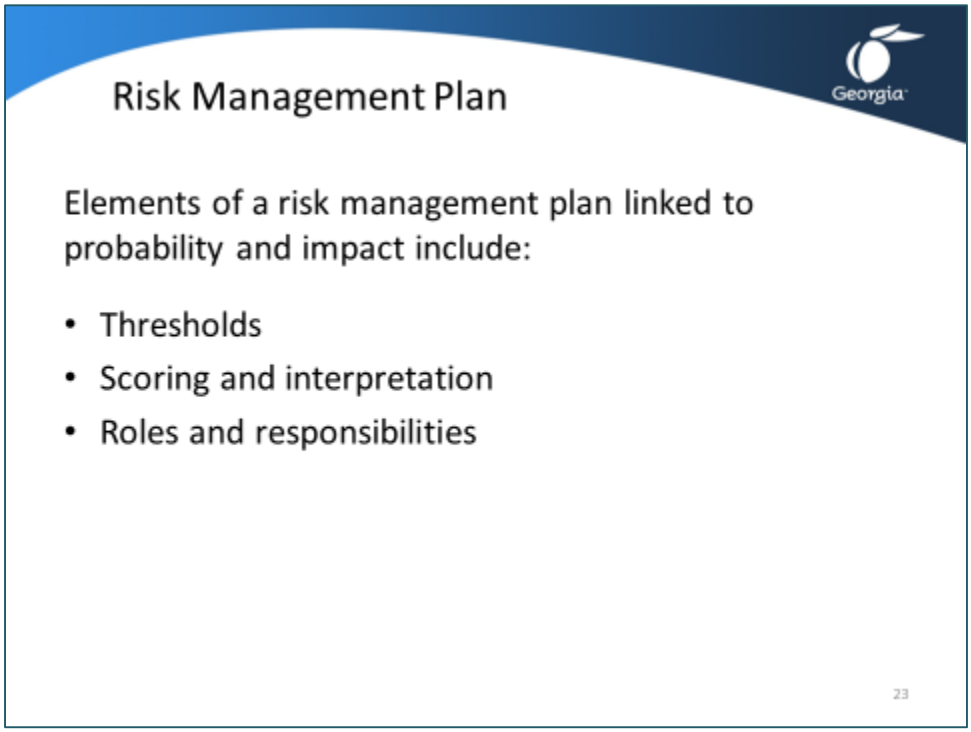
Risk Management Plan

A risk management plan describes how risk management – which entails identification, qualitative and quantitative analysis, response planning, monitoring, and control – is structured and performed on a project.

A risk management plan includes the following elements:

- Methodology defines the approaches, tools, and data sources used to perform risk management. Different types of assessments can be used depending on the project stage, amount of information available, and flexibility remaining in risk management.
- Budgeting determines a risk management budget for the project and assigns resources as required.
- Timing establishes how frequently the risk management process will be performed throughout the project life cycle. Results should be made available early enough to affect decisions, and these decisions should be revisited periodically during project execution.
- Formats describe the content and format of the risk response plan. The reporting formats determine how the results of the risk management processes are documented, analyzed, and communicated to the project team and to internal and external stakeholders.
- Tracking documents is the name given to the process of recording all risk activities, so that information can be used for the benefit of the current project and to inform future needs. Tracking also records if and how risk processes will be audited.
- Risk categories provide a structure for identifying a consistent level of risk detail that contributes to the effectiveness and quality of risk identification. Organizations often use a previously prepared categorization of typical risks. However, these categories may need to be tailored, adjusted, or extended to new situations before they are used on a current project.

Topic 4: Preparing a Risk Management Plan



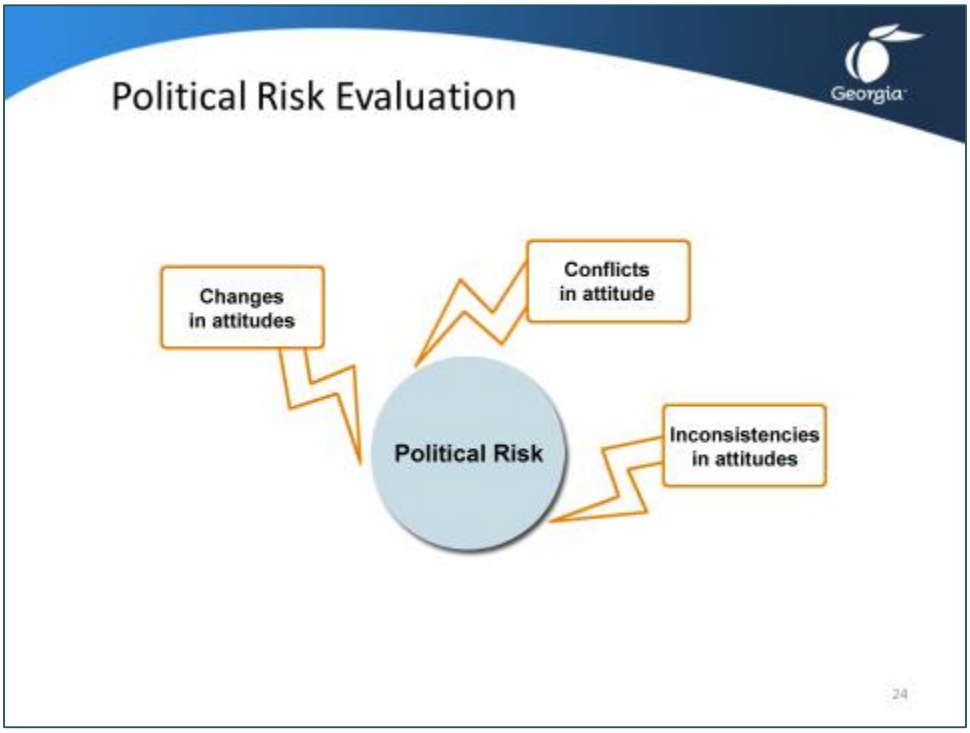
Elements of a risk management plan that are linked to probability and impact can be described as follows:

- **Thresholds** establish risk criteria that will be acted upon, by whom, and in what manner. Stakeholders may have different risk thresholds. The acceptable threshold is the target against which the project team will measure the effectiveness of the risk response plan execution.

- **Scoring and interpretation** determine the most appropriate methods (determined in advance to ensure consistency) for the type and timing of the qualitative and quantitative risk analysis being performed.

- **Roles and responsibilities** define the lead, support, and risk management team membership for each type of action in the risk management plan. Risk management teams organized outside of the project office may be able to perform more independent, unbiased risk analyses of projects than those from the sponsoring project team.

Topic 4: Preparing a Risk Management Plan



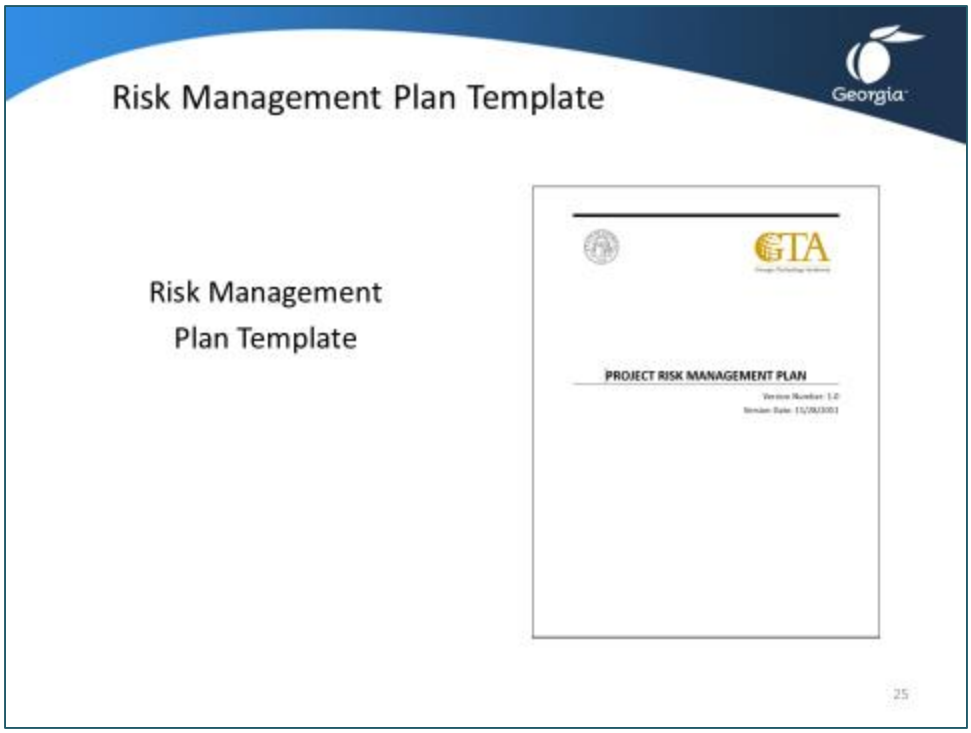
Political risk evaluation is an important element of a government project risk management plan that measures opinions.

In democratic societies, there is a fundamental assumption that decisions are correct. Therefore, a project manager on a government project is ethically bound to carry out the will of the associated project stakeholders – not to ignore or evade it. The will of the project stakeholder is displayed through election results and conveyed to the project manager from elected representatives through the executive.

Issues to consider when evaluating political risk include

- **conflicts between national, regional, and local levels** – for example, national or regional elections may want a facility (for example, a nuclear energy plant) that local voters living beside the proposed facility oppose
- **inconsistencies** – for example, stakeholders may not want to car pool but also not want air pollution
- **changes over time** – for example, stakeholders may support a project in its early stages but oppose it later as the cost of the project increases

Topic 5: A Risk Management Plan Template

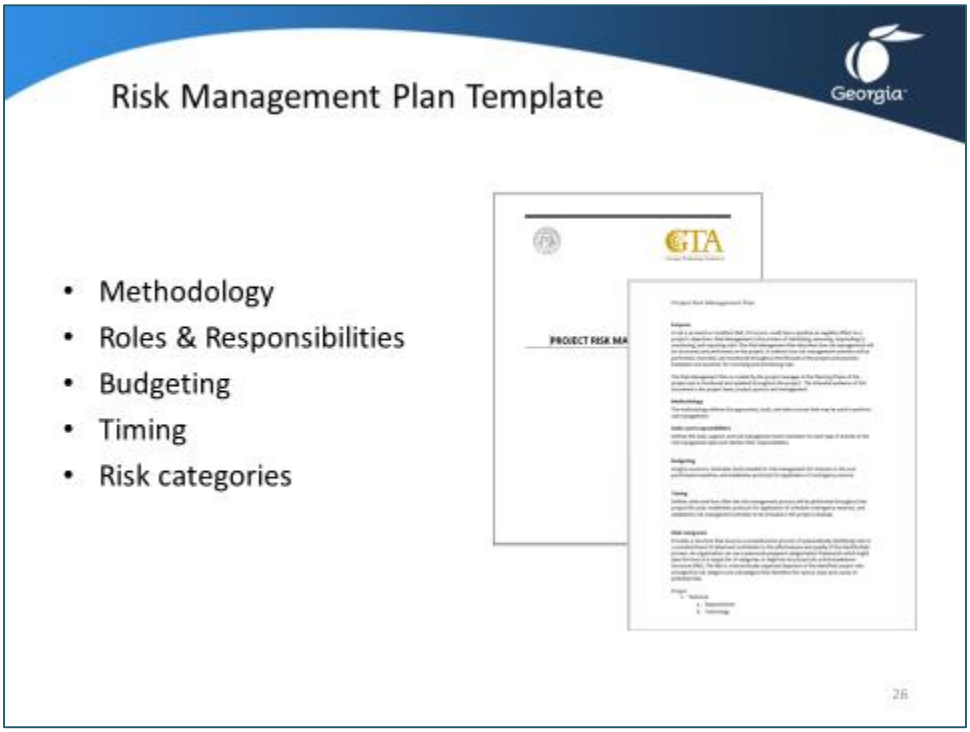


The risk management plan is a component of the project management plan and describes how risk management activities will be structured and performed. According to the *PMBOK® Guide* a risk management plan includes the following components:

- Methodology
- Roles and Responsibilities
- Budgeting
- Timing
- Risk Categories
- Definition of Risk Probability and Impact
- Probability and Impact Matrix
- Revised Stakeholder Tolerances
- Reporting Formats
- Tracking

Each component will be described in this section.

Topic 5: A Risk Management Plan Template



Risk management includes activities concerned with identifying, analyzing, and responding to project risks. It entails maximizing the results of positive events and minimizing the consequences of negative events.

It is an iterative process, initiated at the start of the project and continued throughout the life cycle.

Methodology

This section defines the approaches, tools, and data sources that will be used to perform risk management on the project.

Roles and responsibilities

This section defines the lead, support, and risk management team members for each type of activity in the risk management plan, and clarifies their responsibilities.

Budgeting

This section estimates funds needed, based on assigned resources, for inclusion in the cost baseline and establishes rules for application of contingency and management reserves.

Timing

This section defines when and how often the risk management processes will be performed throughout the project life cycle, establishes procedures for application of schedule contingency reserves, and establishes risk management activities for inclusion in the project schedule.

Risk Categories

This section provides a means for grouping potential causes of risk. Several approaches can be used, for example, a structure based on project objectives by category. A risk breakdown structure (RBS) helps the project team to look at many sources from which project risk may arise in a risk identification exercise. Different RBS structures will be appropriate for different types of projects. An organization can use a previously prepared custom categorization framework, which may take the form of a simple list of categories or may be structured into an RBS. The RBS is a hierarchical representation of risks according to their risk categories. The following figure represents a sample RBS.

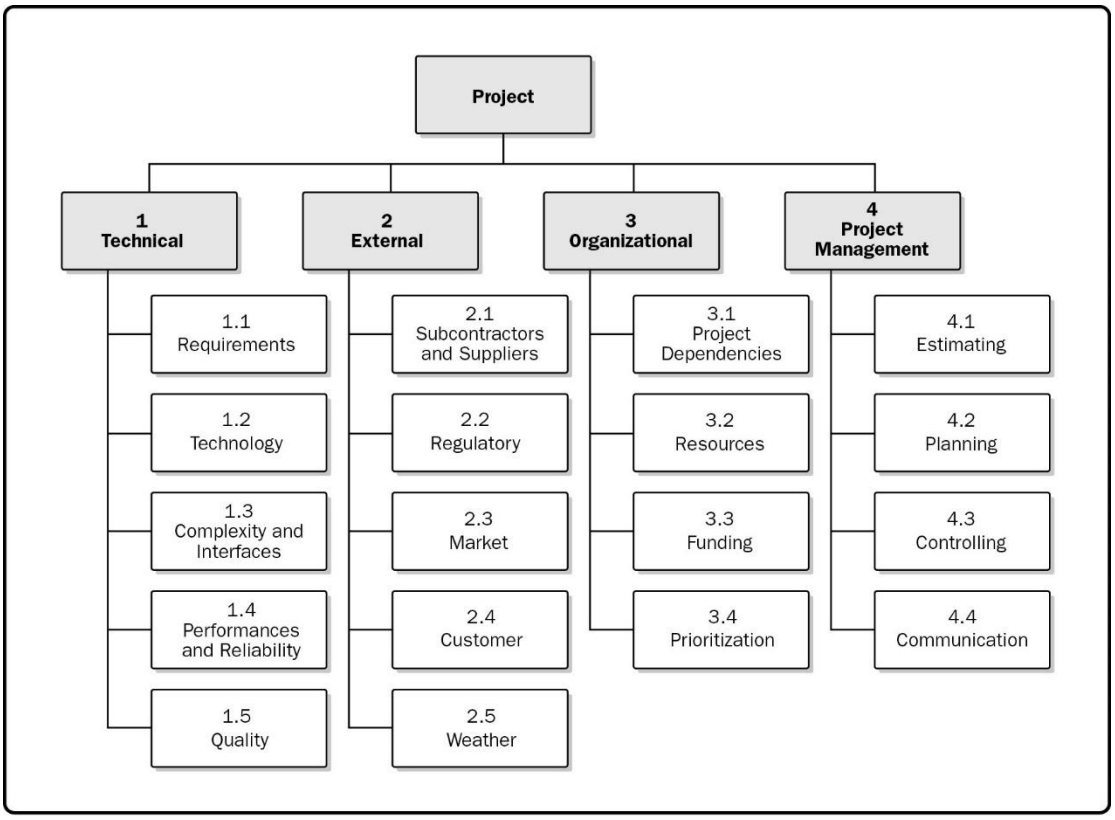
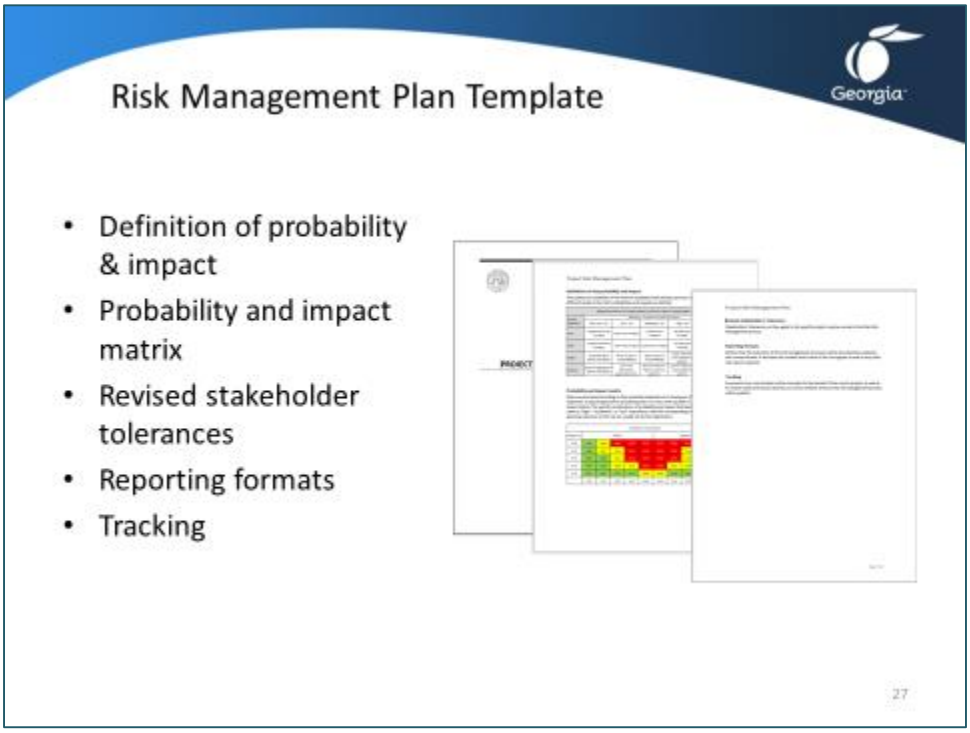


Figure 11-4. Example of a Risk Breakdown Structure (RBS)

Topic 5: A Risk Management Plan Template



Definition of Risk Probability and Impact

This section defines the general definitions of probability levels and impact levels that are tailored to the individual project during the Plan Risk Management process. The table below is an example of definitions of negative impacts that could be used in evaluating risk impacts related to four project objectives. The table illustrates both relative and numerical (nonlinear) approaches.

Defined Conditions for Impact Scales of a Risk on Major Project Objectives
(Examples are shown for negative impacts only)

	Relative or numerical scales are shown				
Project Objective	Very low /0.05	Low /0.10	Moderate /0.20	High /0.40	Very high /0.80
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.

Table 11-1. Definition of Impact Scales for Four Project Objectives

Probability Impact Matrix

This section defines the probability and impact matrix, which is a grid for mapping the probability of each risk occurrence and its impact on project objectives if that risk occurs. The specific combinations of probability and impact that lead to a risk being rated as “high”, “moderate”,, or “low” importance are usually set by the organization. The grid shown below is an example.

Probability and Impact Matirix

Probability	Threats					Opportunities				
0.90	0.05	0.09	0.18	0.36	0.72	0.72	0.36	0.18	0.09	0.05
0.70	0.04	0.07	0.14	0.28	0.56	0.56	0.28	0.14	0.07	0.04
0.50	0.03	0.05	0.10	0.20	0.40	0.40	0.20	0.10	0.05	0.03
0,30	0.02	0.03	0.06	0.12	0.24	0.24	0.12	0.06	0.03	0.02
0.10	0.01	0.01	0.02	0.04	0.08	0.08	0.04	0.02	0.01	0.01
	0.05/ Very low	0.10/ Low	0.20/ Medium	0.40/ High	0.80/ Very high	0.80/ Very high	0.40/ High	0.20/ Medium	0.10/ Low	0.05/ Very low

Revised Stakeholders’ Tolerances

This section describes stakeholders’ tolerances as they apply to the specific project.

Reporting Formats

This section defines how the outcomes of the risk management process will be documented, analyzed, and communicated. It describes the content and format of the risk register as well as any other risk reports required.

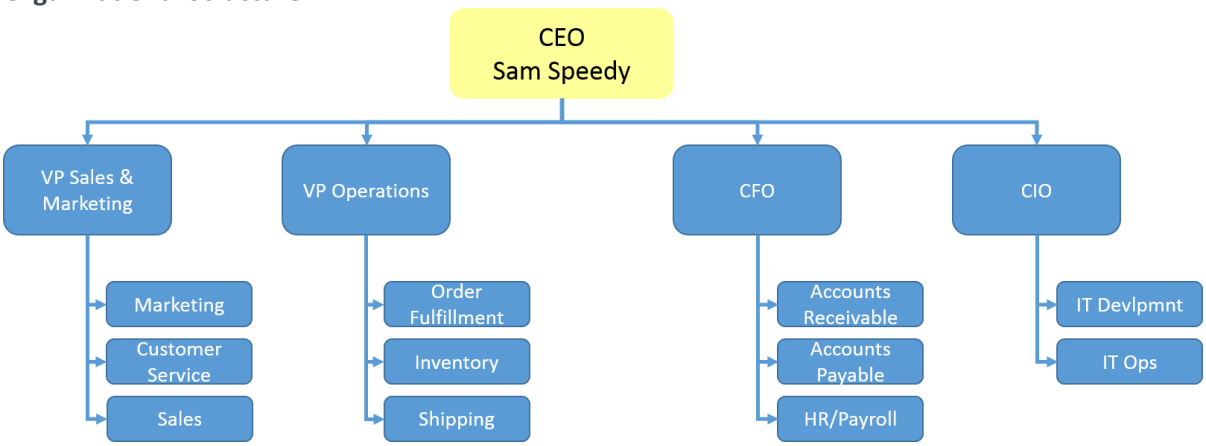
Tracking

This section documents how risk activities will be recorded for the benefit of the current project and how risk management processes will be audited.

Case Study: Speedy Office Supplies

Company Overview
Speedy Office Supplies, led by founder and CEO Sam Speedy, has been in business for 30 years and is recognized as the leader in discount office supplies. We have a reputation of providing high quality products at reasonable prices and offering superior customer service. We are selling to corporate clients, governmental agencies, and individuals nationwide. Our customers are served by over 40,000 employees through direct sales, catalogs, e-commerce and more than 2,000 stores. Eighty percent of our business is currently done in our 2,000 retail stores with total annual sales of 700 million dollars.

Organizational Structure



Business Objectives

Objective Number	Business Objective	Strategic Objective
1	Increase sales by 30% over the next 5 years	Increase sales
2	Reduce overhead costs by 40% over the next 5 years	Reduce cost
3	Expand customer base by 25% over the next 5 years	Increase market share
4	Innovate internal systems and processes within 2 years	Increase effectiveness

Problem Definition
Over the past five years the Retail Store Division has shown a steady decline in sales from 900 million dollars to the current 700 million dollars, a 22% decline; energy costs have increased by 30% for our fleet vehicles and retail stores; employee health care costs have increased by 75% and continue to rise due to federal regulations.

Market trends and customer preferences are indicating that customers desire the ability to order their products on-line at times convenient to them. The SOS management team believes if we phase-out or reduce the number of stores in the Retail Store Division and implement a web-based ordering system and consolidation of our distribution network, we anticipate a savings of nearly 10 million dollars per year. This system would also need to integrate into the existing legacy supply chain systems. Customer satisfaction surveys also indicate a favorable reaction to the concept of web-based sales, which could increase our current sales by at least 30% over the next 5 years, which will put SOS back on track to reach financial goals.

Current State
Currently orders for products are received via in-store requests, phone calls, or catalog mail-in from customers. We access our online system to check inventory, prices, and estimated shipping dates. If the

order total is over $10,000 we turn it over to a supervisor. We then call the Credit Card Authorization Company to check the customer's credit card account. If the credit card charge is authorized we enter the order into the system. The current system is an old mainframe application and is very cumbersome.

There are purchasing agreements, special discounts, and payment terms for our clients purchasing over $50,000 per year. In the past, we have billed these customers on a monthly basis, providing them with a detailed listing by location of their purchases. We want to make it easier for them to pay via credit card each time they place an order to increase our cash flow and lower our Accounts Receivable. If possible, we still want to provide select customers the same reporting on a monthly basis for their purchases by location.

Federal Express and UPS are currently bidding on the exclusive rights for delivery of all customer office supplies. Each company is proposing an online interface to track shipments, including the name of the person who signs for the delivery. The shipment will need to have a label and detailed purchase order slip with the package. The cost of shipping is determined by the size of the package, weight, location, insurance, and timeliness of delivery. The customer will need an accurate shipping cost at the time of purchase.

Project Proposal

Based on this information SOS management is considering a decision to close or reduce the number of the brick and mortar stores within 18 months. We believe this decision will significantly cut costs and that we can be just as successful selling our products on our website.

Our main focus for this project is to create the shopping experience for our retail customer on the website and to place product orders on the Internet. We want to have real time information regarding product description; quantities; pricing; availability; payment processing; shipping method options with associated costs; delivery date; and order tracking. All information currently available at the retail stores and in the catalogs should be available and consistent with the Internet.

It would be nice if there were a place on the Internet for the customer to build a profile and store frequently purchased items in a list to use for future purchases. This would be very beneficial for large organizations that purchase the same products frequently.

We envision using our existing customer number and allowing each customer to create a password to ensure security. Anyone could look at the products online, but only registered customers would be allowed to place orders. The web site should have search ability by several options: product item number (from the catalog), product type, color, and size.

Hopefully when a customer places an order the software would quickly calculate a shipping charge and present the order total to the customer. We would not allow orders totaling more than $1,000 to be placed on the web. The software should also email a confirmation to the customer if requested.

Project Objectives

Project Objective	Project Objective Description	Business Objective
1	Provide a web-based order entry system	1, 2, 3, 4
2	Close or reduce retail stores	2, 4
3	Create distribution centers from some existing stores	2, 4
4	Provide superior shopping experience on web site	3

A feasibility team was formed and evaluated the business and project objectives to establish detailed specifications around the structural aspects of the project. The company also allocated a budget to invest in highly capable individuals who could provide a complete structural solution.

Project Implementation
Specialists recruited by the feasibility team subsequently presented a work breakdown structure (WBS) for the project as seen below, which subdivides the project work into the major elements and then their sub-elements. For example, a major element of work is the web-based order entry system work, which is subdivided into five sections. These sections include customer profile, search and scan products, ordering products, order billing and shipping, and integration to legacy system.

- WBS level 1 – Program/Phase: vision of the end product
- WBS level 2 – Project: the project's major deliverables
- WBS level 3 – Project units: the main work packages associated with each deliverable
- WBS level 4 – Further decomposition of Project units

The specialist team proposed that once the contracts are identified, the project could then be outsourced to different contractors.

Project Management
The feasibility team has proposed that a dedicated project management team be established within Speedy Office Supplies. The team would have total control over budgets and schedules and would report directly to the CEO.

The control, planning, and management of the project present complex logistical issues. The scheme may entail numerous individual contract packages, which will require coordination.
At a very early stage, the feasibility team settled the key project management objectives as

- effective and efficient communication of information
- utilization of thorough project control techniques
- efficient and widely understood procurement and contractor processes

This standardization is necessary to ensure that all contractors are working in unison. To furnish timely and accurate cost reports, the project control team needs a comprehensive system that integrates cost and schedule, provides reporting capabilities consistent with the project requirements, and improves operating efficiency.

The system has to be capable of processing and analyzing a vast amount of incoming monthly cost data quickly and accurately. Also, the team could use integrated systems to perform risk and schedule simulation analysis where the relationship between the schedule and cost is not always clear.
Although technology has simplified data collection and scheduling, the feasibility team has identified that professionals must carefully study and analyze the system output to provide a logical, meaningful explanation of the causes of any cost and schedule variances. In this way, sound project control methodologies reduce cost overruns, control cost growth, help meet project schedule objectives, and ultimately satisfy the client's expectations.

Feasibility Report
The feasibility team completed their study on schedule with an outline of strategy, detailed recommendations, and a list of preferred suppliers.
The main outcomes from the team are the following:

- The web-based order entry system should be piloted in one region. Based on the relative success of the pilot and after a period of "customization", the initiative can be deployed in other areas.
- Contractor participation is a key aspect to the success of the project, and Speedy Office Supplies should establish and work with a set of preferred suppliers.

- Speedy Office Supplies should establish a detailed project management office that has the authority to manage and control the project and report to senior management.

The feasibility team gave the green light for the project, based on these recommendations.

Internal Stakeholders
The **Marketing Department** is responsible for customer reporting and the negotiations for preferred customer status including volume discounts. Our largest customers receive one monthly bill for all their departments' purchases and a report showing the detailed purchases. Additionally, marketing maintains the customer profiles, which are used to process orders, verify billing information, discounts, and reduce redundancy by eliminating the need for the customer to always enter their company information.

The **Customer Service Department** will need access to all information regarding customer orders to assist with the web site usage and handle any possible complaints.

Accounts Receivable is responsible for processing and sending bills to our preferred customers. The web ordering system will need to notify accounts receivable when one of our preferred customers request their order to be direct billed. Some customers have negotiated payment terms and discount rates based on volumes. They work with the Collections Department for any outstanding receivables beyond 90 days. On a monthly basis Accounts Receivable produces an aging report.

Inventory Management is impacted by a reduction in inventory from placed orders and an increase in inventory from cancellations and returns. They are responsible for managing the inventory and placing orders with vendors. Inventory Management is also responsible for handling returns, including items that have to be returned to the suppliers as defective.

Order Fulfillment receives an order notification from the order processing system containing all necessary information required to assemble the order. They are responsible for producing the packaging slips, retrieving the supplies, assembling the order into a bin or crate, and delivering the order to the Shipping Department.

The **Shipping Department** receives the order from fulfillment and prepares the order for shipment. The packing slip contains the shipping method requested by the customer and the estimated shipping timeframe. The Shipping Department is responsible for notifying the shipping company and updating the order status.

The **IT Department** manages and maintains a legacy supply chain system on mainframes at the corporate offices. Each retail store maintains its own sales and inventory on local servers that are integrated to the mainframe via communications lines. Sales and inventory data are downloaded nightly in batches to update corporate databases on the mainframe.

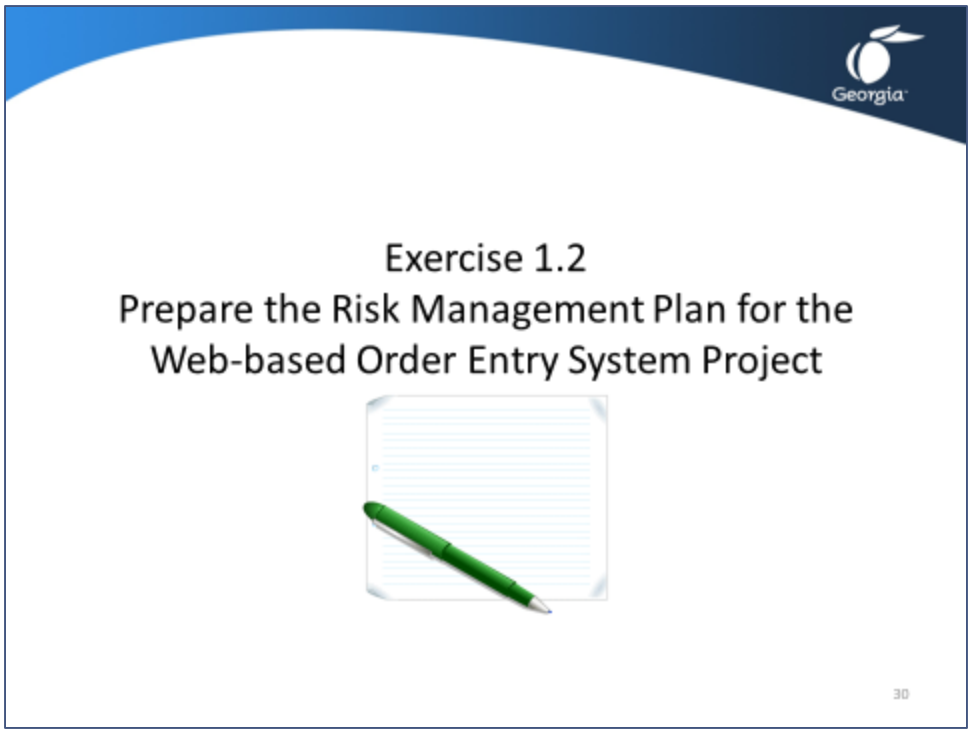
The **Employees** working in the retail stores. These may include stock clerks, cashiers, customer support, back office warehouse, drivers, and store managers. These employees will be directly impacted by a decision to close retail stores or consolidate them into distribution centers.

External Stakeholders
The **Shipping Company** currently has an online tracking system. Our web ordering system will have a direct link to the shipping company's web site for the customer to track packages using the tracking number provided by the Shipping Department to the order status system.

The **Credit Card Processor** currently authorizes customer purchases made in the stores, over the phone, or via fax. An additional interface will need to be established between the web application to receive the customer and order information and to return an authorization code.

The **Customers** ordering from the retail stores and from the web site. These customers will be directly impacted by a decision to close or limit the number of retail stores and purchasing goods via the web site.

Exercise 1.2: Preparing a Risk Management Plan



Instructions:

Assume that the Web-based order entry project has been approved. You are part of the assembled dedicated risk management team. The first set of tasks entails identifying a risk management plan, including key aspects for consideration by the project sponsors.

A risk management plan template is provided for guidance.

Exercise 1.2: Preparing a Risk Management Plan

Risk Management Plan Template:

Methodology
Roles and Responsibilities
Budgeting
Timing
Risk Categories

Definitions of Probability and Impact
Probability and Impact Matrix
Revised Stakeholders' Tolerances
Reporting Formats
Tracking

Lesson 1 Summary: Learning Objectives Recap

- **Define uncertainty and risk and how they relate to each other**
  - Risk is the measurement of uncertainty. It can be both **positive** and **negative.**
  - **Uncertainty** is the lack of sureness about an outcome, ranging from just short of certainty to almost complete lack of knowledge about an outcome.

- **Describe how project stakeholders' risk tolerance affects project management**
  - A project manager must understand organizational and stakeholder attitude towards risk in order to develop an effective risk management plan
  - There are three types of stakeholder attitude toward risk; risk seeker, risk averse, and risk neutral.
  - Understanding individuals' and organizations' attitudes to risk is an important part of project management, enabling better project evaluation, decisions, and negotiations.

- **Explain the concepts of probability and impact in risk management**
  - Probability and impact are the measures of risk in a project;
    - **risk probability** is the likelihood that a risk will occur, whereas risk consequence is the effect on project objectives if the risk event occurs
    - **risk impact** is a measure of the risk
    - To evaluate risk probability and impact, project managers often use a **Probability-Impact (P-I) matrix** that assigns risk ratings (low, moderate, high, etc.) based on a combination of probability and impact scales. The risk rating is determined using a matrix and risk scales for each risk.
    - The probability of occurrence and the impact if the event occurs can be expressed **qualitatively** (using adjectives) or **quantitatively** (using numerical values).

- **Identify the elements of a risk management plan**
  - An ability to identify a sample risk management plan template and explain its sub-sections

- **Prepare and use a risk management plan**
  - An exercise is presented to demonstrate how to prepare and use a risk management plan
  - Using the risk management plan template, the ability to deliver a risk management plan for the Speedy Office Supplies Web Expansion project
  - An understanding of what a risk management plan is and what it is used for

Notes

LESSON 2: IDENTIFYING RISK

Topic 1: Sources of Risk

Topic 2: Risk Gathering Techniques

Topic 3: Preparing the Risk Register

Topic 4: Using Risk Identification Tools and Techniques

Student Learning Objectives

After completing this lesson you should be able to

- Recognize the sources of risk during the Identify Risks process
- Outline the various methods that can be used to identify and gather risk information
- Explain how to structure and populate a risk register
- Prepare a risk register for the course case study

Approximate Presentation time: 3.0 hours

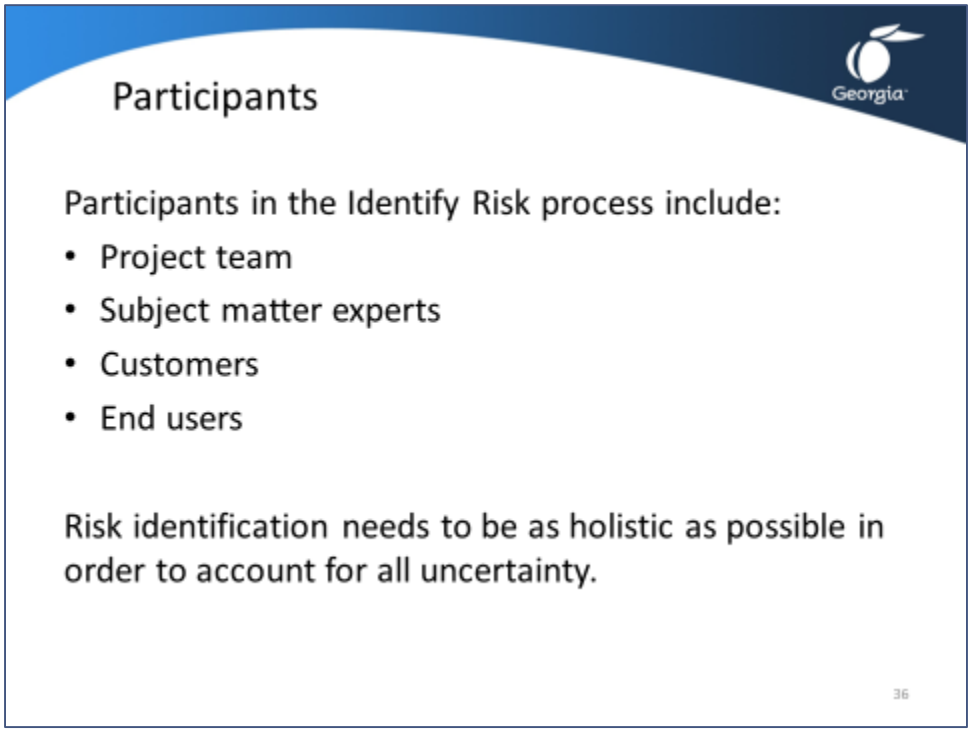
Topic 1: Sources of Risk

Where do Risks Come From?

- Identifying risk is about gathering information.
- If the risk event were to occur particular areas of the project may be affected.
- The process of identifying risks determines the risk events that could affect the project
- Identifying risks helps to gain common understanding within the project team of what the risks are.

'What do you think are the major risk in your project?'

Topic 1: Sources of Risk



Identify Risks is the process of determining which risks may affect the project and documenting their characteristics.

Participants in the Identify Risks process will usually include

- project team
- risk management team
- subject matter experts from other parts of the company
- customers
- end users
- other project managers, stakeholders, and outside experts

The **Identify Risks process is said to be iterative** in that new risks may become known as the project life cycle progresses.

The frequency of iteration and who participates in each cycle will be different with different projects.

The project team needs to be involved in the process so that it can develop and maintain a sense of ownership and responsibility for the risks and associated risk-response actions.

Additional objective information can be provided by persons outside the team.

The Identify Risks process usually leads to the Perform Qualitative Risk Analysis process, or it can lead directly to the Perform Quantitative Risk Analysis process when conducted by an experienced risk manager.

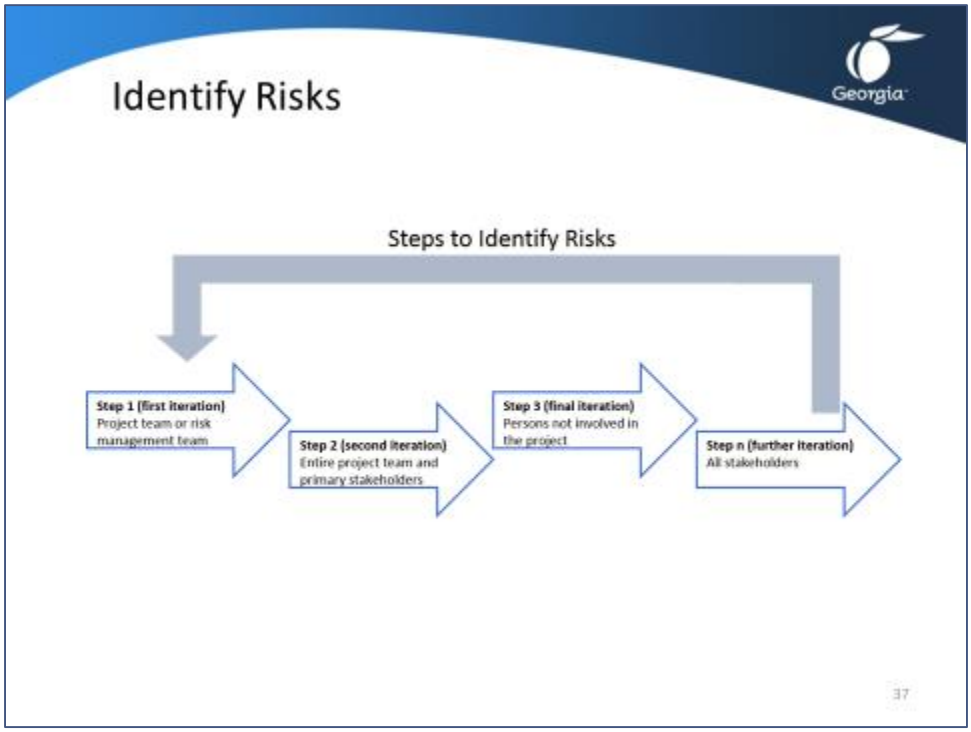
In some cases, an appropriate response is suggested simply by the identification of the risk, and these should be recorded for further analysis and implementation in the Plan Risk Responses process.
Risk identification needs to be as holistic as possible in order to account for all uncertainty. Risk identification is the starting point of any good risk management process – if it is done well, the ensuing analysis and responses will be good.

Risks can be classified based on their level of uncertainty. The Project Management Institute categorizes risks as follows:

- **external – unpredictable**, e.g. government regulations, natural hazards, and acts of God
- **external – predictable**, e.g. cost of money, borrowing rates, raw material availability
- **internal (nontechnical)** , e.g. labor stoppages, cash flow problems, safety issues, health and benefit plans
- **technical**, e.g. changes in technology, changes in state of the art, design issues, operations/maintenance issues
- **legal**, e.g. licenses, patent rights, lawsuits, subcontractor performance, contractual failure

External risks are outside of the project manager's control but may affect the direction of the project. Internal risks may be within control of the project manager and present uncertainty that may affect the project, while technical risks relate to the utilization of technology and the impact it has on the direction of the project. Legal risks relate to any infringements that may occur in contract obligations, licenses etc.

Topic 1: Sources of Risk

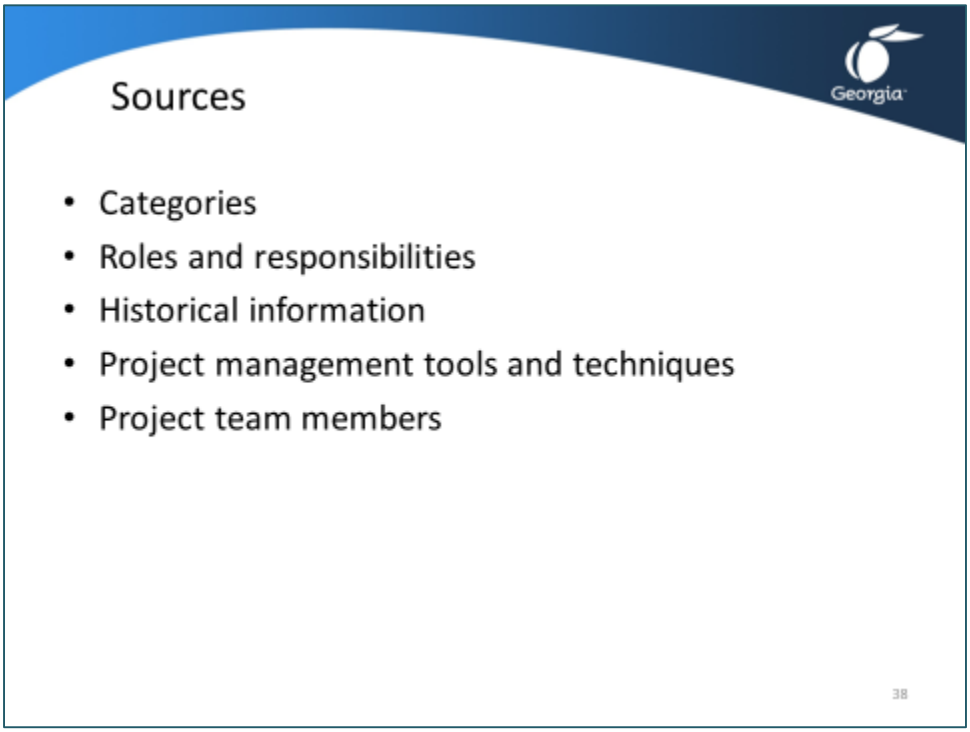


Risk identification is a continual process throughout the life cycle of the project. It proceeds in an iterative fashion using the following steps

- **step 1 (first iteration)** – usually carried out by a part of the project team or by the risk management team
- **step 2 (second iteration)** – usually carried out by a part of the project team or by the risk management team
- **step 3 (final iteration)** – usually carried out by persons who are not involved in the project, in order to achieve an unbiased analysis
- **step n… (final iteration)** – it is not known how many iterations are required and as the process proceeds, all stakeholders are involved

As soon as a risk is identified, simple and effective risk responses can be developed and implemented.

Topic 1: Sources of Risk



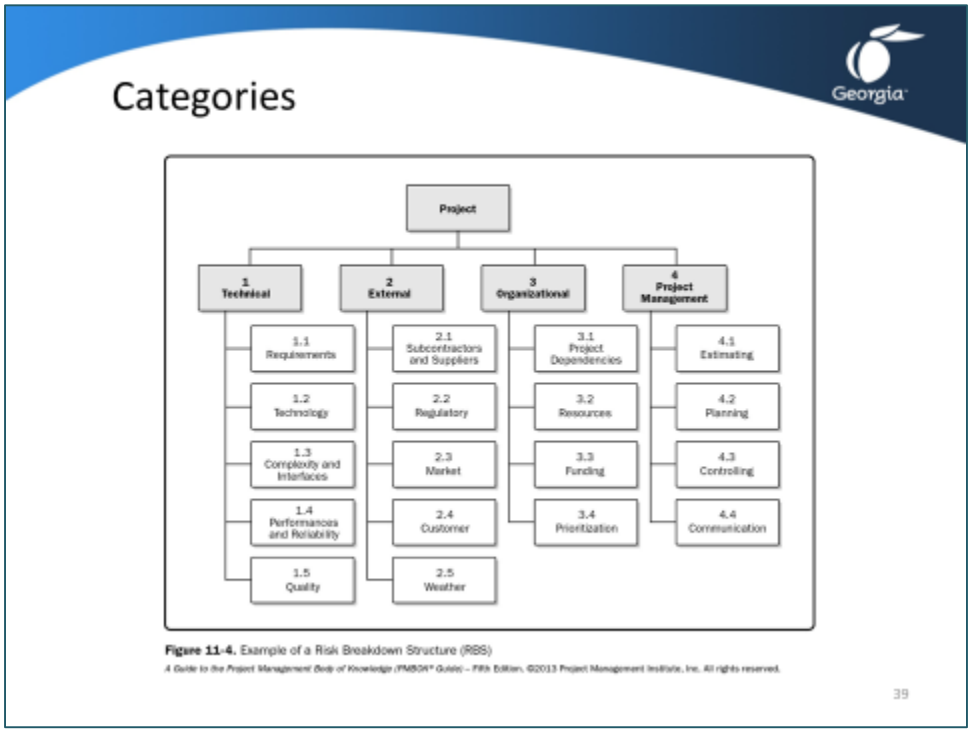
Sources of Risk Identification

The sources of risk for the risk identification process are

- **categories**
- **roles and responsibilities**
- **historical information**
- **project management tools and techniques**
- **project team members**

Risk is sourced from a combination of these elements – for example, historical information is sourced from planning techniques and categories.

Topic 1: Sources of Risk



Categories of Risk

Risks that affect a project can be identified and organized into risk categories. These categories need to be well defined and should reflect common sources of risk for the industry or application area.

Risk categories include:

- technical, quality, or performance risks
  Examples of this risk category include reliance on unproven or complex technology, unrealistic performance goals, and changes to the technology used or to industry standards during the project. Instances where technical categories are relevant include software installations, updates to technology, etc.

- project-management risks
  Examples of this risk category include poor allocation of time and resources, inadequate quality of the project plan, or poor use of project management disciplines.

- organizational risks
  Examples of this risk category include cost, time, and scope objectives that are internally inconsistent; lack of prioritization of projects; inadequacy or interruption of funding; and resource conflicts with other projects in the organization.

- **external risks**
  Examples of this risk category include shifting legal or regulatory requirements, labor issues, changing owner priorities, country risk, and weather. Force majeure risks – such as earthquakes, floods, and civil unrest – usually require disaster recovery actions rather than risk management.

- **political risk**
  This is a measure of the stakeholders' opinion of the project and is the main criterion on government projects.

A basic assumption in societies is that the stakeholders' decisions are correct. A government project manager is ethically bound, therefore, to carry out their will – not to ignore it or evade it. The will of the stakeholders is conveyed to the project manager from the elected representatives through the executive.

There are many variations in opinion. These include

- conflicts between national, regional, and local levels – for example, national or regional elections may want a facility (for example, a nuclear energy plant) that local voters living beside the proposed facility oppose

- inconsistencies – for example, stakeholders may not want to car pool but also not want air pollution

- changes over time – for example, stakeholders may support a project in its early stages but oppose it later as the cost of the project increases

Topic 1: Sources of Risk

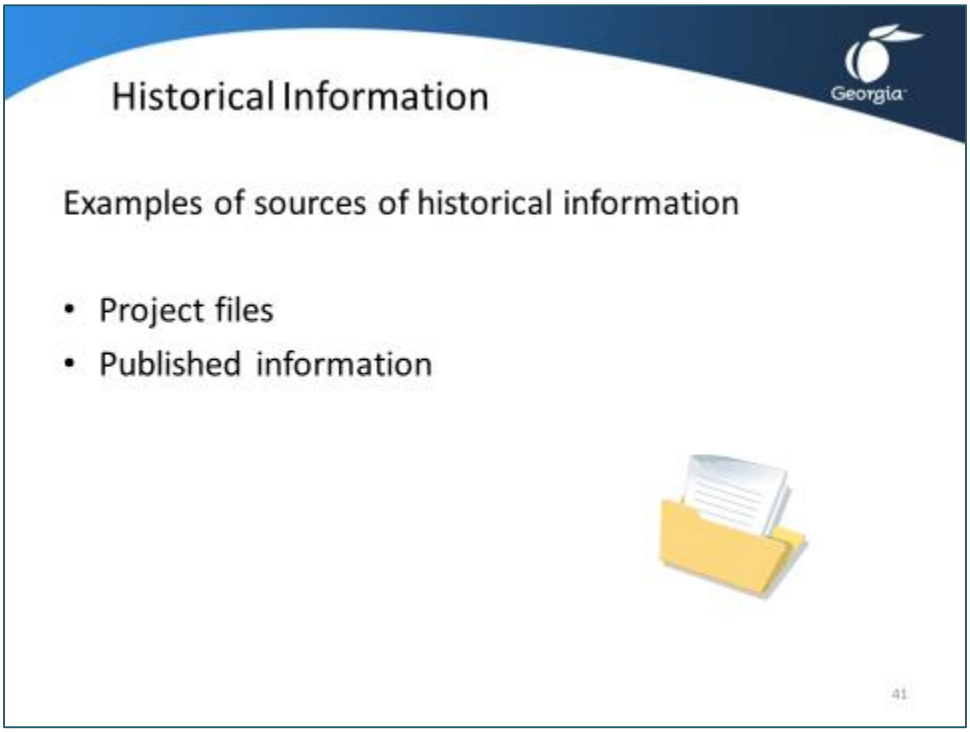
Roles and Responsibilities

As outlined above, participants in the risk identification process usually include

- project team
- risk management team
- subject matter experts from other parts of the company
- customers
- end users
- other project managers, stakeholders, and outside experts

Who participates in each cycle and what their responsibilities are will differ in different projects.

Topic 1: Sources of Risk



Historical Information

Another useful source of input to the risk identification process is historical information gleaned from previous projects.

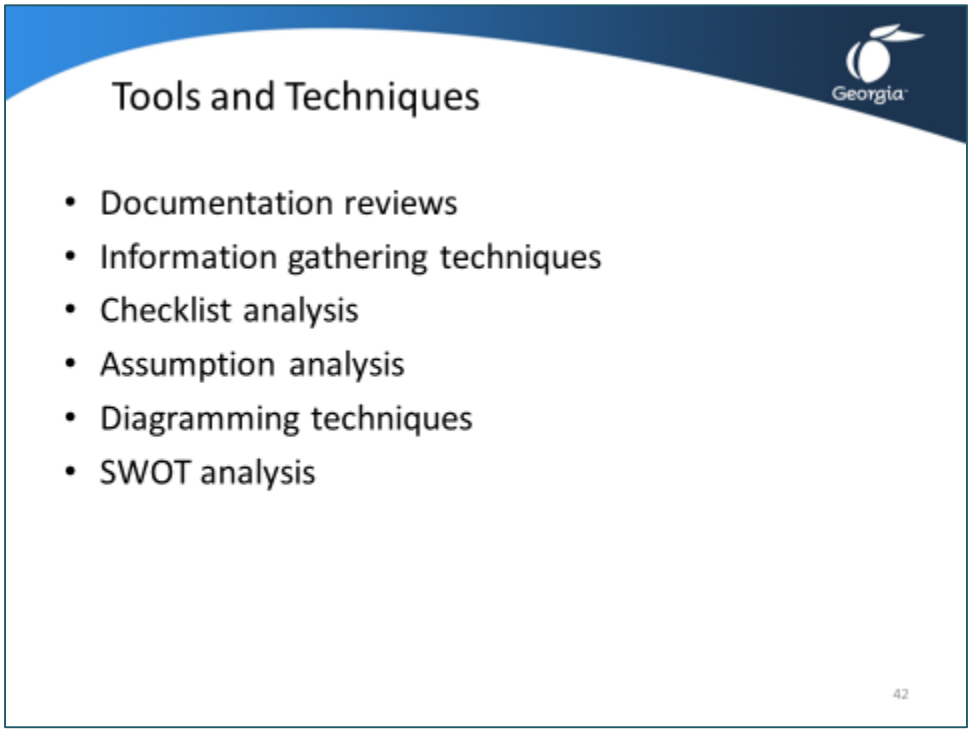
Examples of sources of historical information include

- **project files** – Organizations involved in the project may have records of the results of previous projects. These results, taken from final project reports or risk-response plans, can be used to identify risks.

  Project files may include organized "lessons learned" that describe problems and their resolutions. This information could also be available through the experience of the project stakeholders or others in the organization.

- **published information** – Historical information is also available from commercial databases, academic studies, benchmarking, and other published studies.

Topic 1: Sources of Risk

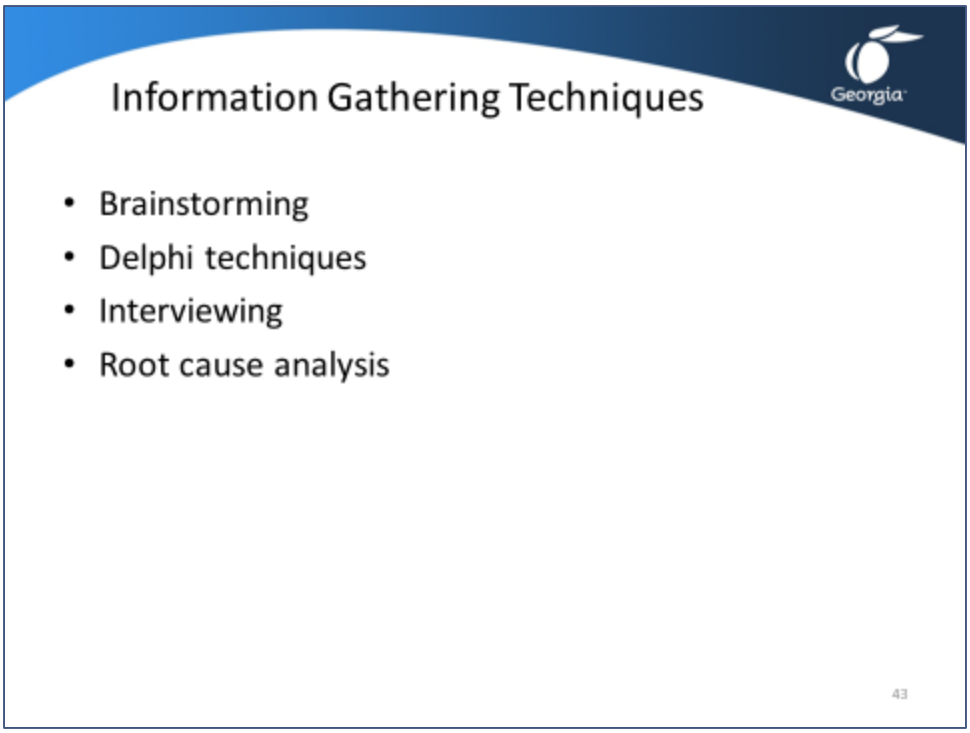


Project Management Tools and Techniques

To complement the other sources of risk, a successful risk identification process will require an understanding of the project's mission and scope, as well as the objectives of the owner, sponsor, or stakeholders.

Outputs of other processes become inputs to the Identify Risks process. These outputs also need to be reviewed.

Topic 2: Risk Gathering Techniques



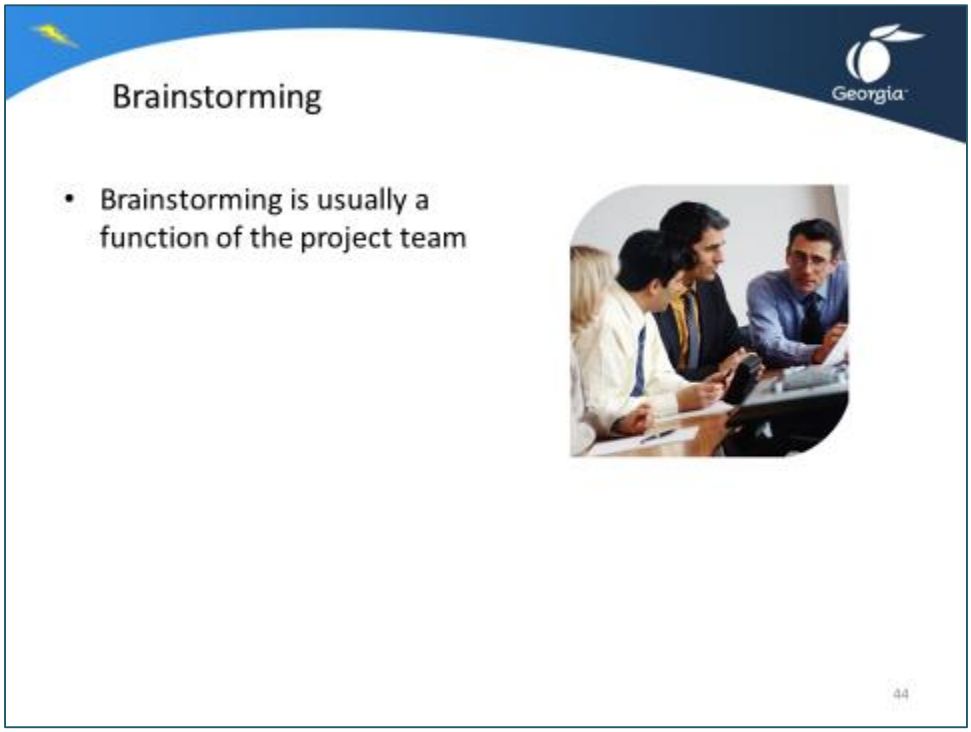
Risk gathering techniques and the tools that project managers and risk managers use to gather information from the various sources include

- **brainstorming**
- **Delphi**
- **checklist**
- **assumption analysis**
- **interviewing**
- **strengths, weaknesses, opportunities, and threats (SWOT) analysis**

Risk gathering is a combination of all of the above techniques, of which brainstorming, assumption analysis, and SWOT analysis are the most commonly used. It aims to determine a comprehensive list of risks and ensure that

- sources of risk are identified
- sources are posted for examination
- risks are categorized by type
- definitions are clearly identified

Topic 2: Risk Gathering Techniques



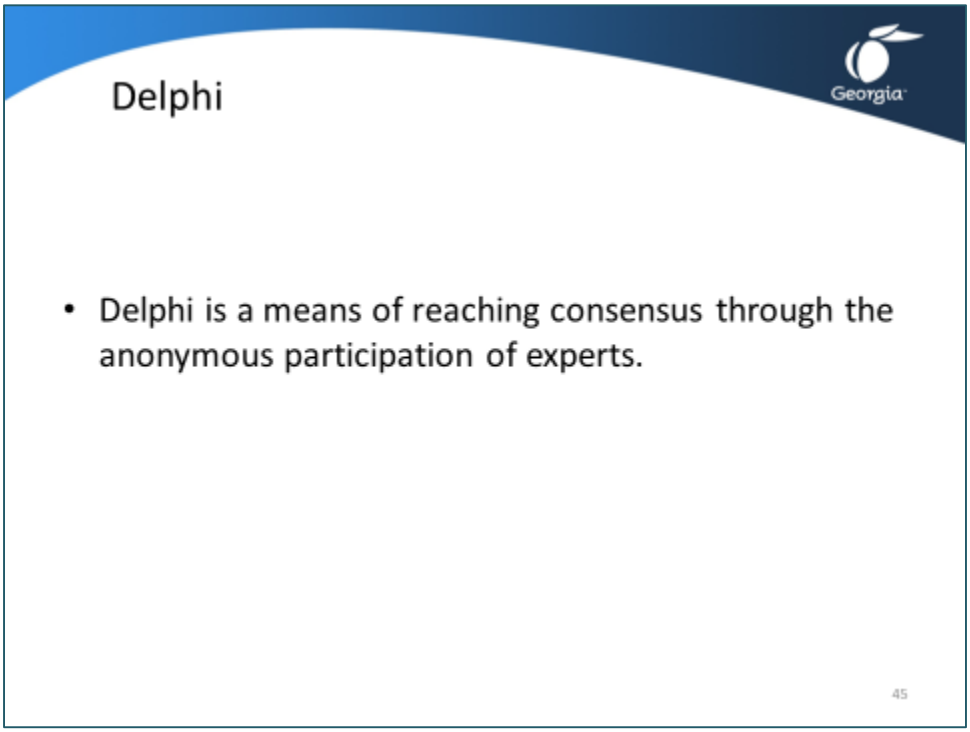
Brainstorming

In terms of techniques for identifying risk, brainstorming is probably the most commonly used.

Brainstorming is usually a **function of the project team**, although a multidisciplinary group of experts can also carry out this task. Under the leadership of a facilitator, these people generate ideas about project risk.

The **goal of brainstorming is to determine a comprehensive list of risks** that can be addressed later in the qualitative and quantitative risk analysis processes. Sources of risk are first identified in a general sense and then posted for all to examine during the meeting. The risks are then categorized by type, and their definitions are clearly identified.

Topic 2: Risk Gathering Techniques

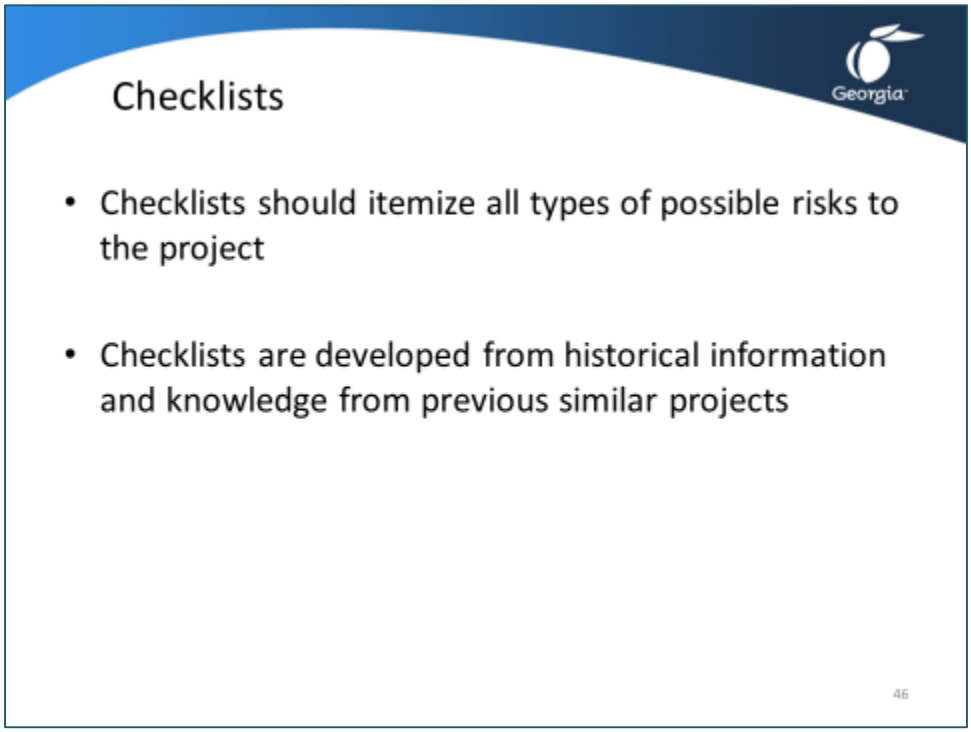


Delphi Technique

The **Delphi technique is a means of reaching consensus on a subject**, such as project risk, through the anonymous participation of experts.

A neutral facilitator solicits ideas about the important project risks using a questionnaire. The submitted responses are circulated to the experts for further comment. In a few rounds of this process, consensus on the main project risks can be reached. The non-interactive nature of the **Delphi technique helps reduce bias** in the data and prevents any one person from having undue influence on the outcome.

Topic 2: Risk Gathering Techniques



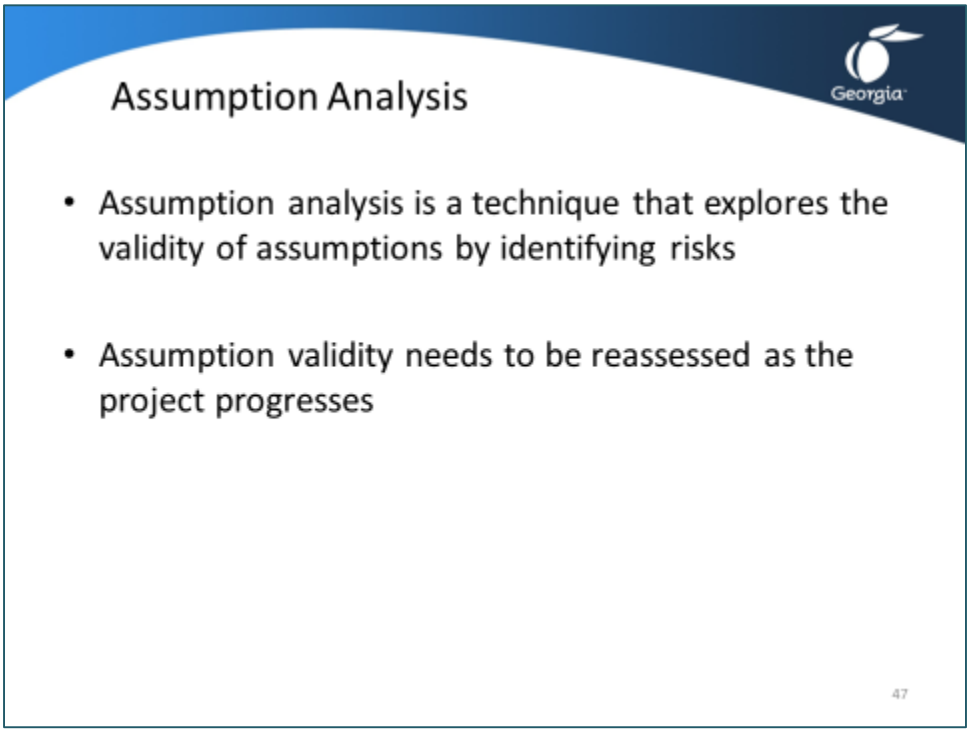
Checklists

Risk identification checklists can be developed from historical information, knowledge that has been accumulated from previous similar projects, and from other sources of information.

There are several good reasons for using checklists - the main benefit being that they are quick and easy to use. A possible disadvantage is that it is impossible to build an exhaustive checklist of risks. As a result, users may effectively limit themselves to the categories in the list. It is important to bear in mind that some items relevant to a specific project will not appear on a standard checklist.

Risk identification checklists should itemize all types of possible risks to the project. It is important to review the checklist as a formal step of every project-closing procedure, in order to improve the list of potential risks and to improve the description of risks.

Topic 2: Risk Gathering Techniques



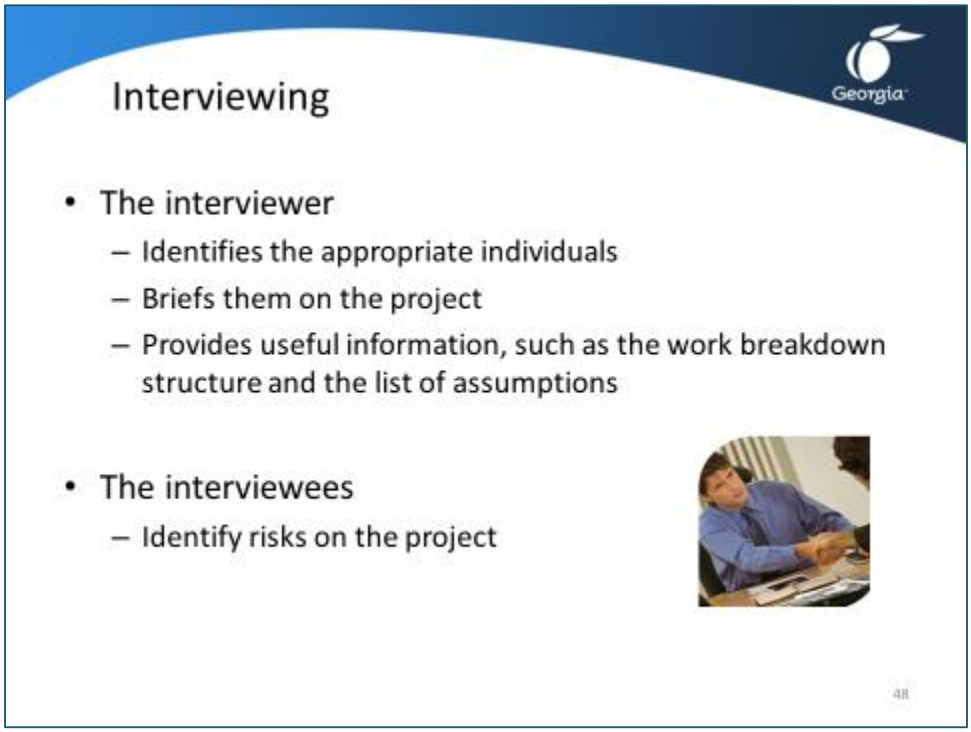
Assumption Analysis

Underpinning every project is the set of hypotheses, scenarios, or assumptions made initially. **Assumptions are any piece of project information that is believed to be true at a point in time but which cannot be validated.** As the project progresses, initial assumptions should be validated and incorporated into the plans.

If an assumption cannot be validated, it may become a risk. As the project progresses, you should reassess the validity of these assumptions.

Assumption analysis is a technique that **explores the validity of assumption by identifying risks to the project from inaccuracy, inconsistency, or incompleteness of assumptions.**

Topic 2: Risk Gathering Techniques



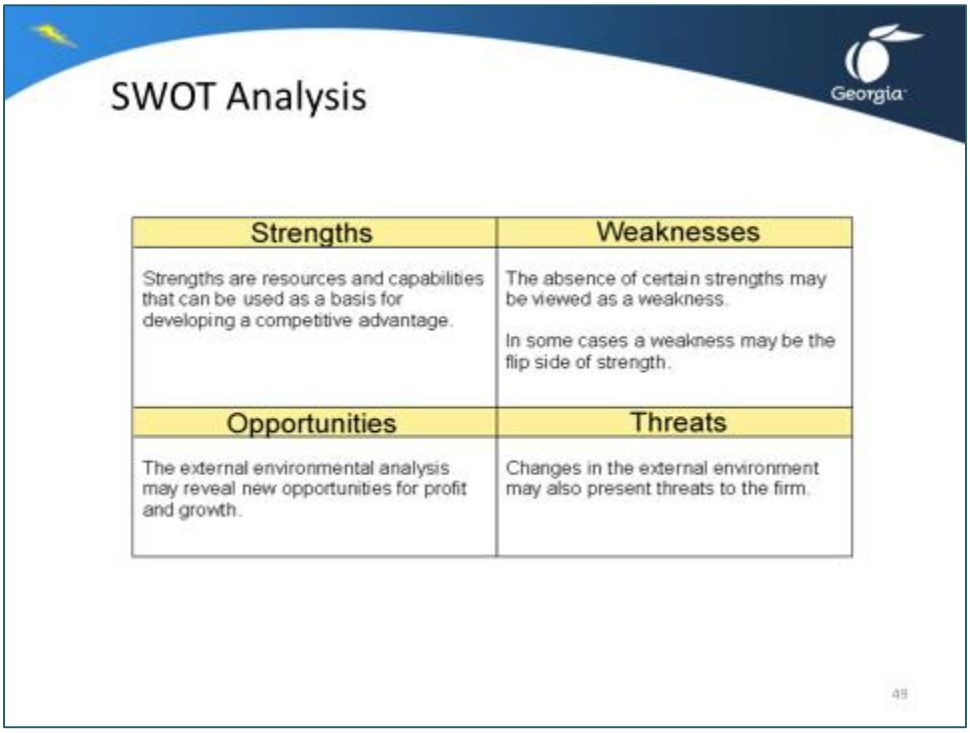
Interviewing

Interviewing experienced project managers or subject matter experts is a good technique for identifying risks.

In this technique, the interviewer identifies the appropriate individuals, briefs them on the project, and provides them with useful information, such as the work breakdown structure and the list of assumptions.

Based on their experience, project information, and other sources that they find useful, the interviewees identify risks on the project.

Topic 2: Risk Gathering Techniques



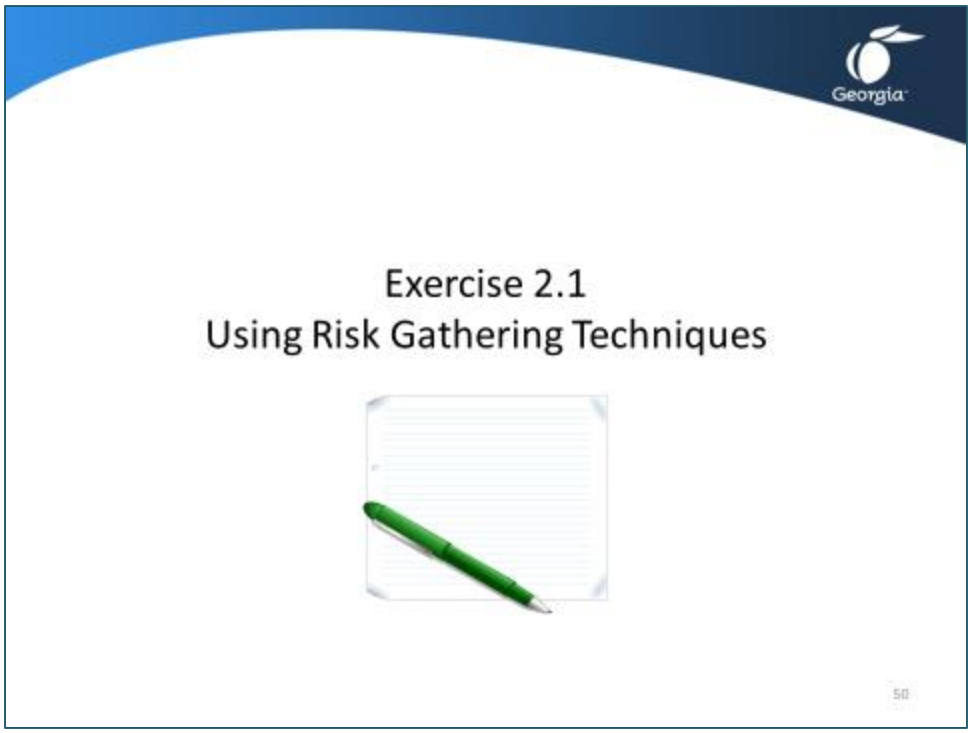
Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis

A SWOT analysis is a classification of situation analysis that focuses on the strengths, weaknesses, opportunities, and threats inherent in a project.

By examining each of the SWOT analysis perspectives in turn, the project team ensures that the breadth of the risks considered is maximized.

SWOT analysis is a useful technique in project management risk, where it is desirable to reduce the probability and impact of a threat and increase the probability and impact of an opportunity.

Exercise 2.1: Using Risk Gathering Techniques



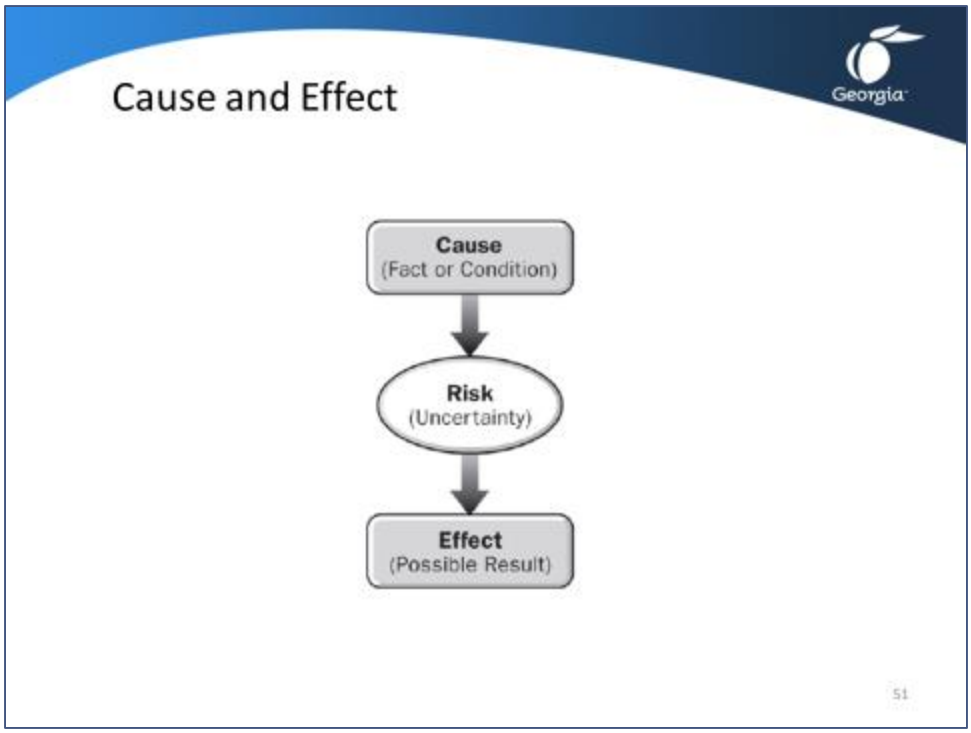
Instructions:

Having read the Speedy Office Supplies case study, the Web-based order entry project has been approved. As a part of the assembled dedicated risk management team you have delivered a risk management plan to the project stakeholders. The stakeholders have requested that a SWOT analysis be performed to highlight project strengths and opportunities.

Exercise 2.1: Using Risk Gathering Techniques Worksheet

Strengths	Weaknesses
Opportunities	**Threats**

Topic 3: Preparing a Risk Register



Cause and Effect Nature of Risk

Root cause identification is the process of inquiring into the essential cause of the risks associated with a project.

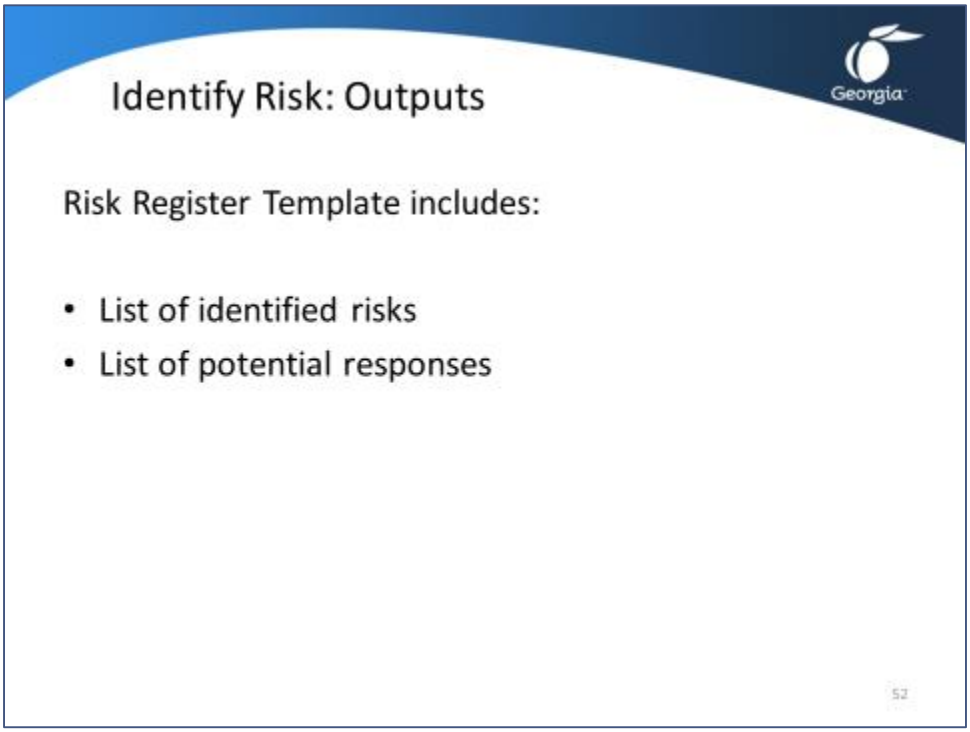
This process results in a sharper definition of the risk and facilitates the grouping of risks according to cause.

Addressing the root causes of the risk means that effective risk responses can be developed.

When identifying risk, it is the cause that needs to be understood.

For example, if poor quality of materials is detected during a structural project, this can be considered a risk event. The cause, however, may be that the materials supplier is unable to meet the project demands. To proceed with the risk analysis, the cause is the information that will be used to determine appropriate response strategies.

Topic 3: Preparing a Risk Register



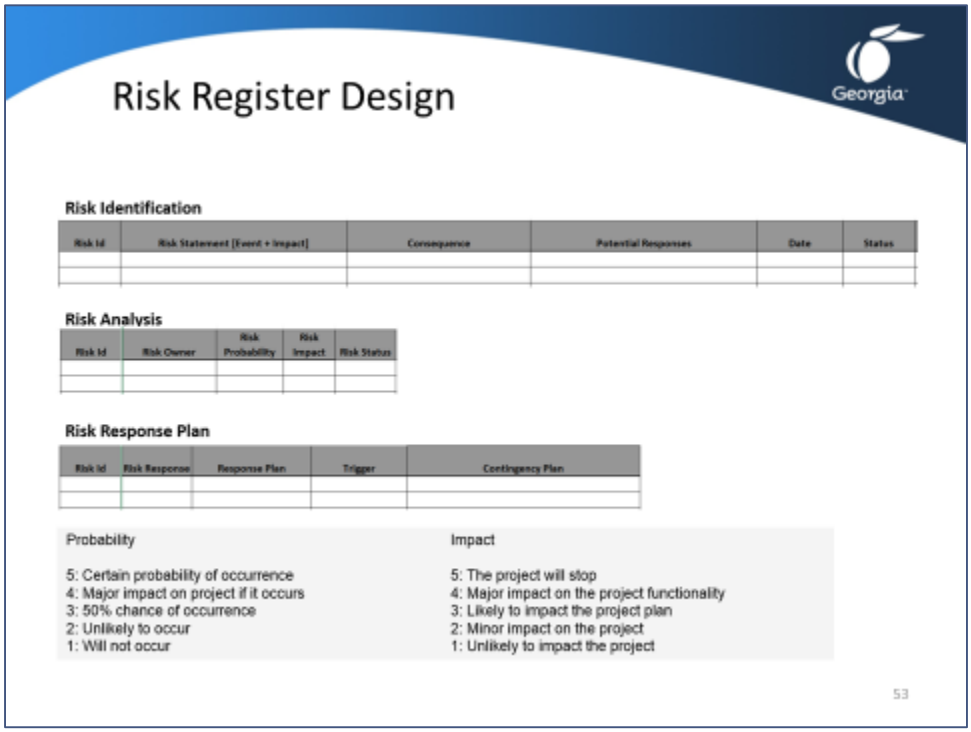
Risk Register

The risk register is a document in which the results of risk analysis and risk response planning are recorded. It contains the outcomes of the other risk management processes as they are conducted resulting in an increase in the level and type of information contained in the risk register over time. The preparation of the risk register begins in the Identify Risks process with a list of identified risks and a list of potential responses.

List of identified risks. The identified risks are described in as much detail as is reasonable. In addition to the list of identified risks, the root causes of those risks may become more evident. These are the fundamental conditions or events that may give rise to one or more identified risks. They should be recorded and used to support future risk identification for this and other projects.

List of potential responses. Potential responses to a risk may sometimes be identified during the Identify Risks process. These responses, if identified in this process, should be used as inputs to the Plan Risk Responses process. Potential responses include the “no go” option – this is variously referred to as “do nothing” and “no build”.

Topic 3: Preparing a Risk Register



Risk Register

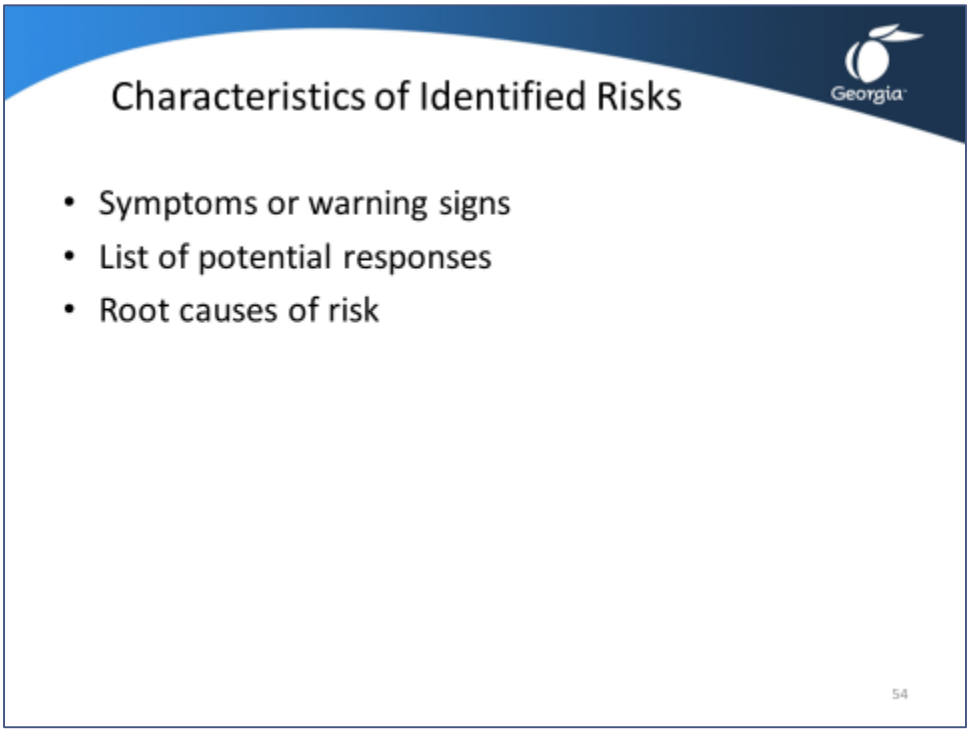
The risk register is a document in which the results of risk analysis and risk response planning are recorded. It contains the outcomes of the other risk management processes as they are conducted resulting in an increase in the level and type of information contained in the risk register over time. The preparation of the risk register begins in the Identify Risks process with a list of identified risks and a list of potential responses.

The risk register template for Identify Risks would look like the diagram below.

Risk Identification

Risk Id	Risk Statement [Event + Impact]	Consequence	Potential Responses	Date	Status

Topic 3: Preparing a Risk Register



Symptoms or Warning Signs

Symptoms or warning signs are indications that a risk requires greater attention, or is about to occur. An event that has already occurred is no longer a risk but may be a problem or an issue.

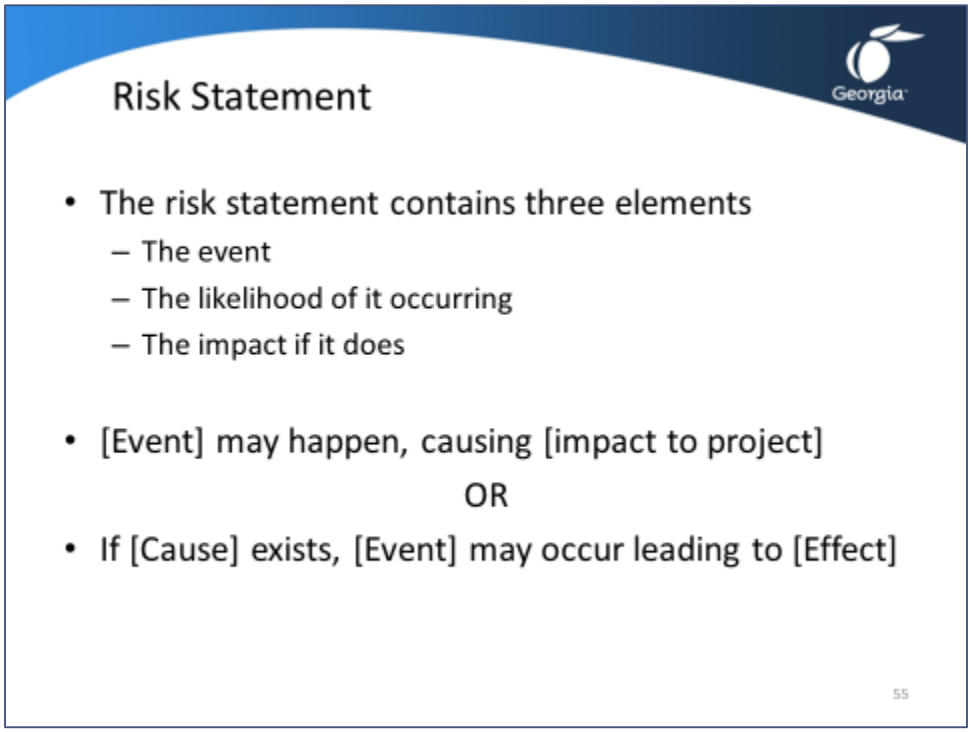
List of Potential Responses

During the risk identification process, potential responses to a risk may be identified. These responses serve as useful inputs to the Planning Risk Responses process.

Root Causes of Risk

The root causes of risk are the fundamental conditions or events that can trigger the identified risk. As root causes can give rise to more than one risk, tackling them can lead to very effective risk responses.

Topic 3: Preparing a Risk Register



Risk Statement

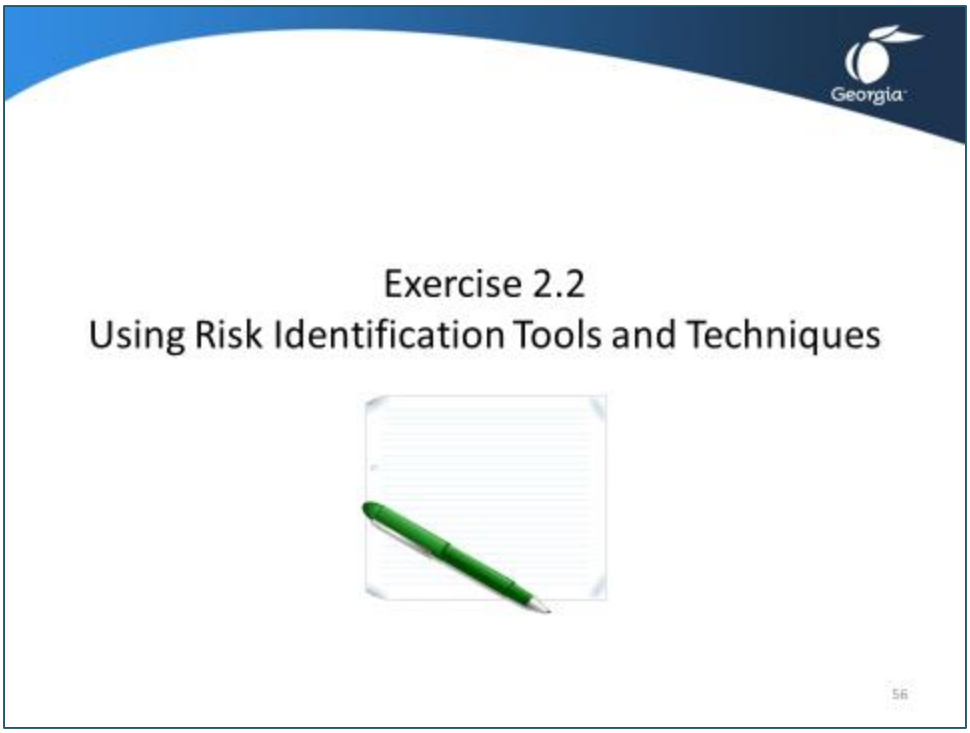
A structure for describing risks using statements may be applied, for example,

- EVENT may occur causing IMPACT, or
- If CAUSE exists, EVENT may occur leading to EFFECT.

Example:

- A thunderstorm may occur during lunch, causing a cancellation of our outdoor luncheon.
- If a low pressure systems moves across our area, a thunderstorm may occur during lunch leading to, a cancellation of our outdoor luncheon.

Exercise 2.2: Using Risk Identification Tools and Techniques



Instructions:

Having read the Speedy Office Supplies case study, the Web-based order entry project has been approved. As a part of the assembled dedicated risk management team you have completed a SWOT analysis there are some apparent risks that need to be logged. You are tasked with delivering the initial components of a risk register that should include a list of identified risks and potential responses.

Use the following structure for describing identified risks;

- EVENT may occur causing IMPACT, or
- If CAUSE exists, EVENT may occur leading to EFFECT.

Use the template provided on the next page to complete the initial risk register for the Speedy Office Supplies Web-based Order Entry System project.

Exercise 2.2: Using Risk Identification Tools and Techniques - Worksheet

Risk ID	Risk Statement	Consequence	Potential Responses

Lesson 2 Summary: Learning Objectives Recap

- Recognize the sources of risk during the Identify Risks process
  - **Risk identification** is the process of determining which risks might affect the project and documenting their characteristics. It is an iterative process that occurs throughout the life cycle of the project.
  - **External risks** are outside of the project manager's control but may affect the direction of the project, while **internal risks** may be within control of the project manager and present uncertainty that may affect the project. **Technical risks** relate to the utilization of technology and the impact it has on the direction of the project.
  - The sources of risk for the risk identification process include c**ategories, roles and responsibilities, historical information, project management tools and techniques,** and **project team members.**
- Outline the various methods that can be used to identify and gather risk information
  - Risk gathering techniques and the tools that project managers use to gather information from the various sources include **brainstorming, Delphi, checklist, assumption analysis, interviewing,** and **strengths, weaknesses, opportunities, and threats (SWOT) analysis.**
- Explain how to structure and populate a risk register
  - The outputs from risk identification are typically compiled into a document called a risk register. A risk register contains a description of each risk event, and details of each risk consequence.
  - A **list of identified risks**, including their **consequences** and uncertain **project assumptions**, are first described. Their **impacts** are then identified, and persons (the risk owners) are subsequently assigned responsibility for further analysis, responses, and monitoring.
  - Characteristics of identified risk include symptoms or warning signs, a list of potential responses, and the root causes of risk.

Notes

LESSON 3: ANALYZING RISK

Topic 1: Structuring Risk Analysis

Topic 2: Probability and Impact Assessment

Topic 3: Quantitative Risk Analysis

Topic 4: Performing Risk Analysis

Student Learning Objectives

After completing this lesson you should be able to

- Outline the various components of risk analysis and identify how they are used
- Demonstrate how to measure risk using probability and impact with relevant tools and techniques
- Identify the various tools and techniques that are part of quantitative risk analysis
- Discuss how to analyze risk

Approximate Presentation time: 2.0 hours

Topic 1: Structuring Risk Analysis

Risk Analysis

Risk analysis is carried out as part of the risk management plan.

Risk analysis is about understanding and evaluating the identified risks associated with a project and determining which risk events warrant a response.

A project's risk event status is determined from a combination of **probability** and **impact**.

Probability is defined as the likelihood of an event occurring and is usually expressed as a number from 0 to 1 (or equivalent percentages).

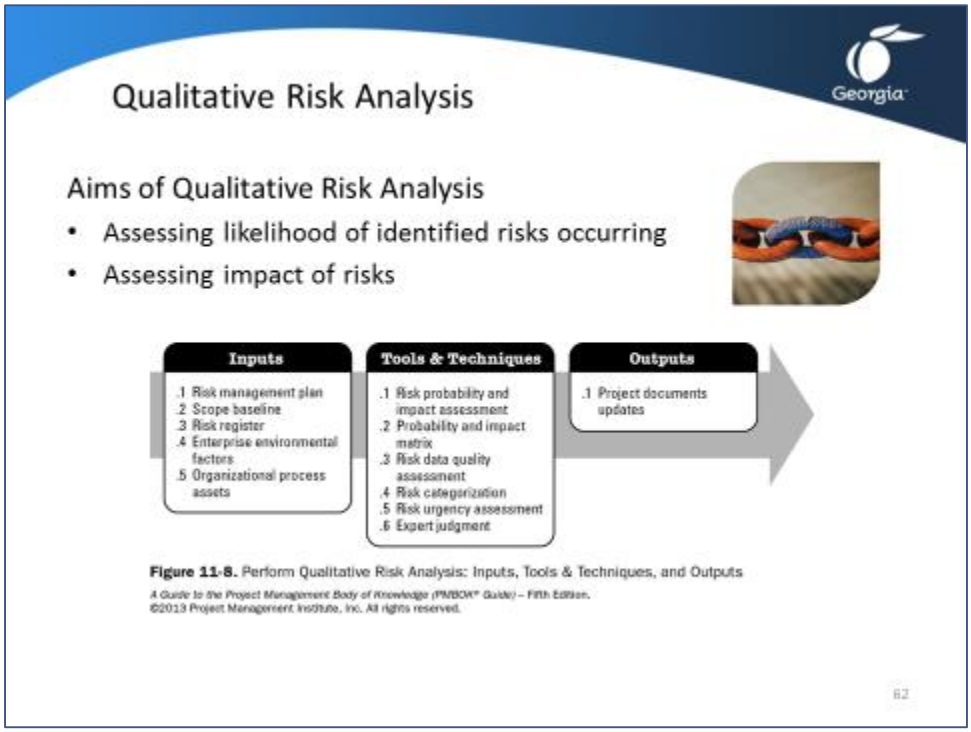
Impact is defined as the effect that a risk or opportunity will have on cost, schedule, or performance.

The risk management plan covers the

- probability of a discrete risk event occurring – these risk events can be either desirable (opportunities) or undesirable (threats)
- cost or time impact on the project if the risk event occurs

Risk analysis can be carried out using a **qualitative** or **quantitative** approach.

Topic 1: Structuring Risk Analysis



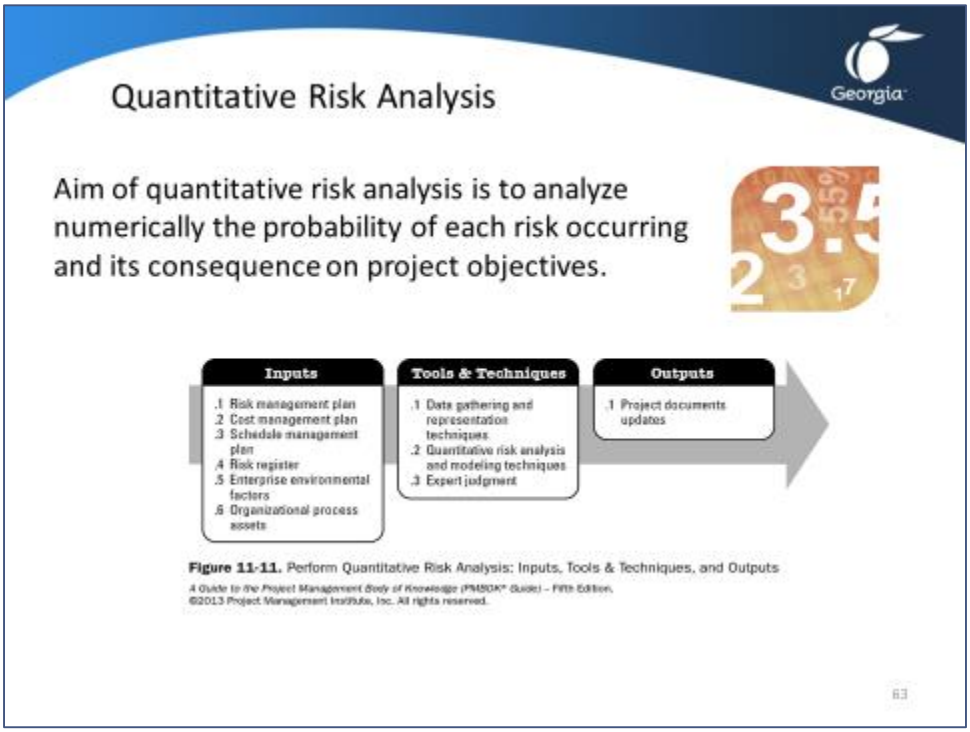
Qualitative Risk Analysis

Qualitative risk analysis prioritizes risks based on their potential effect on project objectives.

This type of analysis determines the importance of addressing specific risks and guiding risk responses. The importance of a risk may be magnified by the time criticality of the risk-related actions. Evaluating the quality of the available information helps modify the assessment of the risk. Using established qualitative-analysis methods and tools to evaluate the probability and consequences of the risks helps correct biases that are often present in a project plan.

In order to monitor changes in the project risks, qualitative risk analysis should be revisited during the project's life cycle. This process can result in further quantitative risk analysis or risk response planning – both of which are discussed later in this lesson

Topic 1: Structuring Risk Analysis



Quantitative Risk Analysis

The aim of quantitative risk analysis is to analyze numerically the probability of each risk occurring and assess the consequence on project objectives. This process uses several different techniques – for example, Monte Carlo simulation and decision analysis.

The function of quantitative risk analysis is to

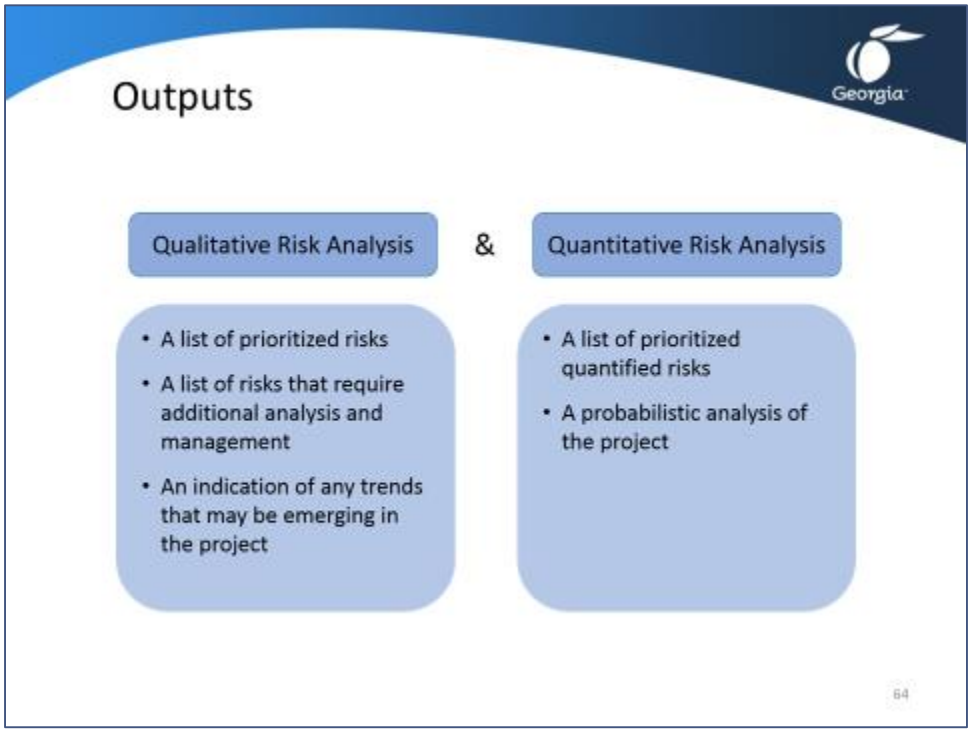
- determine the probability of achieving each project objective
- quantify the project's risk exposure and determine the size of cost and schedule contingency reserves that may be needed
- identify risks that require the most attention by quantifying their contribution to project risk
- identify realistic and achievable targets related to cost, schedule, or scope

This type of analysis generally follows qualitative risk analysis, but both types of analysis processes can be used separately or together.

The method of quantitative analysis used will be determined by time and budget availability considerations and the need for qualitative or quantitative statements about risk and impacts.

You can determine whether more or less risk management action is required by repeating quantitative analysis a few times during the project's life cycle and observing the trends in the results.

Topic 1: Structuring Risk Analysis



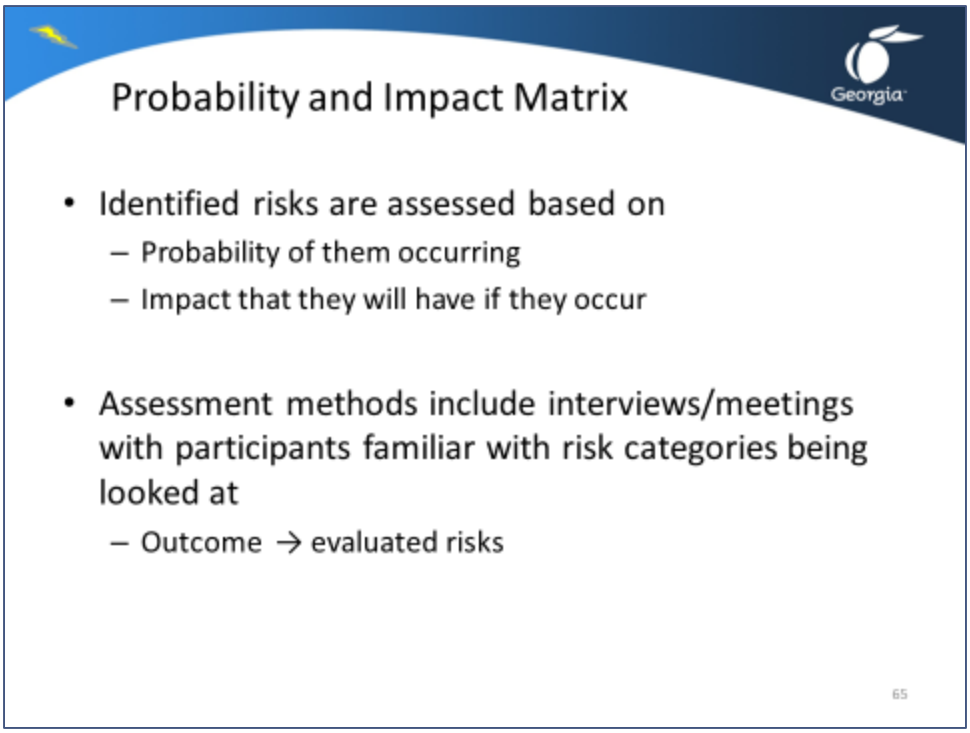
Qualitative analysis generates several outputs. These include a list of prioritized risks, a list of risks that require additional analysis and management, and an indication of any trends that may be emerging in the project. High or moderate risks may require additional analysis including quantitative risk analysis, and risk management action.

Conducting a quantitative analysis allows you to generate a prioritized list of quantified risks and a probabilistic analysis of the project. A list of quantified risks includes those that present the greatest opportunity or pose the greatest threat to the project, coupled with a measure of their impact. Probabilistic analysis yields forecasts of possible completion dates and project duration and costs, together with their associated confidence levels.

Quantitative analysis also provides an opportunity to assess the probability of achieving cost and time objectives. This is done by evaluating the current plan and the current knowledge of the risks facing the project.

As with qualitative analysis, the results of a quantitative analysis can be studied to determine if any trends – positive or negative – are emerging. Identifying trends at an early stage can help you determine what kind of analysis and risk response to perform as the project progresses.

Topic 2: Probability and Impact Assessment



Risk Probability / Impact Assessment

One of the techniques used in qualitative risk analysis is a risk probability and impact assessment. Risk probability describes the likelihood of a risk occurring, whereas risk impact describes the effect a risk will have if it occurs on a project objective – such as time, cost, scope, or quality. The impact can have negative effects (threats) or positive ones (opportunities).

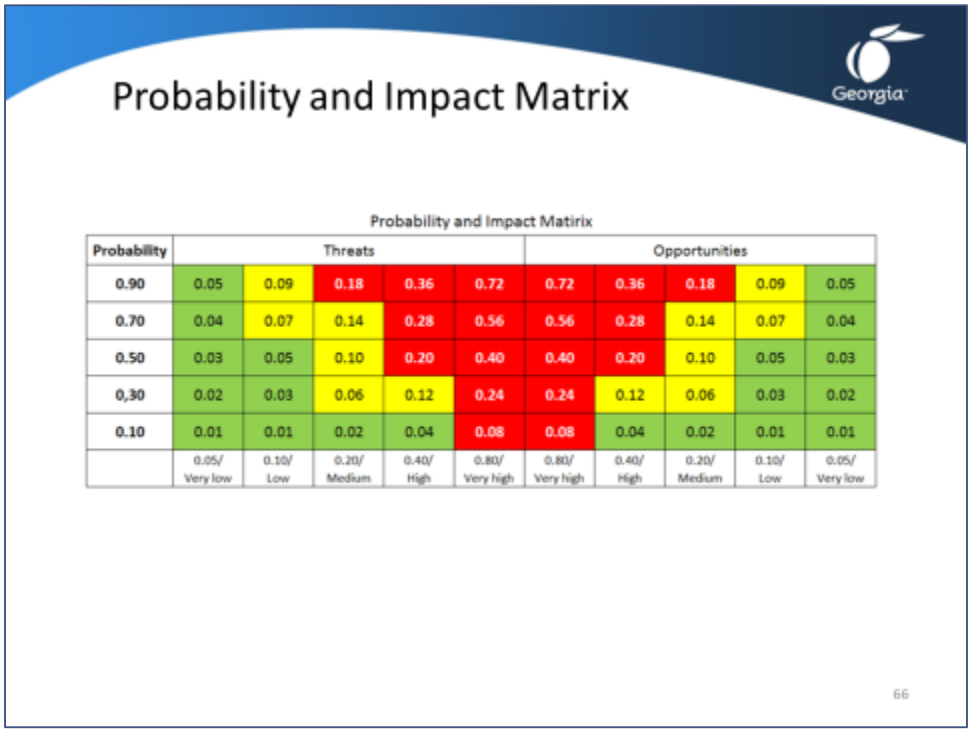
A common way of assessing risks is to conduct interviews or hold meetings with participants who are familiar with the risk categories being examined. For this reason, it's a good idea to include project team members and knowledgeable people from outside the project in any interviews or meetings. (Obtaining expert judgment is important because very little information on risks can be obtained from an organization's database of past projects.)

The discussion should be led by an experienced facilitator because participants may have little or no experience with risk assessment.

During the discussion, participants evaluate the level of probability for each risk, assess its impact on each objective, and take notes about how the decisions were made.

Some risks – for example, ones with low ratings of probability and impact – will not be rated. Although these risk are ignored, they are included on a watch list for future monitoring.

Topic 2: Probability and Impact Assessment



Risk Event Status

A probability and impact matrix is used to combine probability and impact to yield the risk event status. Probability is defined as the likelihood of an event occurring and is expressed as a number from 0 to 1. Impact is defined as the effect that a risk or opportunity will have on cost, schedule, or performance.

Each risk's importance, or priority for attention, is evaluated using a look-up table or a probability and impact matrix. This table/matrix specifies descriptive relative terms or numeric values for the probability and impact of a risk(s), as follows:

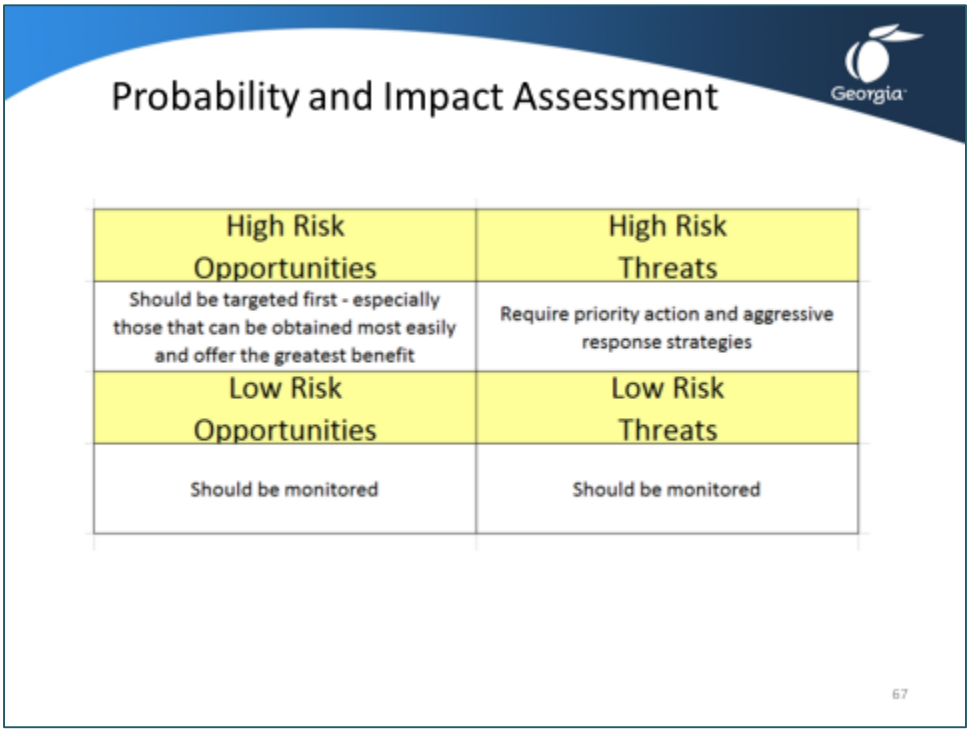
- descriptive terms – e.g. "very low", "low", "moderate", "high", and "very high"
- numeric values – e.g. 1, .3, .5, .7, .9, (1 = high chance of the risk occurring)

These terms/values determine which combinations of probability and impact result in a particular risk event status. In the slide shown above, a high risk is represented by the red fill pattern, a moderate risk by the yellow fill pattern, and a low risk by the green fill pattern. (These risk event statuses can be used to prioritize a risk for further quantitative analysis and response.)

Usually, the risk event status rules are specified at the planning stage and can be tailored to the specific project being examined.

An organization can rate a risk separately for each objective, and it can develop ways to determine one overall rating for each risk – for example, a weighted average of the objective-specific scores can be used to derive a blended risk score for each risk.

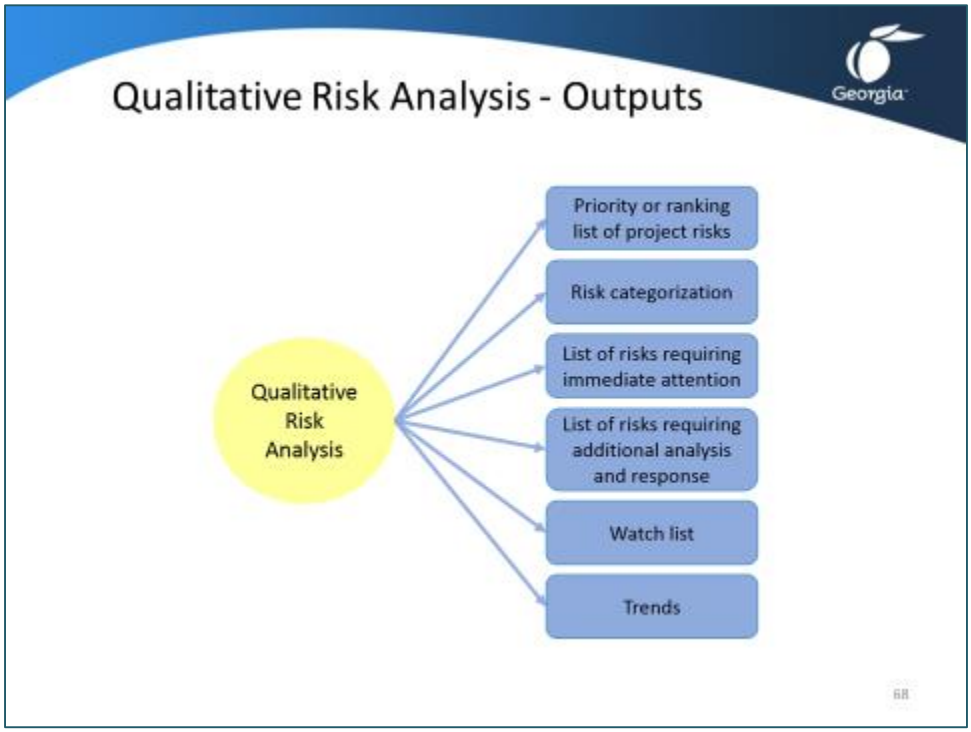
Topic 2: Probability and Impact Assessment



Threats and Opportunities

The same matrix can be used for both threats and opportunities, but a mirror double matrix is generally used to clarify which require priority attention.

Topic 2: Probability and Impact Assessment

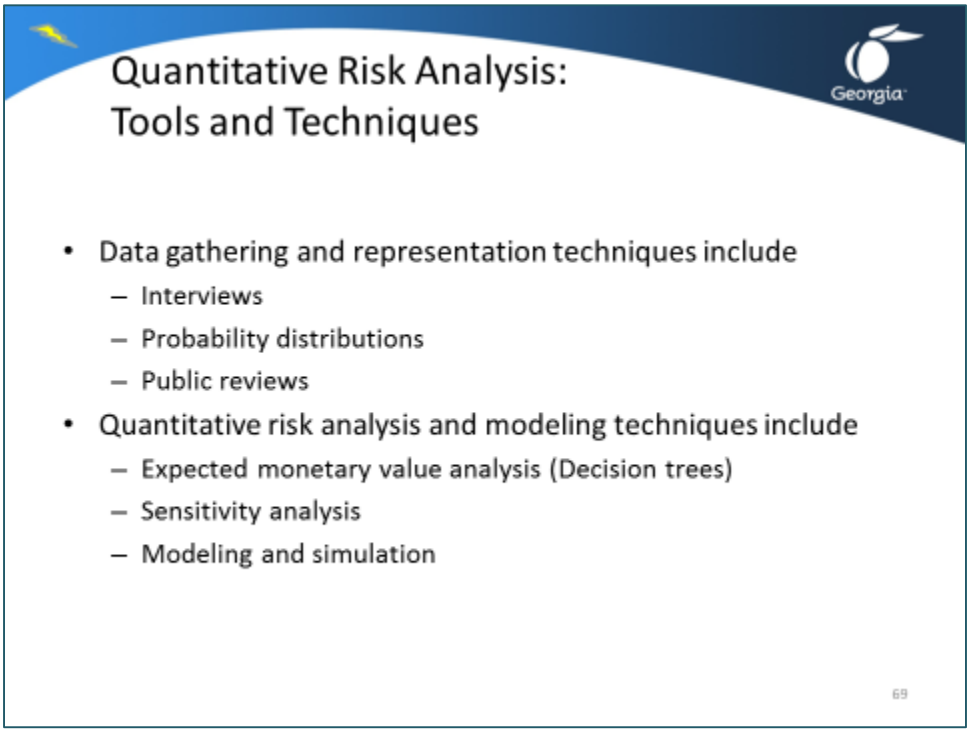


Qualitative Risk Analysis Outputs

Information from the qualitative risk analysis is added to the risk register and is used as inputs to the Plan Risk Responses process. The risk register is project document used to track identified risks and the analysis. The information added to the risk register, in addition to the identified risks, includes

- relative rating or priority list of project risks, which classifies risks according to their individual significance – a separate list can be done for each objective
- risk categorization, which helps identify common causes of risk or areas that require attention
- list of risks requiring an urgent response
- list of risks for additional analysis and response
- watch list of low priority risks
- trends in qualitative risk analysis results

Topic 3: Quantitative Risk Analysis



Conducting Quantitative Risk Analysis

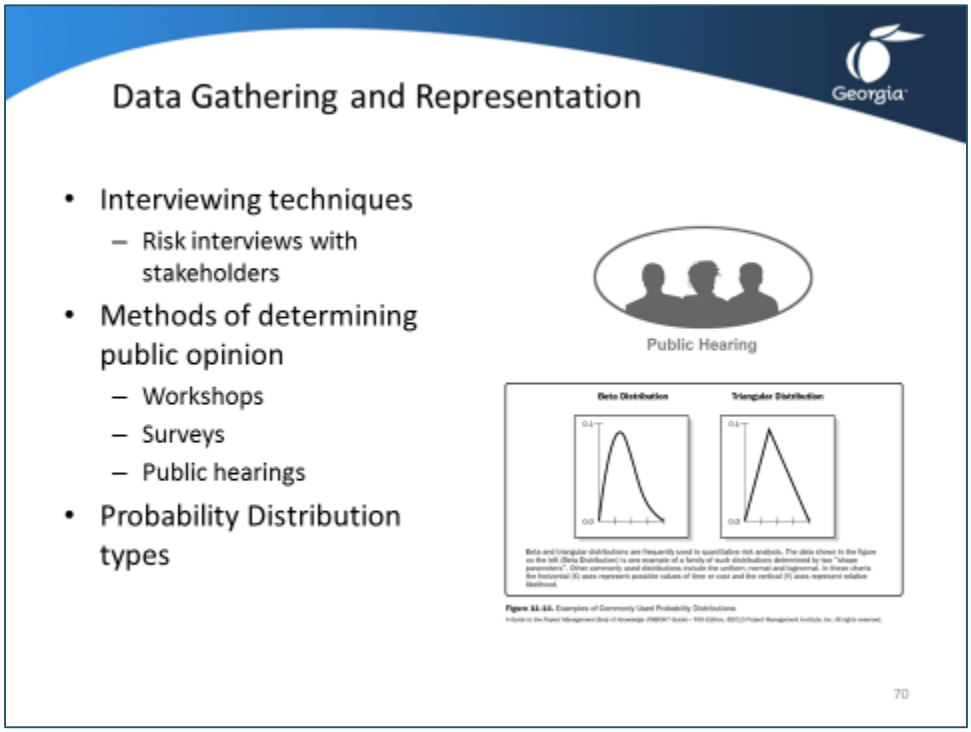
The aim of quantitative risk analysis is to analyze numerically the probability of each risk occurring and its consequence on project objectives. The method for conducting quantitative risk analysis is twofold:

Firstly, data gathering occurs. A variety of tools and techniques are used to gather information that is then processed using the quantitative risk analysis tools.

Next, quantitative risk analysis tools are used to assess risks against the project objectives. These tools include

- interviewing
- public review
- decision tree analysis
- sensitivity analysis
- modeling and simulation

Topic 3: Quantitative Risk Analysis



Interviewing Techniques

Good data collection is essential for accurate risk assessment. One way of doing this is to use interviewing techniques to quantify the probability and consequences of risks on project objectives. For example, many organizations conduct risk interviews with project stakeholders and subject-matter experts as a first step to quantifying risks. An important component of the risk interview is documenting the rationale of the risk ranges. By doing this, effective strategies for risk response can be defined in the risk response planning process.

Probability Distribution Types

The information required depends on the type of probability distributions used. Quantitative risk analysis normally uses continuous probability distributions, which represent both probability and consequences of the project component. The most popular distributions are

- Beta distribution (uses a three-point estimate)
- Triangular distribution (uses a two-point estimate)

Determining Public Opinion

If there is any controversy about the government project, it should be subjected to public scrutiny. This allows the elected representatives to gauge the opinion of voters.

Every project has advantages and disadvantages. Public project reviews help opponents of the project make their case. The opponents do not have the resources or information that the supporters of the project have and generally respond on an emotional level, which does not help inform the elected representatives or search for the best solution. Project resources must, therefore, be committed to helping the opponents to articulate their case in a clear and logical manner.

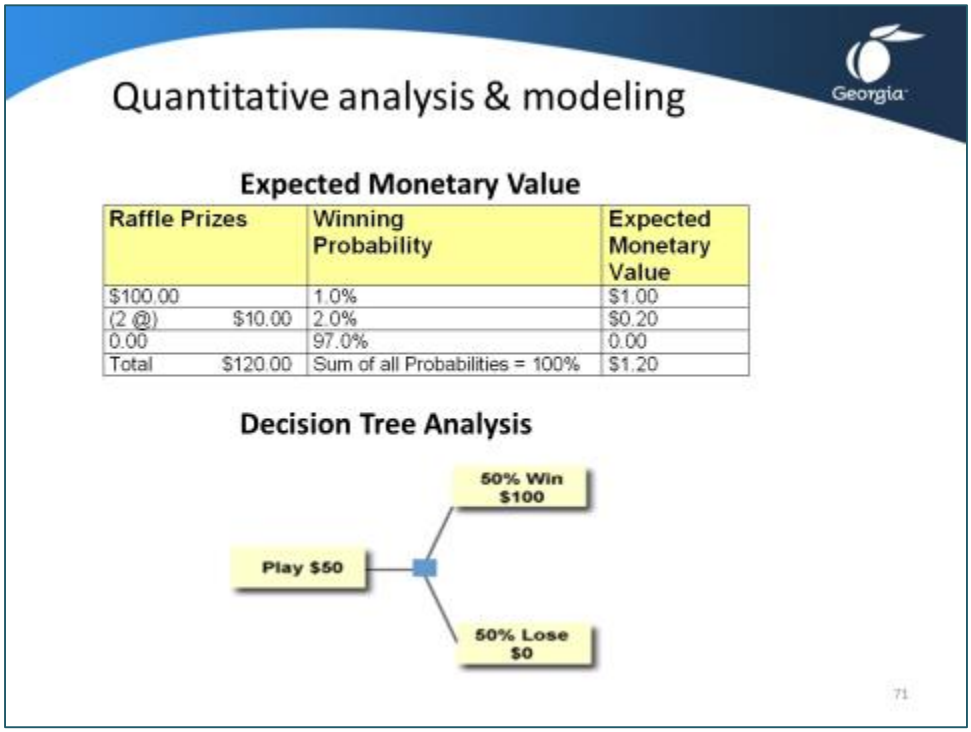
There are three ways of gauging public opinion. These are to hold

- workshops
- surveys
- public hearings

The advantage of holding **workshops** and surveys is that everyone has an opportunity to participate. In a workshop, the different aspects of the project are described at information booths. Members of the public visit each booth to learn about the project and present opinions.

Surveys are quantitative information collection techniques used in marketing, political polling, and social science research. All surveys involve questions of some sort. When the questions are administered by a researcher, the survey is called an interview or a researcher-administered survey. When the questions are administered by the respondent, the survey is referred to as a questionnaire or a self-administered survey.

Topic 3: Quantitative Risk Analysis



Decision Trees

Decision trees are used to select the best course of action in situations where you face uncertainty. For example:

- a project manager may need to establish how much inventory is required for the Georgia rail system before knowing precisely what level of demand there will be
- a technical project may have to choose between maintaining an older technology or leasing a new system (if the project stays with the older technology, it may risk serious technical flaws)
- a speculator must decide to buy an asset before knowing if it can be sold for a profit

In all of these cases, the decision-maker faces an unknown that seems to make it difficult to choose the right option with any certainty.

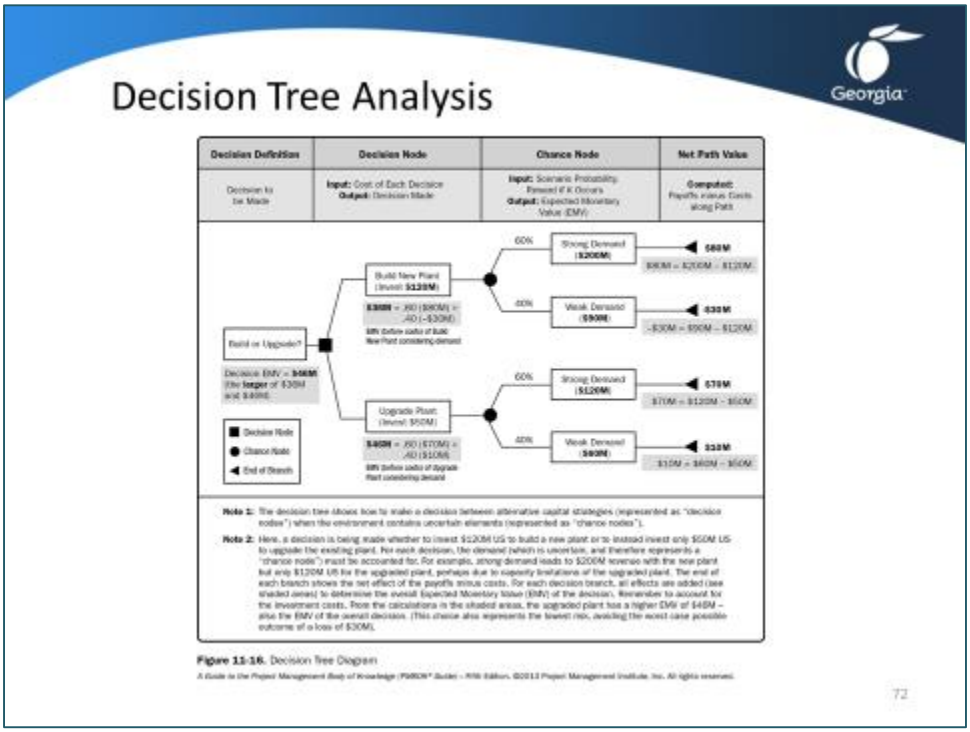
Although the decision-maker does not know what the outcome of the unknown will be, he or she generally has some knowledge about what the possible outcomes are and how likely each is to occur.

This information can be used to select the option that is most likely to yield favorable results. Decision trees are the structure, using the concept of Expected Monetary Value (EMV) that makes this type of analysis easy to apply.

Expected Monetary Value is the product of an event's probability of occurrence and the loss or gain that will result. Here is an example of a single, independent risk:

- There is a 50% probability of a snow storm, and snow will result in a $10,000 loss
- The expected monetary value of the snow event is $5,000 (0.5 * $10,000)

Topic 3: Quantitative Risk Analysis



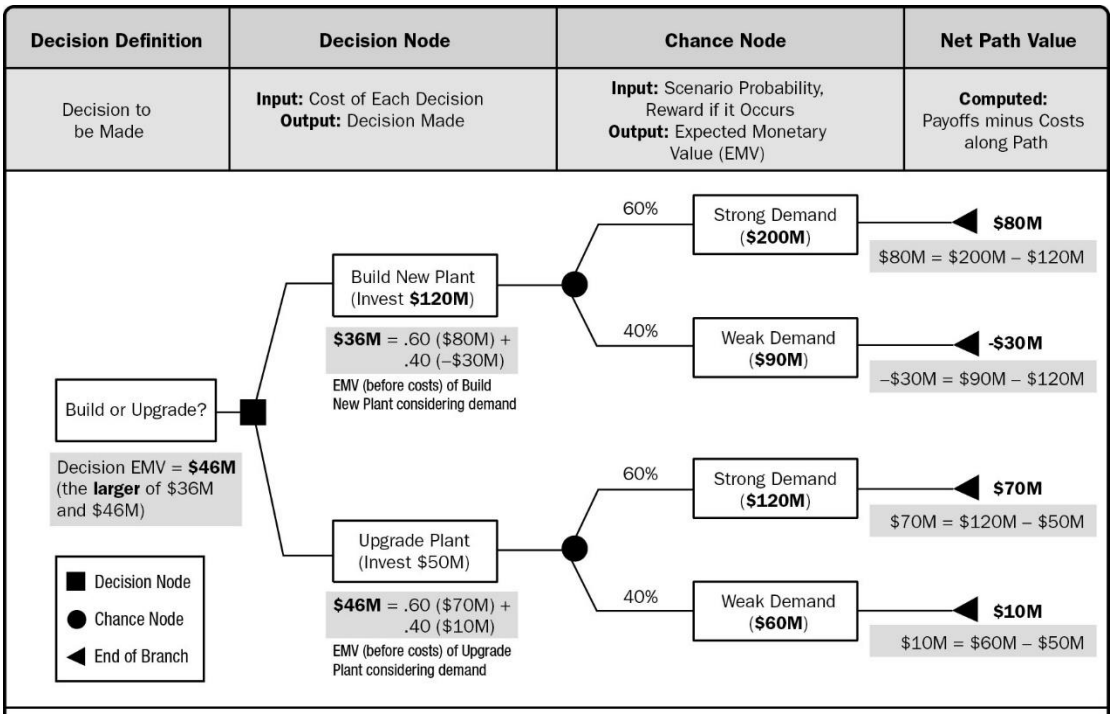
Decision Tree Analysis

A decision tree is a diagram that describes a decision under consideration. It is used to assess the implications of choosing one or another of the available alternatives. It incorporates probabilities or risks and the costs or rewards of each logical path of events and future decisions.

The decision tree diagram incorporates the cost of each choice, the probabilities of each possible scenario, and the rewards of each alternative logical path. It is usually drawn chronologically from left to right and branches out, like a tree lying on its side.

The decision tree diagram consists of three types of nodes:

Node type	Indicated in diagram by	Represents
Definition	Rectangle	Decision to be made
Decision	Squares	Variables/actions that decision maker controls
Chance	Circles	Variables/events that decision maker cannot control
Net Path Value	Arrow	Endpoints where outcome values are attached



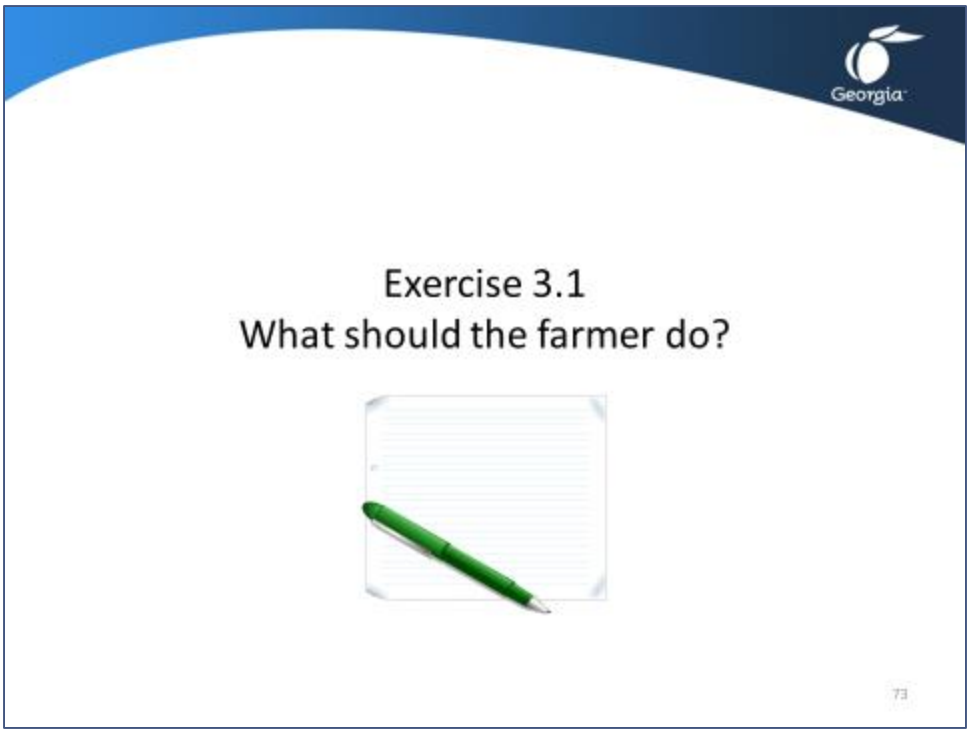
In the illustration above, a decision is being made whether to invest $12o million to build a new plan or to instead invest only $50 million to upgrade the existing plant. For each decision, the demand (which is uncertain, and therefore represents a "chance node") must be accounted for. For example, *strong* demand leads to $200 million revenue with the new plant but only $120 million for the upgraded plant, perhaps due to capacity limitations of the upgraded plant. The end of each branch shows the net effect of the payoffs minus costs. For each decision branch, all effects are added (see shaded areas) to determine the overall Expected Monetary Value (EMV) of the decision. Remember to account for the investment costs. From the calculations in the shaded areas, the upgraded plant has a higher EMV of $46 million – also the EMV of the overall decision. (This choice also represents the lowest risk,, avoiding the worst case possible outcome of a loss of $30 million).

There are three simple rules to keep in mind when solving a decision tree:

- At a chance node, calculate its EMV (or EV cost) from the probabilities and values of each alternative branch. Label the node with this value.
- At a decision node, label it with the value of its best alternative (using the EMV decision rule).
- If a cost lies along a branch, factor in the cost when passing from right to left – that is, subtract the cost to maximize EMV. (If a tree is designed to solve EV costs, then add the cost along the branch.)

Decision tree analysis is best suited for everyday problems where you want to pick the best alternative quickly.

Exercise 3.1: What Should the Farmer do?



A Georgia farmer needs to make a decision. His orchard is expected to produce 100,000 bushels of peaches, which he wishes to sell to a large grocery chain at $15 per bushel as 'Grade A' peaches.

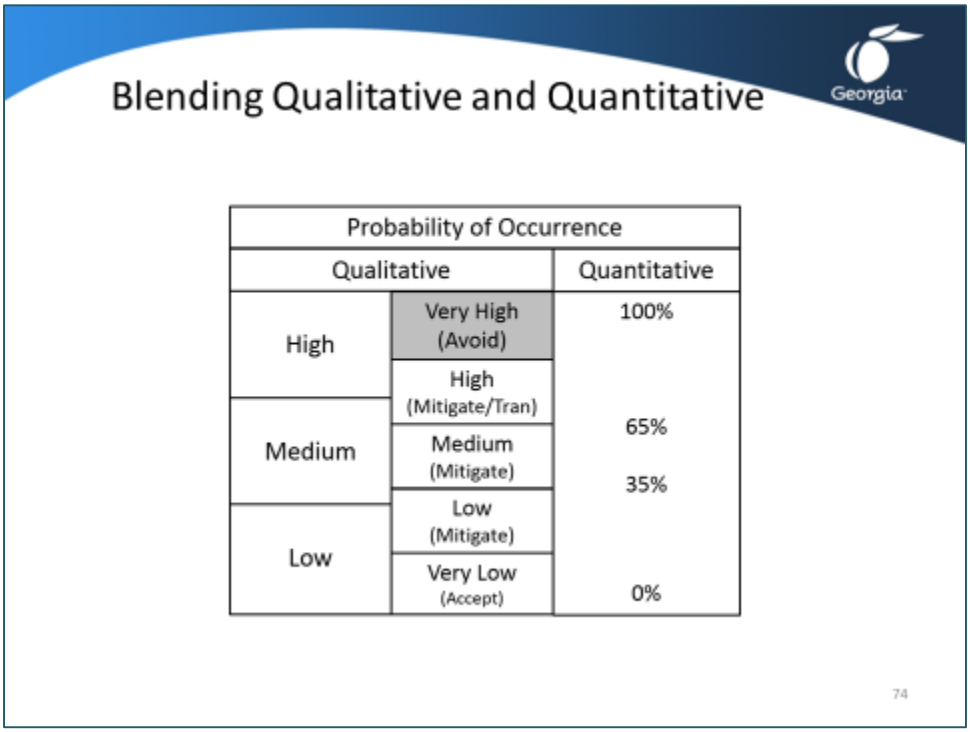
However, he has great concern about the possibility of early frost damaging his crop. For three of the past five years, the western part of the state where the farmer lives has suffered severe frost.

The Department of Agriculture's figures show that the probability of early frost in the orchard area in any given year is 20%. If his crop is damaged, it would not be marketable as fresh fruit and he would have to sell it to a cannery in Alabama for $3.00 per bushel.

He could purchase insurance which would ensure that if his peaches were damaged, he could sell the total crop (both damaged and good fruit) to the insurance company for $7.00 per bushel. The cost of the insurance would be $50,000. What are the monetary expectations of the farmer's decision to purchase or to not purchase insurance?

Exercise 3.1: What Should the Farmer do? Worksheet

Topic 3: Quantitative Risk Analysis



Organizations may have several different factors to considering when deciding what makes a risk high, medium or low. Consequently they require definitions to ensure the same criteria and interpretation are applied to each analyzed risk.

Some general definitions which can be applied or modify to conduct project risk evaluation are as follows:

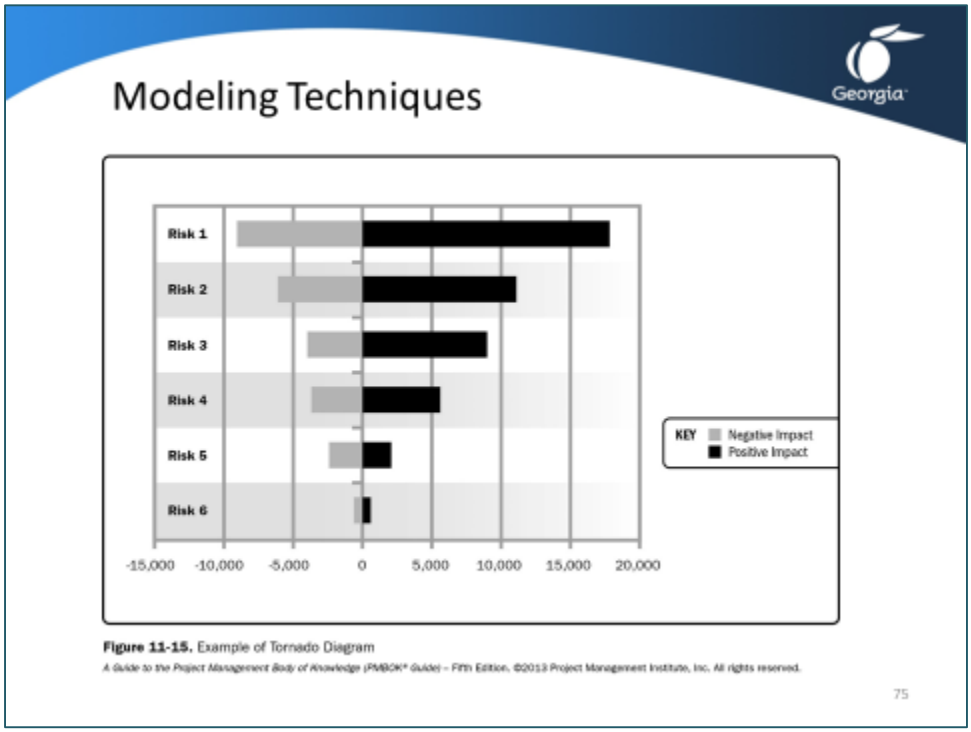
- **high risk** – a risk that is very likely to adversely impact the schedule, drive costs up or drive quality down. Under these conditions, close project monitoring and contractor or vendor involvement will not change the course of events.
- **medium risk** – a risk that has the potential to affect the schedule, drive project costs up or the quality of deliverable down. Under these conditions, close project monitoring and contractor or vendor involvement will overcome the difficulties.
- **low risk** – a risk with a very low potential to cause measurable effects on the schedule, costs, or the quality of deliverables. Normal project management controls and contractor or vendor involvement will probably overcome difficulties.

In addition to having definitions for qualitative risk evaluation, the organization needs to determine what percentage constitutes the probabilities from a **low** to a **high** risk rating. This decision is driven by risk tolerance.

For example, an organization that is a risk taker may establish a limit of **high** probability of occurrence at 45%, while a risk adverse organization may choose to classify risks with a 25% probability of occurrence as **high.**

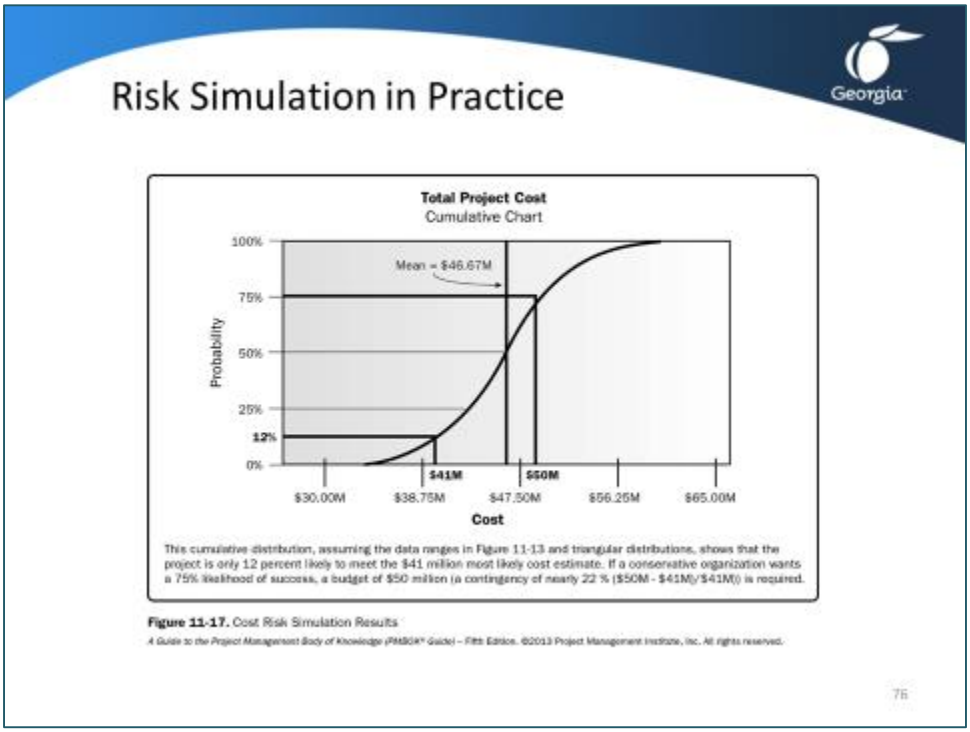
In other words, the blending of **qualitative** and **quantitative** risk assessment will be driven by the organizational risk tolerance.

Topic 3: Quantitative Risk Analysis

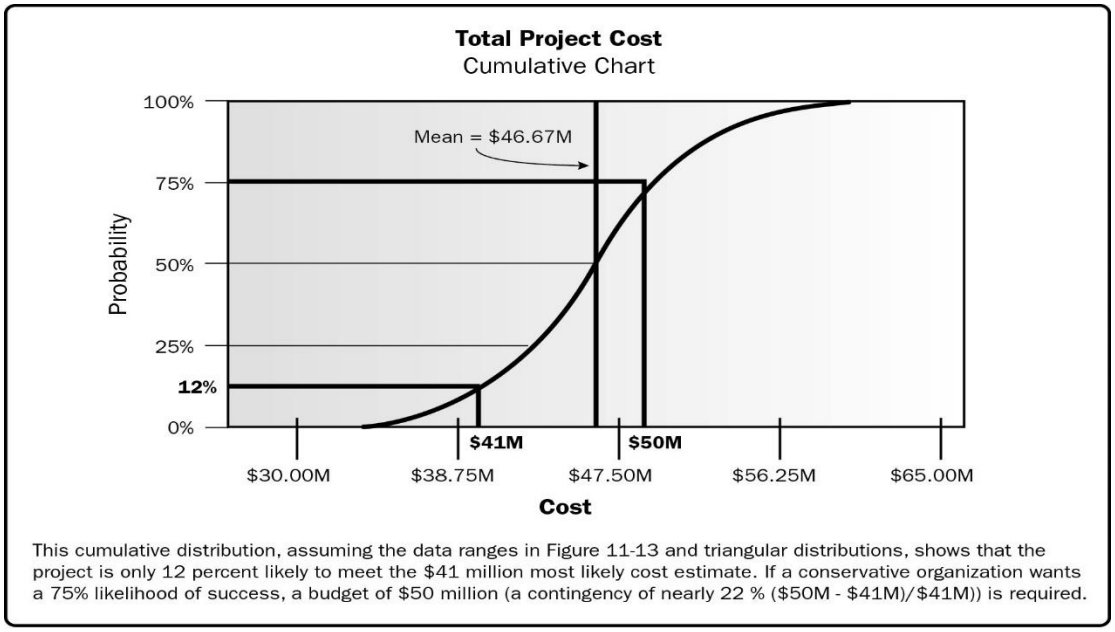


Sensitivity analysis helps to determine which risks have the most potential impact on the project. It helps to understand how the variations in project objectives correlate with variations in different uncertainties. It also examines the extent to which the uncertainty of each project element affects the objective being studied when all other uncertain elements are held at their baseline values.

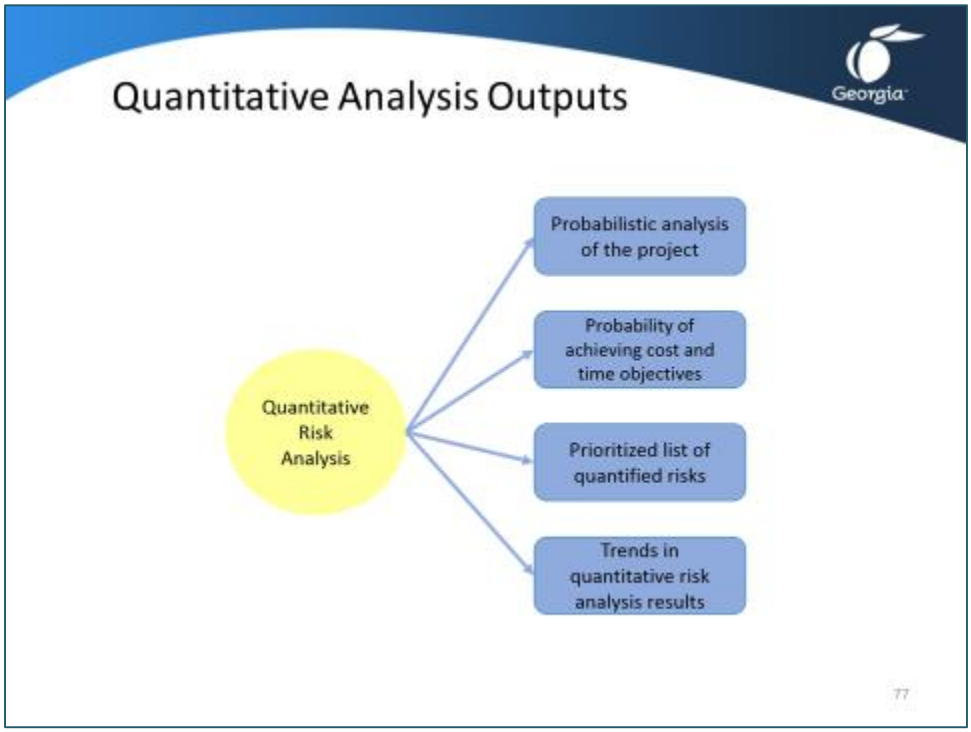
A **tornado diagram**, represented above, is useful for comparing relative importance and impact of variables that have a high degree of uncertainty to those that are more stable. The Tornado diagram is also helpful in analyzing risk-taking scenarios enabled on specific risks whose quantitative analysis highlights possible benefits greater than corresponding identified negative impacts.



Modeling and simulation uses a model that translates the specified detailed uncertainties of the project into their potential impact on project objectives. Simulations are typically performed using the Monte Carlo technique. In a simulation, the project model is computed many times (iterated), with the input values (e.g., cost estimates or activity durations) chosen at random for each iteration from the probability distributions of these variables. A histogram (e.g., total cost or completion date) is calculated from the iterations.



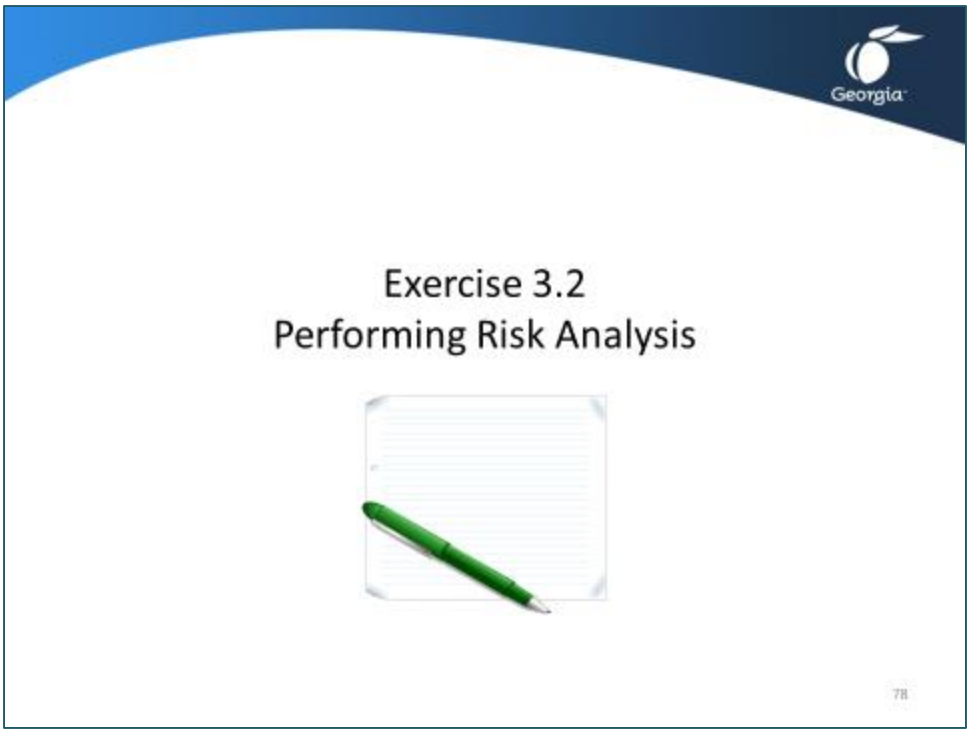
Topic 3: Quantitative Risk Analysis



In quantitative risk analysis, the risk register is updated with the following components:

- **probabilistic analysis** of the project, which defines estimates for potential project schedule and cost outcomes, with an associated confidence level of achieving each one
- **probability of achieving the cost and time objectives**, which is based on the current plan and the risks facing the project
- **prioritized list of quantified risks**, which indicates the greatest threats or greatest opportunities to the project
- **trends** in quantitative risk analysis results, which can affect risk responses

Exercise 3.2: Performing Risk Analysis



In this exercise, you have a list of some apparent risks that need to be logged. You are tasked with performing a risk analysis of the risks and updating the risk register with the following information;

- Risk Owner
- Risk Probability
- Risk Impact
- Risk Status

Exercise 3.2: Performing Risk Analysis - Worksheet

Current Risks:

1. If lack of web development skills exist, a poorly performing order entry system may occur leading to customers not using the system.
2. Customers may reject the design of the web-based system causing a loss of orders.
3. Employees being laid off may seek remuneration causing law suits for wrongful termination.
4. Due to "new" nature the learning curve may result in cost and time over-runs.

Probability and Impact Matirix

Probability	Threats					Opportunities				
0.90	0.05	0.09	0.18	0.36	0.72	0.72	0.36	0.18	0.09	0.05
0.70	0.04	0.07	0.14	0.28	0.56	0.56	0.28	0.14	0.07	0.04
0.50	0.03	0.05	0.10	0.20	0.40	0.40	0.20	0.10	0.05	0.03
0,30	0.02	0.03	0.06	0.12	0.24	0.24	0.12	0.06	0.03	0.02
0.10	0.01	0.01	0.02	0.04	0.08	0.08	0.04	0.02	0.01	0.01
	0.05/ Very low	0.10/ Low	0.20/ Medium	0.40/ High	0.80/ Very high	0.80/ Very high	0.40/ High	0.20/ Medium	0.10/ Low	0.05/ Very low

Risk ID	Risk Owner	Risk Probability	Risk Impact	Risk Status

Lesson 3 Summary: Learning Objectives Recap

- Outline the various components of risk analysis and identify how they are used.
  Risk analysis can be carried out using a **qualitative** or **quantitative** approach.
    - **Qualitative risk analysis** prioritizes risks based on their potential effect on project objectives. It generates several outputs including a list of prioritized risks, a list of risks that require additional analysis and management, and an indication of any trends that may be emerging in the project.
    - The aim of **quantitative risk analysis** is to analyze numerically the probability of each risk occurring and assess the consequence on project objectives.

- Demonstrate how to measure risk using probability and impact with relevant tools and techniques
  A risk matrix is used to combine probability and impact to yield the **risk event status**. The matrix specifies descriptive terms or numeric values for the probability and impact of a risk(s).

- Identify the various tools and techniques that are part of quantitative risk analysis
    - **decision trees –** these are diagrams that describe a decision under consideration. They incorporate probabilities or risks and the costs or rewards of each logical path of events and future decisions.
    - **EMV** – the concept of **Expected Monetary Value (EMV)** makes decision tree analysis easy to apply. **Expected Monetary Value** is the product of an event's probability of occurrence and the loss or gain that will result.
    - s**ensitivity analysis** – this is the process of analyzing the relative importance of elements in the project model. It can be represented by a **spider diagram,** a **sensitivity chart** or a **tornado diagram.**
    - **simulation** – this refers to any analytical method used to imitate a real-life system. It is undertaken when other analyses are too mathematically complex or too difficult to reproduce.
    - **Monte Carlo simulation –** this is a simulation method that randomly and repeatedly generates values for uncertain variables to simulate a model.

Notes

LESSON 4: RESPONDING TO RISK

Topic 1: Identify Risk Response Strategies

Topic 2: Responding to Analyzed Risk

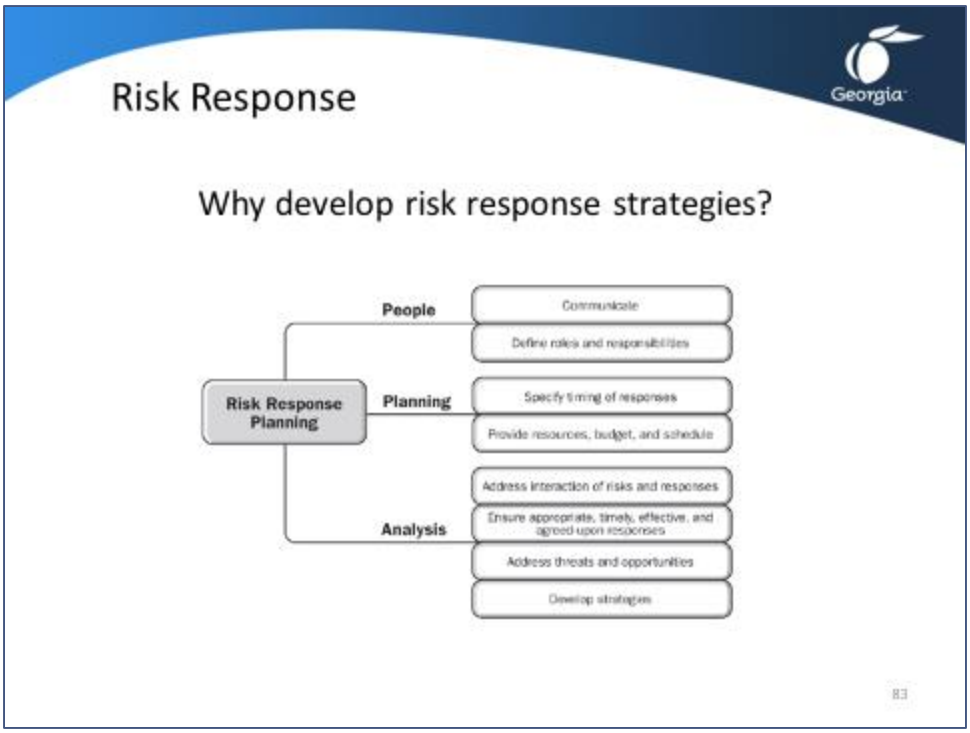
Student Learning Objectives

After completing this lesson you should be able to

- Discuss risk response strategies
- Identify appropriate response strategies based on analyzed risks

Approximate Presentation time: 2.0 hours

Topic 1: Identifying Risk Response Strategies



Risk response deals with identifying strategies and developing plans to address risk in the event of it occurring.

In developing risk responses, the project team should come up with as many responses as possible. Once each risk has been analyzed and responses developed, the project team may then select those responses which will offer the greatest benefit to the project.

Topic 1: Identifying Risk Response Strategies

There are several risk response strategies available to project managers, each of which requires specific actions to be developed to implement the strategy.

Avoid – involves altering the project plan to eliminate the risk or to protect the project objectives from the risk's impact. Specific risks identified early in a project can be dealt with by clarifying requirements, obtaining information, improving communication, or acquiring expertise. Examples of risk avoidance strategies include **reducing scope to avoid high-risk activities**, adding resources, adopting a cautious rather than innovative approach, or avoiding an unfamiliar subcontractor.

Transfer – is attempting to **shift risk impact and risk response ownership to a third party** – without eliminating the risk. Risk transfer is generally most effective when dealing with financial risk exposure and involves the payment of a risk premium to the party taking on the risk. Examples of risk transfer include the use of insurance, performance bonds, warranties, and guarantees.

Mitigate - involves attempting to **reduce the probability and/or impact of an adverse risk event to an acceptable threshold**. Taking early action to reduce the probability of a risk occurring is more effective than trying to repair any damage after it has occurred. Examples of risk mitigation include changing conditions to reduce risk by adding resources or time to a schedule or, where it isn't possible to reduce risk probability, targeting factors that determine the severity of risk impact.

Accept – occurs when the project team decides not to change the project plan to deal with a risk, or when the team is unable to identify any other suitable response strategy. Active **acceptance involves developing a contingency plan that can be executed if a risk does occur**. In contrast, passive acceptance doesn't require any action, leaving the project team to deal with the risks as they occur. The most common risk acceptance response is to establish a contingency allowance that includes amounts of time, money, or resources to account for known risks.

Topic 1: Identifying Risk Response Strategies

Project managers also need to consider the correct response strategy for dealing with positive risks (opportunities).

Exploit

Project managers use the **exploit strategy** when the organization wishes to ensure that the opportunity is realized. An example of an exploiting response is assigning better resources to a project to reduce the time to completion or to provide better quality than originally planned.

Share

Sharing a positive risk means **sharing risk ownership** with a third party who is better placed to capture the opportunity for the benefit of the project. An example of a sharing action is forming a joint venture with a company that has the specialized skills to exploit a particular opportunity.

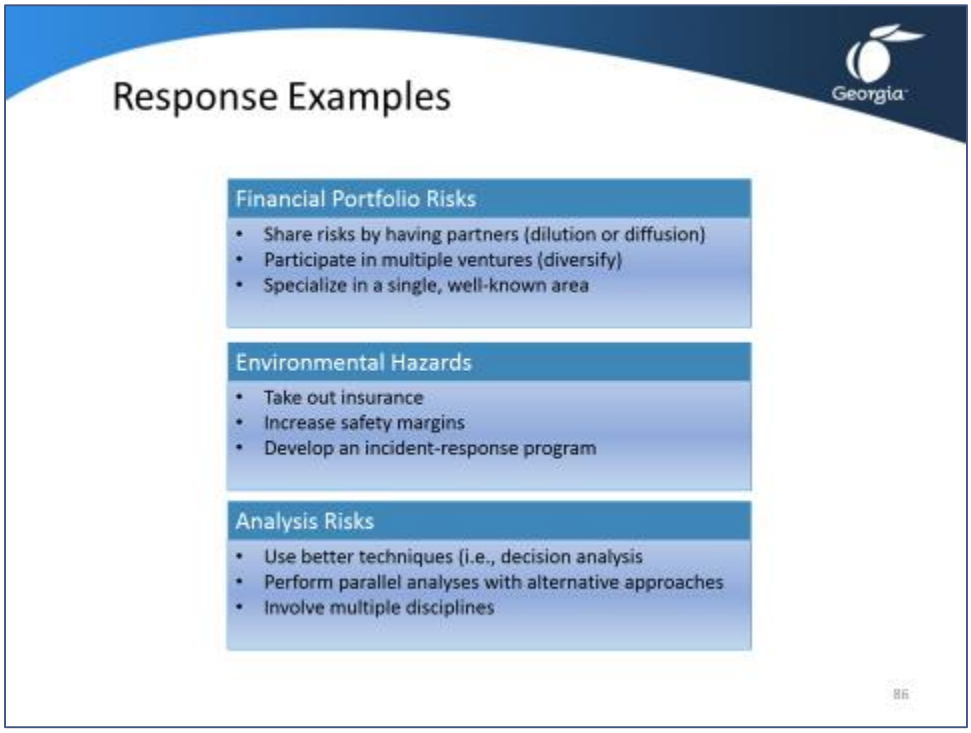
Enhance

A risk enhancing strategy entails **modifying the "size" of an opportunity by increasing probability** and positive impacts, and by identifying and maximizing key drivers of these positive-impact risks.

An example of a risk enhancing strategy is a government IT project where the opportunity could be increased by using enhanced test procedures and equipment to validate new software. The opportunity is enhanced and the budget is increased.

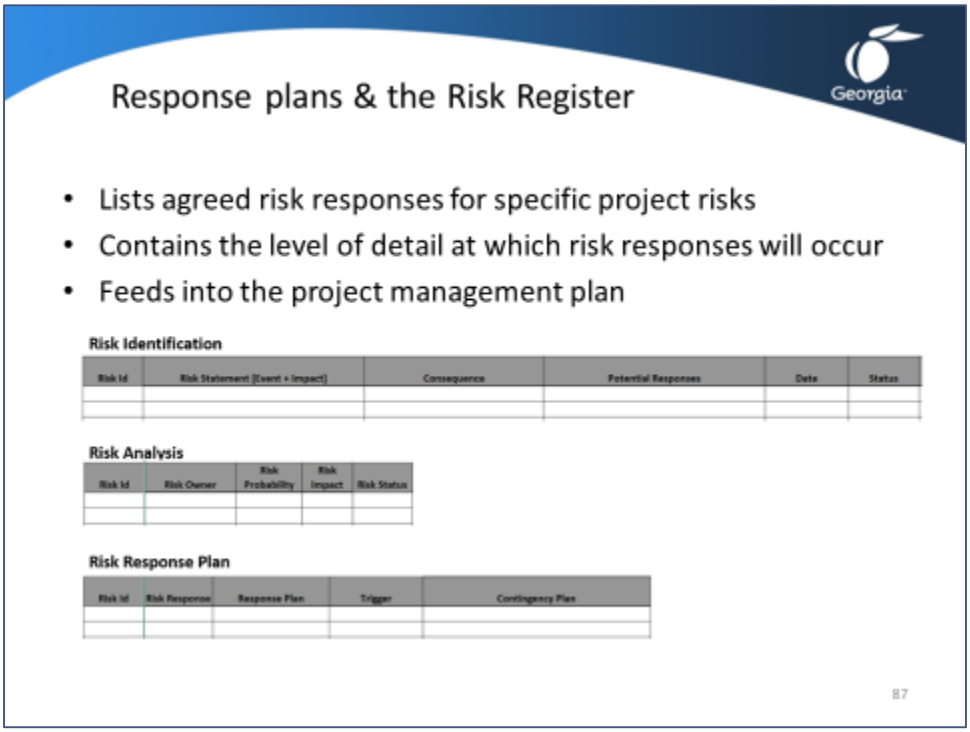
Acceptance is represented as both positive and negative. Typically, a further strategy of acceptance can be adopted because it is usually impossible to remove all risk from a project. This strategy indicates that the project team has opted not to alter the project plan to deal with a risk or is unable to identify any other suitable response strategy. It may be adopted for either threats or opportunities. The most common risk acceptance response is to establish a contingency reserve that includes amounts of time, money and resources.

Topic 1: Identifying Risk Response Strategies



The slide lists sample strategies for avoiding, transferring, or mitigating risks for certain types of risks

Topic 1: Identifying Risk Response Strategies



Plan Risk Responses

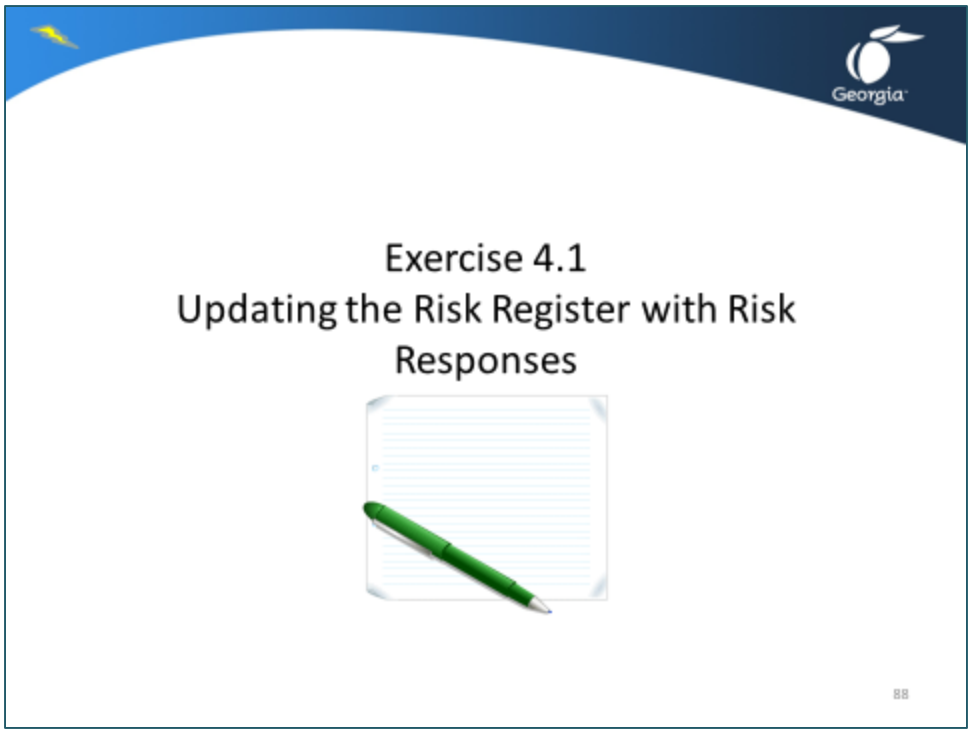
When appropriate risk responses are chosen and agreed upon, they are included in the **risk register**.

The **risk register** should be written at the level of detail that corresponds with the priority ranking and the planned response. The high and moderate risks are generally included in detail, whereas risks considered to be of low priority are included in a "watch list" for periodic monitoring.

Updates to the risk register include:

- **Risk owners** and assigned responsibilities
- Agreed-upon **response strategies**
- **Specific actions** to implement the response strategy
- **Trigger conditions**, symptoms, and warning signs of a risk occurrence
- **Budget and schedule activities** required to implement the chosen responses
- **Contingency plans** and triggers that call for their execution
- **Fallback plans** for use as a reaction to a risk that has occurred. These are plans with specific actions that will be taken if the contingency plan is not effective.
- **Residual risks** that may remain after planned responses have been taken
- **Secondary risks** that arise as a direct result of implementing a risk response
- **Contingency reserves** that are calculated based on the quantitative risk analysis of the project and the organizations risk thresholds

Exercise 4.1: Updating the Risk Register with Risk Responses



In this exercise, you have a list of identified risks that that have completed their analysis process. You are tasked with planning risk responses of the risks and updating the risk register. You are requested to identify an appropriate risk response strategy. It can be one for the following:

- avoid
- mitigate
- transfer
- accept

How would you respond to these risks? What is the specific response strategy in each case?

Exercise 4.1: Updating the Risk Register with Risk Responses - Worksheet

Current Risks:

1. If lack of web development skills exist, a poorly performing order entry system may occur leading to customers not using the system.
2. Customers may reject the design of the web-based system causing a loss of orders.
3. Employees being laid off may seek remuneration causing law suits for wrongful termination.
4. Due to "new" nature the learning curve may result in cost and time over-runs.

Risk ID	Risk Response	Response Plan	Trigger	Contingency Plan

Lesson 4 Summary: Learning Objectives Recap

- Discuss risk response strategies
  There are several risk response strategies available to project managers, each of which requires specific actions to be developed to implement the strategy. They include;
  - Avoid
  - Transfer
  - Mitigate
  - Accept

  When faced with positive risks (opportunities), project managers need to consider the correct response strategy – whether to exploit, share, or enhance the positive risk.

Notes

LESSON 5: CONTROL RISK

Topic 1: Risk Control

Topic 2: Risk Ownership and Action

Topic 3: Tracking the Action Plan

Topic 4: Presenting the Action Plan

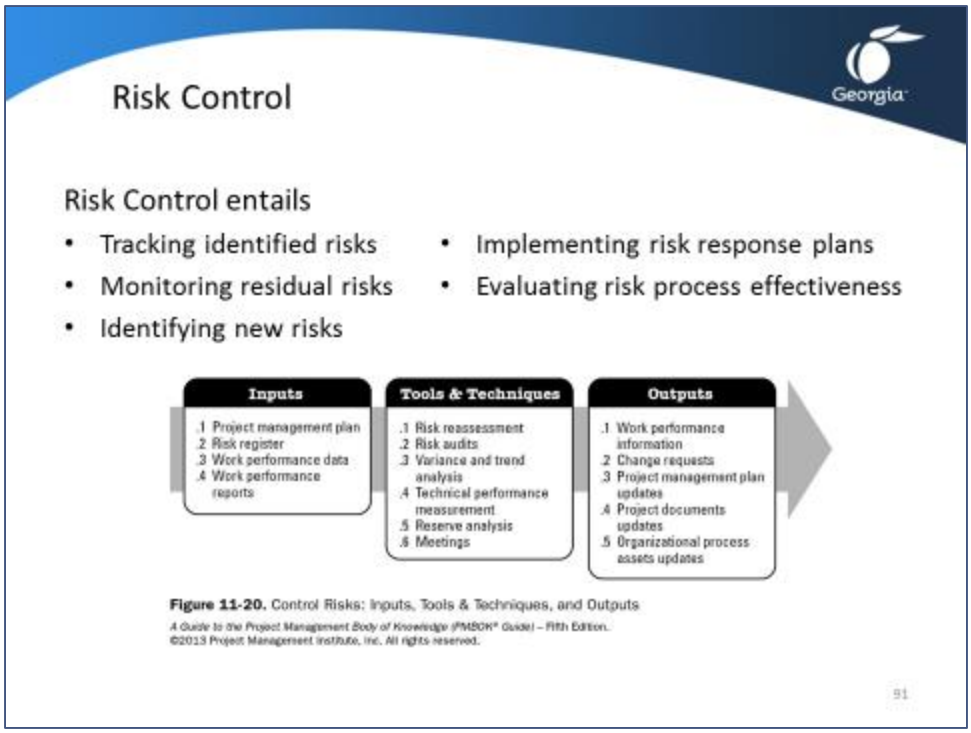
Student Learning Objectives

After completing this lesson you should be able to

- Recognize where and why risk control is used
- Explain the relevance of action plans as part of risk control
- Identify the tools and techniques that can be used to track risk action plans

Approximate Presentation time: 2.0 hours

Topic 1: Risk Control



Risk Control

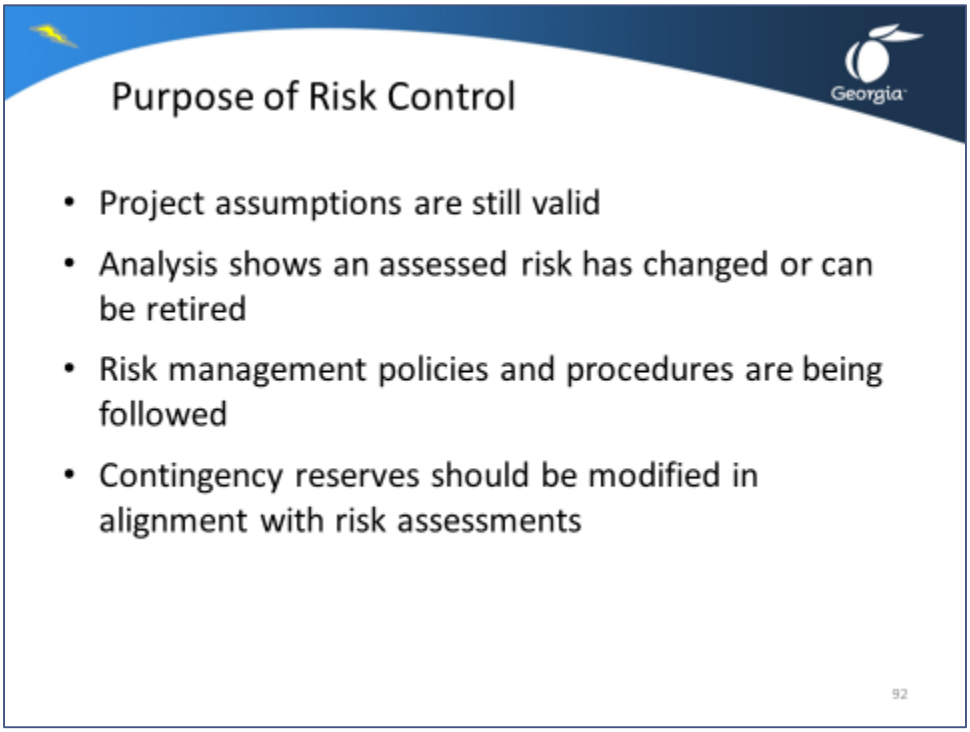
The Control Risk process involves

- **tracking identified risks**
- **monitoring residual risks** (risks that remain after risk responses have been implemented)
- **identifying new risks**
- evaluating risk process **effectiveness** throughout the project life cycle

This process records risk metrics associated with implementing contingency plans. It is an ongoing process for the life of the project. As the project progresses, the risks change, new risks develop, or expected risks do not appear.

Good risk control processes provide information that enable effective decisions to be made before the risk occurs.

Topic 1: Risk Control



Control Risk - Purpose

All project stakeholders need to be involved periodically in risk control, in order to assess the acceptability of the level of risk on the project. The purpose of the Control Risk process is to ascertain whether

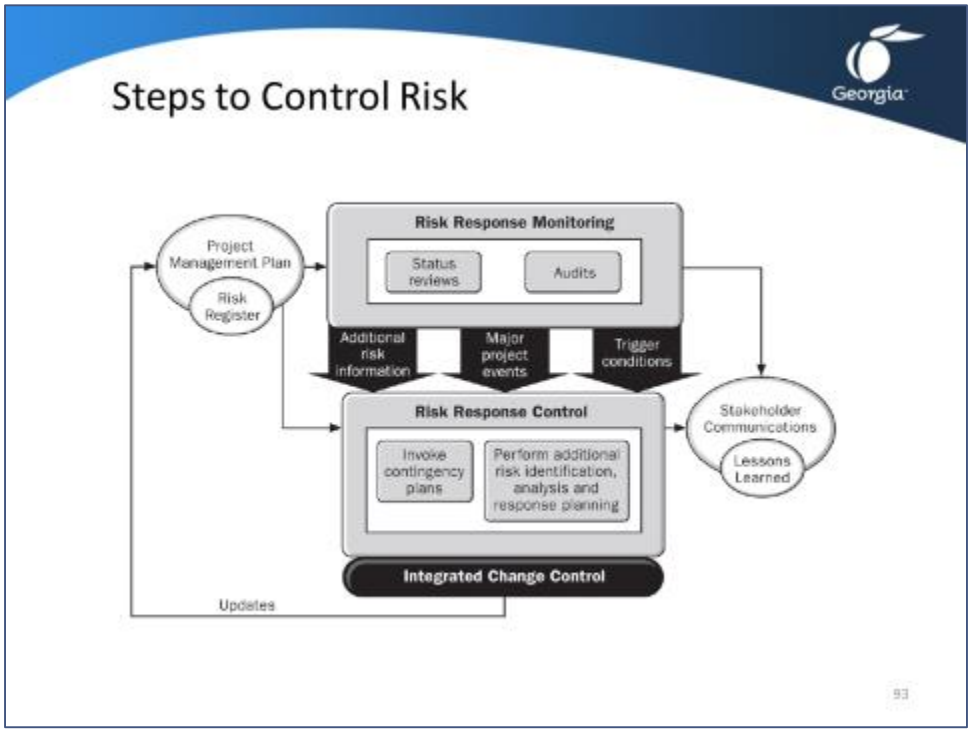
- Project assumptions are still valid
- Analysis shows an assessed risk has changed or can be retired
- Risk management policies and procedures are being followed
- Contingency reserves for cost or schedule should be modified in alignment with the current risk assessment

Risk control may entail

- choosing alternative strategies
- executing a contingency plan
- taking corrective action
- modifying the project management plan

The risk response owner should report periodically to the project manager and the risk team leader on the effectiveness of the plan, any unanticipated effects, and any mid-course corrections needed to offset the risk.

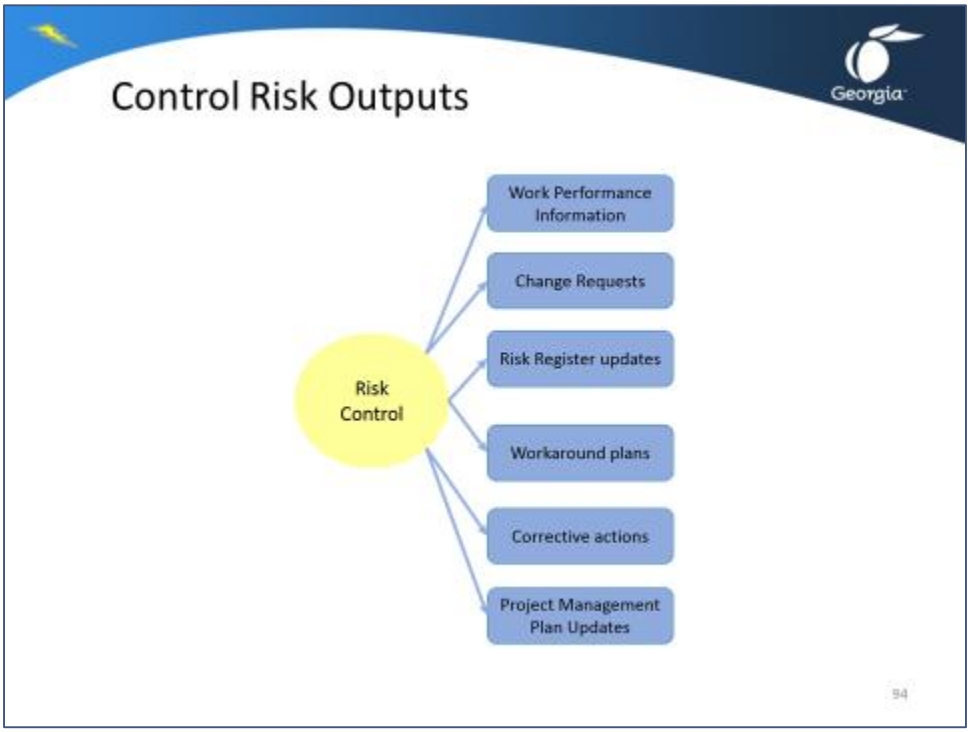
Topic 1: Risk Control



Critical Success Factors to Control Risk

- **Integrate Risk Control with Project Monitoring and Controlling**
  The project management plan should include the actions required to control risk. Once the Plan Risk Response process has been carried out, the project schedule should include all of the agreed-upon, response-related actions so that they can be carried out as a normal part of project execution and tracked in the project schedule.
- **Continuously Monitor Risk Trigger Conditions**
  The Plan Risk Response process will have defined a set of actions to be carried out as part of the project schedule as well as actions whose execution is dependent on a predefined trigger condition. Checking for specifically defined risks that may trigger conditional responses is the responsibility of the risk action owner.
- **Maintain Risk Awareness**
  Risk management reports should be a regular item on every status meeting agenda to ensure that all team members remain aware of the importance of risk management and to ensure that is fully integrated into all of the project management decisions.

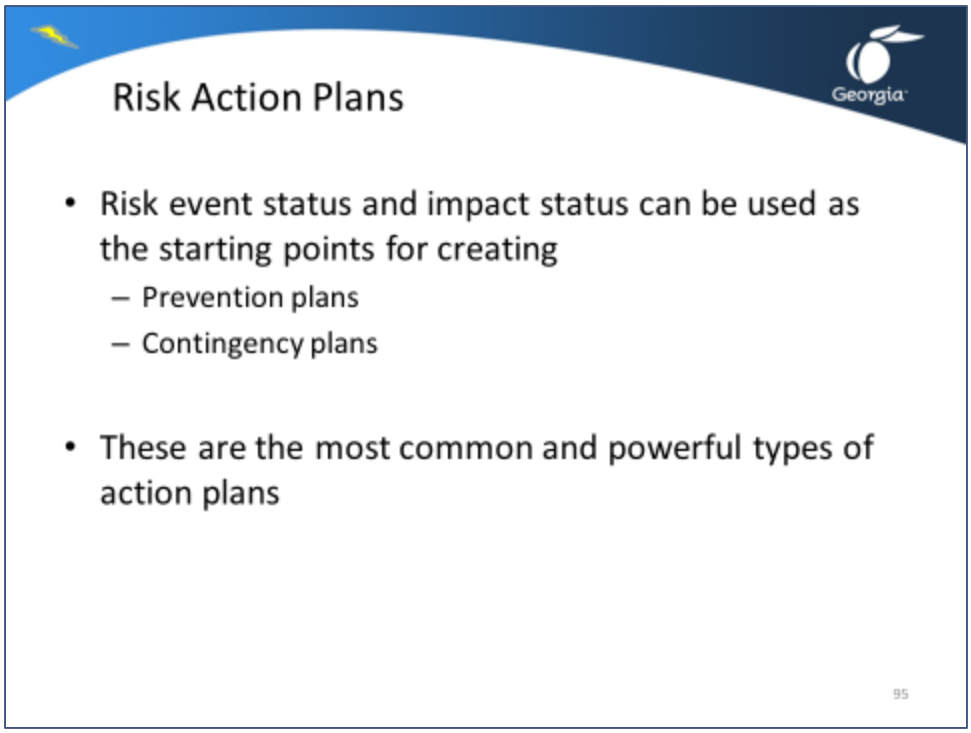
Topic 1: Risk Control



Control Risks: Outputs

- **Work Performance Information**
  This information provides a mechanism to communicate and support project decision making
- **Change Requests**
  Change requests are a result of implementing a contingency plan or workaround. Change requests are prepared and submitted to the Perform Integrated Change Control process. They can include recommended corrective and preventive actions as well.
    - **Corrective actions** are activities that realign the performance of the project work. They include contingency plans and **workarounds**, which are responses that were not initially planned, but are required to deal with emerging risks that were previously unidentified or accepted passively.
    - **Preventive actions** are activities that ensure that future performance of the project work is aligned with the project management plan.
- **Project Management Plan Updates**
  If the approved change requests have an effect on the risk management processes, the corresponding component documents of the project management plan are revised and reissued to reflect the approved changes.

Topic 2: Risk Ownership and Action



Risk Action Plan

The risk action plan is a subset of the risk register. A **risk register** is the documentation of identified risk, analysis information, and response strategies. The **risk action plan** is a series of steps used to realize the desired response strategy.

Risk event status and impact status can be used as the starting points for creating the most common and powerful types of action plans: prevention plans and contingency plans.

Usually, each risk event status suggests a **prevention plan**, which is an action plan that keeps the risk event from occurring. A **contingency plan** is an action plan that minimizes the actual loss should the risk event occur despite your prevention plans. These plans also depend on the type of response strategy identified.

Sometimes, one status suggests multiple action plans, whereas others do not lead to an action plan by themselves. An effective action plan must designate a responsible individual, a due date, a means of measuring progress, and resources to execute the plan.

The model facilitates the formulation of actionable plans in two ways:

- The status often may point toward an **effective action plan** targeting root causes.
- If an **action plan isn't apparent**, it may be necessary to check that the status for the risk is listed in full.

If the risk event and impact status are not defined clearly, it cannot be assumed that a clear picture of the risk has been obtained. A lack of clarity in wording the risk event and impact status will become apparent when you are attempting to convert risk events into action plans.

Topic 3: Tracking the Action Plan

Control Risks: Tools and Techniques

Risk Reassessment
Control Risks often result is identification of new risks, reassessment of current risks, and the closing of risks that are outdated. Risk reassessments should be regularly scheduled. The amount and detail of repetition depends on how the project progresses relative to its objectives.

Risk Audits
Risk audits examine and document the effectiveness of the risk responses in dealing with identified risks and their root causes, as well as the effectiveness of the risk management process. The risk management plan should define the frequency of these audits. They may also be included during routine project review meetings.

Variance and Trend Analysis
Trends in the projects execution should be reviewed using performance information. Earned value analysis and other methods of project trend and variance analysis may be used as well.

Technical Performance Measurement
This compares technical accomplishments during project execution to the schedule of technical achievement. It requires the definition of objective, quantifiable measures of technical performance, which can be used to compare actual results and targets. These measures may include weight, transaction time, number of delivered defects, etc.

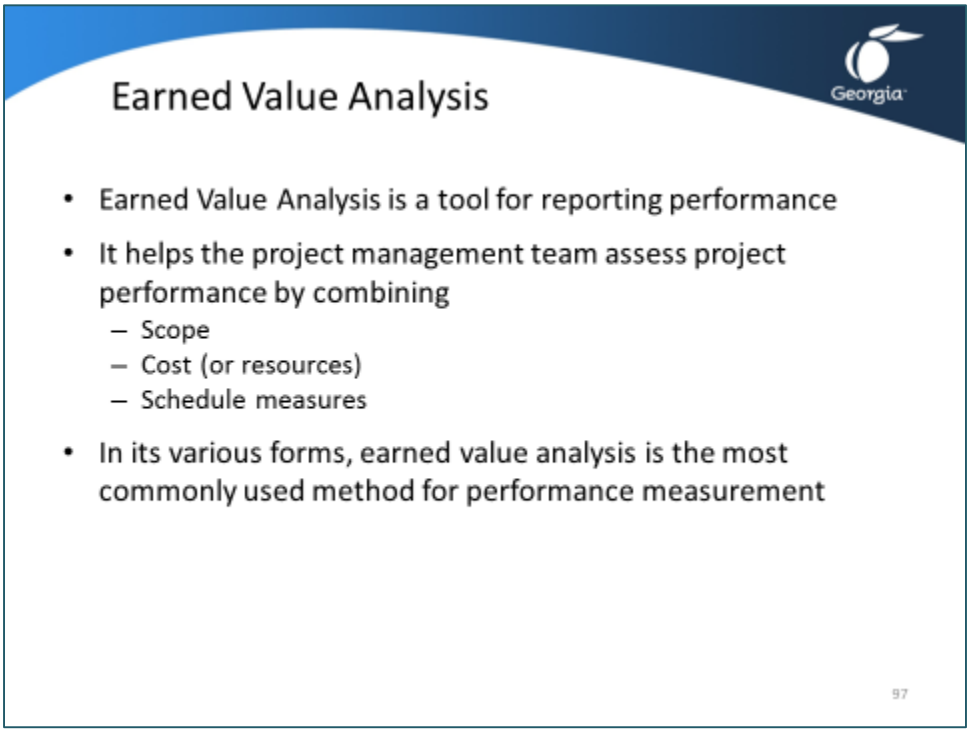
Reserve Analysis
Reserve analysis compares the amount of contingency reserves remaining to the amount of risk remaining at any time in the project in order to determine if the remaining reserve is adequate.

Meetings

Project risk management should be an agenda item at periodic status meetings. The more often risk management is practiced, the easier it becomes. Frequent discussions about risk make it more likely that people will identify risks and opportunities.

This course looks at earned value in detail because it is the commonly recommended control tool for all types of project and risk plans.

Topic 3: Tracking the Action Plan



Earned Value Analysis

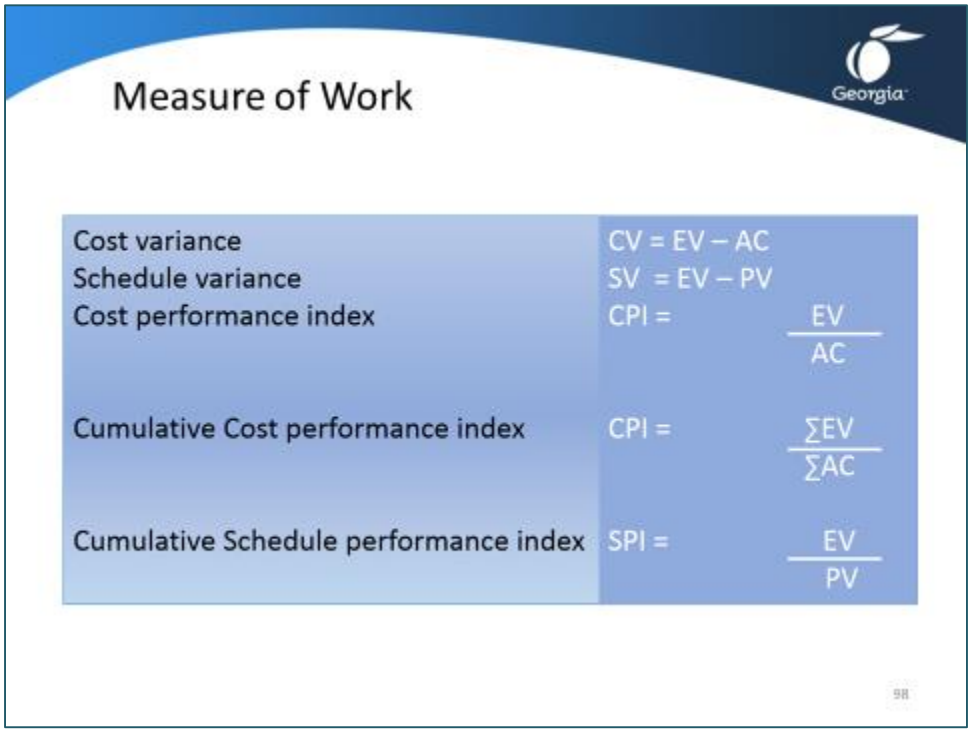
Of the tools for monitoring and controlling risk, earned value analysis is perhaps the most important.

Earned value analysis is a tool for reporting performance. In its various forms, earned value analysis is the most commonly used method of performance measurement. It combines scope, cost (or resource), and schedule measures to help the project management team assess project performance.

There are three key values that must be calculated for each activity in earned value analysis.

- **planned value (PV)**, this is the portion of the approved cost estimate planned to be spent on the activity during a given period
- **earned value (EV)**, this is the value of the work actually completed
- **actual cost (AC)**, this is the total of all costs incurred in accomplishing work on the activity during a given period, and it must correspond to whatever was budgeted for the PV and the EV

Topic 3: Tracking the Action Plan



Earned Value Analysis

Planned value, earned value, and actual cost can be combined in various ways to provide measures of whether work is being accomplished as planned.

The most commonly used measures are the **cost variance (CV)** and the **schedule variance (SV)**:

CV = EV – AC
SV = EV – PV

These two values can be converted to efficiency indicators to reflect the cost and schedule performance of any project.

The **cost performance index (CPI)** is the most commonly used cost-efficiency indicator:

CPI = EV/AC

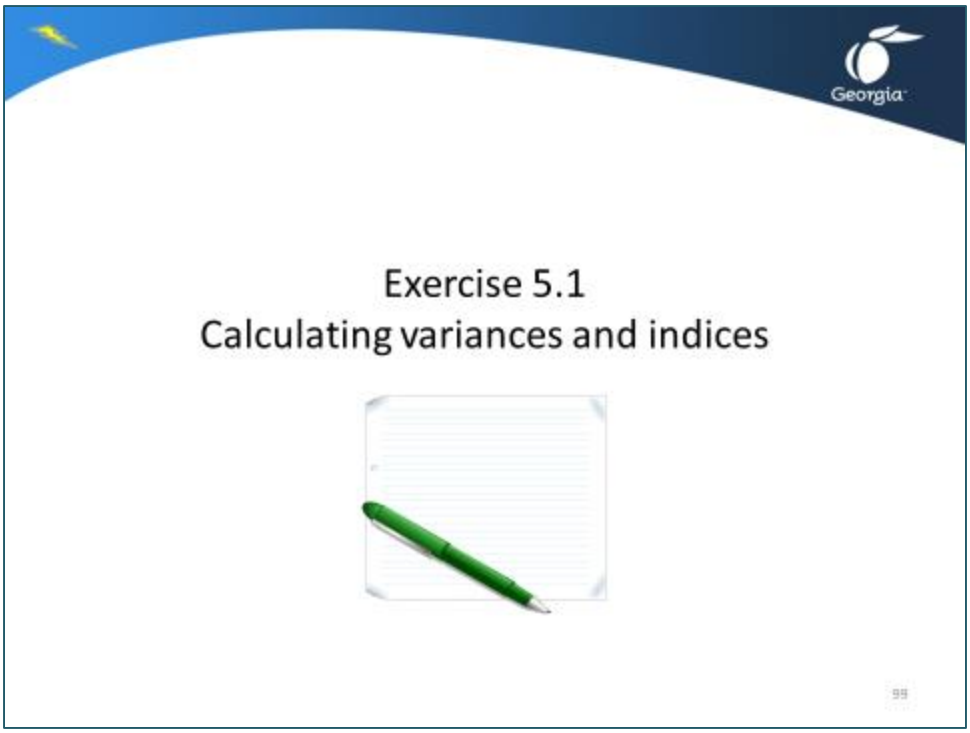
The cumulative CPI is widely used to forecast project costs at completion:

Cumulative CPI = ∑ EV / ∑AC

The **schedule performance index (SPI)** is sometimes used in conjunction with the CPI to forecast the project completion estimates:

SPI = EV/PV

Exercise 5.1: Calculating Variances and Indices



Instructions:

Due to the "new" nature of the Web-based Order Entry system project for all stakeholders, the associated learning curve may result in cost and time over-runs.

While the vendor is experienced in web-based projects, the functional expertise within Speedy Office Supplies may undergo a learning curve during the pilot scheme which will result in cost and time over-runs.

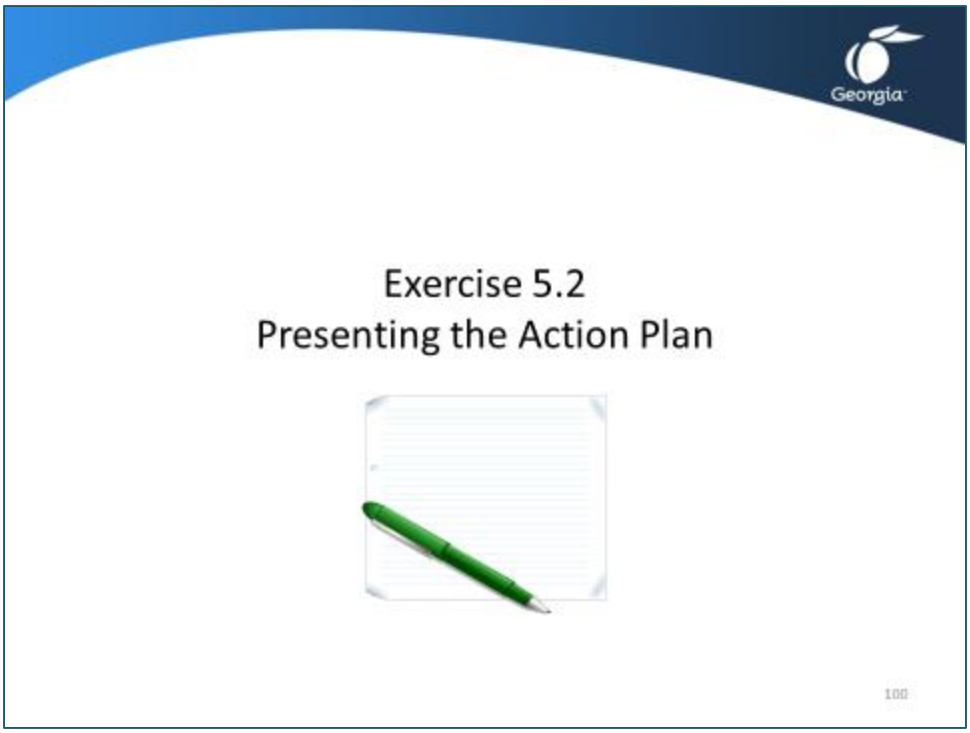
The response to this risk is to put training plans in place and monitor progress to see if the risk event status is reduced. The newly hired Training Manager owns this risk and is indicating that such training will take 6 months to complete at a cost of $180,000, which will be prorated evenly per month. There are ninety people who need to be trained, with 15 people receiving the training per month. At the end of the second month, at a risk review meeting, the training manager indicates that they have spent $40,000 and 20 people have completed the training program.

You are requested to represent this data using cost variances, schedule variances, cost performance index and schedule performance index, and comment on the overall position of the training program.

CV = EV – AC
SV = EV – PV
CPI = EV/AC
SPI = EV/PV

Exercise 5.1: Calculating Variances and Indices - Worksheet

Exercise 5.2: Presenting the Action Plan



Instructions:

At this point the Risk Register for the Speedy Office Supplies Web-based Order Entry System project is completed.

You are requested to discuss the risk status of the project at the quarterly risk review meeting with Sam Speedy and the senior management team. Indicate the current status of risks and results of any action plans taken to reduce the impact of any risks. The current Risk Register is provided for your use.

Exercise 5.2: Presenting the Action Plan - Worksheet

Risk Id	Risk Statement [Event + Impact]	Consequence	Potential Responses	Risk Owner	Risk Probability	Risk Impact	Risk Status	Risk Response	Response Plan	Trigger	Contingency Plan
1	If lack of web development skills exist, a poorly performing order entry system may occur leading to customers not using the system.	Sales will drop.	Do nothing Procure skills outside Train IT team Procure working system	IT Department	0.9	0.8	0.72	Transfer	Create Employee Training Program and use qualified vendors for knowledge transfer	Vendor product misses critical quality check points.	Utilize existing staff to augment after they have been trained.
2	Customers may reject the design of the web-based system causing a loss of orders.	Customer service suffers and sales drop.	Do nothing Include customer in design Offer deep discounts for a period of time	IT Department Sales Department	0.7	0.4	0.28	Mitigation	Verify vendor references Skill added to RFP with demonstration skill set	Focus group does not find consensus in requirements or design.	Bring in professional facilitator and mediate a consensus.
3	Employees being laid off may seek remuneration causing law suits for wrongful termination.	Added costs from legal action, bad morale, bad publicity.	Do nothing Develop package of compensation, benefits, and placement services Offer bonuses for transition	CEO HR Department	0.5	0.2	0.10	Mitigate	Monitor political activity and adjust project plan accordingly	Employee surveys show discontentment over package.	Have legal on retainer and begin negotiating one-on-one.
4	Due to "new" nature the learning curve may result in cost and time over-runs	Delivery delays Potential cancellation of project Lose of support from stakeholders Reduced quality of deliverables	Do nothing Reduce scope Lengthen schedule Training program Hire contractors	CEO IT Department	0.9	0.8	0.72	Mitigation	Create Employee Training Program and use blended learning techniques for accelerated knowledge transfer	Major deliverables becoming past due	Procure experienced staff to augment call center, distribution center, and functional duties while staff learns new system.
	Project Risk Score				**0.75**	**0.55**	**0.41**				

Lesson 5 Summary: Learning Objectives Recap

- Recognize where and why risk control is used
  The process of risk control involves **tracking identified risks, monitoring residual risks**, **identifying new risks,** ensuring the execution of **risk plans,** and evaluating the **effectiveness of risk plans** in reducing risk.

  The main elements of risk control are the **risk management plan,** the **risk register, project communication, additional risk identification of potential risks** and **scope changes.**

  The results from risk control are **workaround plans, corrective action, project change requests, updates to the risk register** and **updates to risk identification checklists.**

- Explain the relevance of action plans as part of risk control
  The **risk action plan** is a series of steps used to realize the desired response strategy.

  There are two types of action plans. A **prevention plan** is an action plan that keeps the risk event from occurring. A **contingency plan** is an action plan that minimizes the actual loss should the risk event occur despite your prevention plans. These plans also depend on the type of response strategy identified.

  If the risk event and impact status are not defined clearly, it cannot be assumed that a clear picture of the risk has been obtained. A lack of clarity in wording the risk event and impact status will become apparent when you are attempting to convert risk events into action plans.

- Identify the tools and techniques that can be used to track risk action plans
  Earned value analysis is a tool for reporting performance. The three key values that must be calculated for each activity in earned value analysis are;
  Planned value (PV),
  Earned value (EV)
  Actual cost (AC).

  The most commonly used cost-efficiency indicator is the cost performance index (CPI):
  CPI = EV/AC

  The schedule performance index (SPI) is sometimes used in conjunction with the CPI to forecast the project completion estimates:
  SPI = EV/PV

Notes

APPENDIX I - EXERCISE ANSWERS

Exercise 1.1: Are you a risk seeker or risk averse?

Instructions:
Read the excerpts that follow and decide which option you would choose.

A project manager is sourcing equipment for a new IT project. The project has to choose between two vendors, Best Retailer IT and New Retailer IT. To simplify the problem, the project manager decides to estimate the potential profit of these vendors on the basis of product reliability.

- Through research and talking to other project managers, the manager finds that Best Retailer IT has a 60% chance of providing reliable equipment, and its parts cost $300,000 (this includes costs of installations and maintenance).
- There is, however, a 40% chance that the equipment will fail – in which case, costs can increase to $850,000.
- On the other hand, if New Retailer IT is chosen, there is an 80% chance of high reliability at a cost of $750,000 and a 20% chance of failure.
- New Retailer IT provides lifelong guarantees and maintenance services.

Would you choose Best Retailer IT or New Retailer IT?

Sample answer & guidelines

If you choose Best Retailer IT, you can consider yourself to be a risk seeker, and if you chose New Retailer IT, you could be considered averse to risk.

- **Risk seekers** will choose the option with the most at stake (40% chance that costs can increase to $850,000) but the most favorable outcome ($300,000 cost).

- **Risk averse** individuals will choose the safest option (80% chance of high reliability at a cost of $750,000) with a life-long guarantee. However, this is the costly option.

As a risk seeker would the following scenario change your mind?

Given the competition from New Retailer IT, Best Retailer IT has proposed the following incentive: a 70% guarantee of providing reliable equipment and parts at a cost of $300,000. There is still however a 30% chance that the equipment will fail – in which case, the costs can increase to $850,000.

Would this change your choice of retailer?

As Best Retailer IT increases its guarantees, its offer becomes attractive to even the most risk-averse individuals because of the massive savings it offers compared with New Retailer IT.

Exercise 1.2: Preparing a Risk Management Plan

Instructions:

Assume that the Web-based order entry project has been approved. You are part of the assembled dedicated risk management team. The first set of tasks entails identifying a risk management plan, including key aspects for consideration by the project sponsors.

A risk management plan template is provided for guidance.

Exercise 1.2: Preparing a Risk Management Plan

Risk Management Plan Template:

Methodology

The methodology defines the approaches, tools, and data sources that may be used to perform risk management.

1. Risk Management Planning
2. Identify Risks
3. Perform Qualitative Risk Analysis
4. Perform Quantitative Risk Analysis
5. Plan Risk Responses
6. Control Risk

Roles and Responsibilities

Defines the lead, support, and risk management team members for each type of activity in the risk management plan and clarifies their responsibilities.

Roles	Responsible	Accountable	Consulted	Informed
Project Manager		X		
Risk Owner	X			
Program Manager		X		X
Sr Management		X	X	X
Top Management				X

Budgeting

Assigns resources, estimates funds needed for risk management for inclusion in the cost performance baseline, and establishes protocols for application of contingency reserve.

Contingency budgets for the Web-based Order Entry project will be determined by calculations performed to account for identified schedule and cost risk. Any pre-determined corrective actions will also be allocated from the contingency reserves.

Timing

Defines when and how often the risk management process will be performed throughout the project life cycle, establishes protocols for application of schedule contingency reserves, and establishes risk management activities to be included in the project schedule.

Monthly team reviews of the risk register. Identifying and prioritizing risks. Start weekly and move to monthly meetings. If triggers or thresholds met then activate contingency plans and communicate to stakeholders.

Risk Categories

Provides a structure that ensures a comprehensive process of systematically identifying risks to a consistent level of detail and contributes to the effectiveness and quality of the Identify Risks process. An organization can use a previously prepared categorization framework which might take the form of a simple list of categories or might be structured into a Risk Breakdown Structure (RBS). The RBS is a

hierarchically organized depiction of the identified project risks arranged by risk category and subcategory that identifies the various areas and causes of potential risks.

1. Technical
    a. Requirements
    b. Technology
    c. Complexity and Interfaces
    d. Performance and Reliability
    e. Quality
2. External
    a. Subcontractors and suppliers
    b. Regulatory
    c. Market
    d. Customer
    e. Weather
3. Organizational
    a. Project dependencies
    b. Resources
    c. Funding
    d. Prioritization
4. Project Management
    a. Estimating
    b. Planning
    c. Controlling
    d. Communication

Definitions of Probability and Impact

The quality and credibility of the Perform Qualitative Risk Analysis process requires that different levels of the risks' probabilities and impacts be defined.

Defined Conditions for Impact Scales of a Risk on Major Project Objectives					
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	Quality reduction requires sponsor approval	Quality reduction unacceptable to sponsor	Project end item is effectively useless

Probability and Impact Matrix

Risks are prioritized according to their potential implications for having an effect on the project's objectives. A typical approach to prioritizing risks is to use a look-up table or a Probability and Impact Matrix. The specific combinations of probability and impact that lead to a risk being rated as "high", "moderate", or "low" importance, with the corresponding importance for planning responses to the risk are usually set by the organization.

Probability Impact Matrix										
Probability	Threats					Opportunities				
0.90	0.05	0.09	0.18	0.36	0.72	0.72	0.36	0.18	0.09	0.05
0.70	0.04	0.07	0.14	0.28	0.58	0.56	0.28	0.14	0.07	0.04
0.50	0.03	0.05	0.10	0.20	0.40	0.40	0.20	0.10	0.05	0.03
0.30	0.02	0.03	0.06	0.12	0.24	0.24	0.12	0.06	0.03	0.02
0.10	0.01	0.01	0.02	0.04	0.08	0.08	0.04	0.02	0.01	0.01
	0.05	0.10	0.20	0.40	0.80	0.80	0.40	0.20	0.10	0.05

Revised Stakeholders' Tolerances

Stakeholders' tolerances, as they apply to the specific project, may be revised in the Plan Risk Management process.

Stakeholder	Risk Attitude	Risk Driver
Customers	Averse	Cost, reliability, shopping experience
Senior Management	Averse	Cost, meet business goals, profitability
Shipping Company	Seekers	Profits, on-time delivery
Credit Card Company	Averse	Profits, security
Employees	Averse	Job security, compensation

Reporting Formats

Defines how the outcomes of the risk management processes will be documented, analyzed, and communicated. It describes the content and format of the risk register as well as any other risk reports required.

Risk Register, Stakeholder Analysis with Risk Tolerance, Impact Matrix, Risk Status Report

Tracking

Documents how risk activities will be recorded for the benefit of the current project, as well as for future needs and lessons learned, as well as whether and how the risk management process will be audited.

Risk Register
Action Plan with Risk Status Log

Exercise 2.1: Using Risk Gathering Techniques

Instructions:

Having read the Speedy Office Supplies case study, the Web-based order entry project has been approved. As a part of the assembled dedicated risk management team you have delivered a risk management plan to the project stakeholders. The stakeholders have requested that a SWOT analysis be performed to highlight project strengths and opportunities.

Strengths	Weaknesses
Experienced management team Strong customer base Executive support Proven legacy system	Lack of web development skills IT Department unfamiliar with web-based systems Little experience in running distribution centers No experience in Call Center management
Opportunities	**Threats**
Expanded product line Larger market, international Cost reduction Centralized inventory/distribution	Other on-line retailers with more experience Law suits be employees Low morale from remaining workforce Rejection of model by customers Downturn in Real Estate market

Exercise 2.2: Using Risk Identification Tools and Techniques

Instructions:

Having read the Speedy Office Supplies case study, the Web-based order entry project has been approved. As a part of the assembled dedicated risk management team you have completed a SWOT analysis there are some apparent risks that need to be logged. You are tasked with delivering the initial components of a risk register that should include a list of identified risks and potential responses.

Use the following structure for describing identified risks;

- EVENT may occur causing IMPACT, or
- If CAUSE exists, EVENT may occur leading to EFFECT.

Use the template provided on the next page to complete the initial risk register for the Speedy Office Supplies Web-based Order Entry System project.

Risk ID	Risk Statement	Consequence	Potential Responses
1	If lack of web development skills exist, a poorly performing order entry system may occur leading to customers not using the system.	Sales will drop.	Do nothing Procure skills outside Train IT team Procure working system
2	Customers may reject the design of the web-based system causing a loss of orders.	Customer service suffers and sales drop.	Do nothing Include customer in design Offer deep discounts for a period of time
3	Employees being laid off may seek remuneration causing law suits for wrongful termination.	Added costs from legal action, bad morale, bad publicity.	Do nothing Develop package of compensation, benefits, and placement services Offer bonuses for transition
4	Due to the “new” nature of the project for all stakeholders, the associated learning curve may result in cost and time over-runs.	Delivery delays Potential cancellation of project Lose of support from stakeholders Reduced quality of deliverables	Do nothing Reduce scope Lengthen schedule Training program

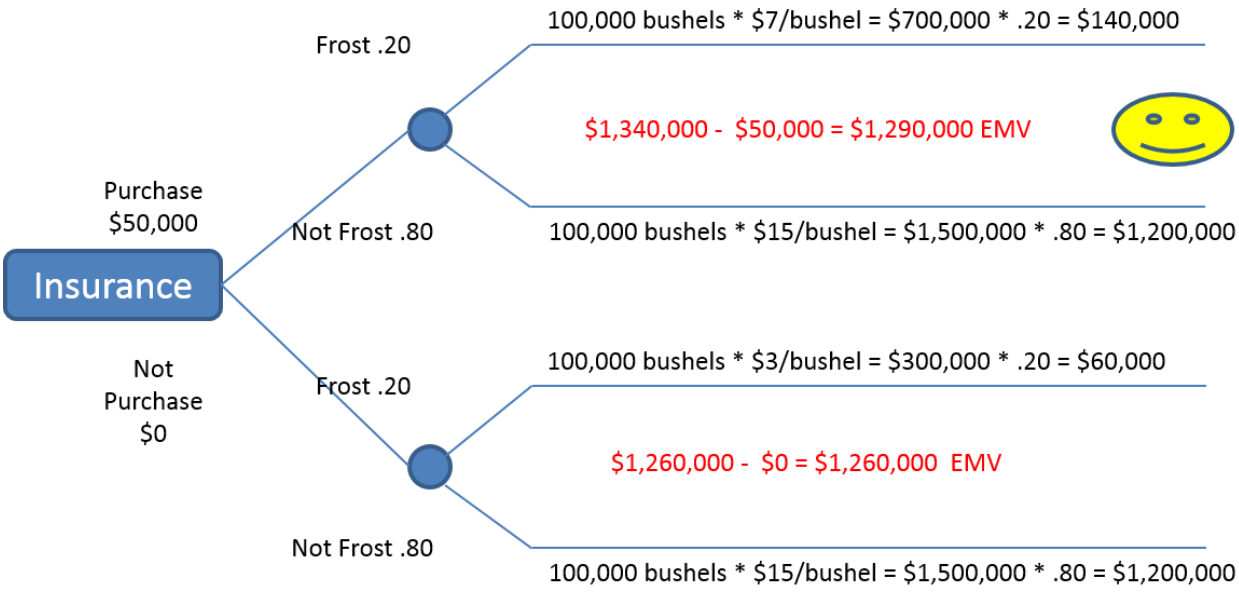
Exercise 3.1: What Should the Farmer do?

A Georgia farmer needs to make a decision. His orchard is expected to produce 100,000 bushels of peaches, which he wishes to sell to a large grocery chain at $15 per bushel as 'Grade A' peaches.

However, he has great concern about the possibility of early frost damaging his crop. For three of the past five years, the western part of the state where the farmer lives has suffered severe frost.

The Department of Agriculture's figures show that the probability of early frost in the orchard area in any given year is 20%. If his crop is damaged, it would not be marketable as fresh fruit and he would have to sell it to a cannery in Alabama for $3.00 per bushel.

He could purchase insurance which would ensure that if his peaches were damaged, he could sell the total crop (both damaged and good fruit) to the insurance company for $7.00 per bushel. The cost of the insurance would be $50,000. What are the monetary expectations of the farmer's decision to purchase or to not purchase insurance?



Exercise 3.2: Performing Risk Analysis

In this exercise, you have a list of some apparent risks that need to be logged. You are tasked with performing a risk analysis of the risks and updating the risk register with the following information;

- Risk Owner
- Risk Probability
- Risk Impact
- Risk Status

Current Risks:

5. If lack of web development skills exist, a poorly performing order entry system may occur leading to customers not using the system.
6. Customers may reject the design of the web-based system causing a loss of orders.
7. Employees being laid off may seek remuneration causing law suits for wrongful termination.

Probability and Impact Matirix

Probability	Threats					Opportunities				
0.90	0.05	0.09	0.18	0.36	0.72	0.72	0.36	0.18	0.09	0.05
0.70	0.04	0.07	0.14	0.28	0.56	0.56	0.28	0.14	0.07	0.04
0.50	0.03	0.05	0.10	0.20	0.40	0.40	0.20	0.10	0.05	0.03
0,30	0.02	0.03	0.06	0.12	0.24	0.24	0.12	0.06	0.03	0.02
0.10	0.01	0.01	0.02	0.04	0.08	0.08	0.04	0.02	0.01	0.01
	0.05/ Very low	0.10/ Low	0.20/ Medium	0.40/ High	0.80/ Very high	0.80/ Very high	0.40/ High	0.20/ Medium	0.10/ Low	0.05/ Very low

Risk ID	Risk Owner	Risk Probability	Risk Impact	Risk Status
1	IT Department	.9	.8	.72 High Risk
2	IT Department Sales Department	.7	.4	.28 High Risk
3	CEO	.5	.2	.10 Med Risk
4	CEO IT Department	.9	.8	.72 High Risk

Exercise 4.1: Updating the Risk Register with Risk Responses

In this exercise, you have a list of identified risks that that have completed their analysis process. You are tasked with planning risk responses of the risks and updating the risk register. You are requested to identify an appropriate risk response strategy. It can be one for the following:

- Avoid, mitigate, transfer, accept

How would you respond to these risks? What is the specific response strategy in each case?

Risk ID	Risk Statement	Consequence	Potential Responses
1	If lack of web development skills exist, a poorly performing order entry system may occur leading to customers not using the system.	Sales will drop.	Do nothing Procure skills outside Train IT team Procure working system
2	Customers may reject the design of the web-based system causing a loss of orders.	Customer service suffers and sales drop.	Do nothing Include customer in design Offer deep discounts for a period of time
3	Employees being laid off may seek remuneration causing law suits for wrongful termination.	Added costs from legal action, bad morale, bad publicity.	Do nothing Develop package of compensation, benefits, and placement services Offer bonuses for transition
4	Due to the "new" nature of the project for all stakeholders, the associated learning curve may result in cost and time over-runs.	Delivery delays Potential cancellation of project Lose of support from stakeholders Reduced quality of deliverables	Do nothing Reduce scope Lengthen schedule Training program

Risk ID	Risk Owner	Risk Probability	Risk Impact	Risk Status
1	IT Department	.9	.8	.72 High Risk
2	IT Department Sales Department	.7	.4	.28 High Risk
3	CEO	.5	.2	.10 Med Risk
4	CEO IT Department	.9	.8	.72 High Risk

Risk ID	Risk Response	Response Plan	Trigger	Contingency Plan
1	Transfer Mitigate	Procure vendor with system that meets requirements	Vendor product misses critical quality check points.	Utilize existing staff to augment after they have been trained.
2	Mitigate	Form Customer Focus group and include in requirements, design, and implementation	Focus group does not find consensus in requirements or design.	Bring in professional facilitator and mediate a consensus.
3	Mitigate	Develop communication plan and severance package	Employee surveys show discontentment over package.	Have legal on retainer and begin negotiating one-on-one.
4	Mitigate	Create Employee Training Program and use blended learning techniques for accelerated knowledge transfer	Major deliverables becoming past due	Procure experienced staff to augment call center, distribution center, and functional duties while staff learns new system.

Exercise 5.1: Calculating Variances and Indices

Instructions:

Due to the “new” nature of the Web-based Order Entry system project for all stakeholders, the associated learning curve may result in cost and time over-runs.

While the vendor is experienced in web-based projects, the functional expertise within Speedy Office Supplies may undergo a learning curve during the pilot scheme which will result in cost and time over-runs.

The response to this risk is to put training plans in place and monitor progress to see if the risk event status is reduced. The newly hired Training Manager owns this risk and is indicating that such training will take 6 months to complete at a cost of $180,000, which will be prorated evenly per month. There are ninety people who need to be trained, with 15 people receiving the training per month. At the end of the second month, at a risk review meeting, the training manager indicates that they have spent $40,000 and 20 people have completed the training program.

You are requested to represent this data using cost variances, schedule variances, cost performance index and schedule performance index, and comment on the overall position of the training program.

CV = EV – AC
SV = EV – PV
CPI = EV/AC
SPI = EV/PV

Exercise 5.1: Calculating Variances and Indices - Worksheet

It costs $2,000 to train one person (Total Cost / Number of people trained = $180,000 / 90 = $2,000)

PV @ 2 months = 30 people trained at a cost of $60,000.
EV @ 2 months = 20 people trained = $40,000
AC @ 2 months = $40,000

CV = EV – AC
= $40,000 - $40,000
= 0

SV = EV – PV
= $40,000 - $60,000
= -$20,000

CPI = EV / AC
= $40,000 / $40,000
= 1

SPI = EV / PV
= $40,000 / $60,000
= 0.67 or 67%

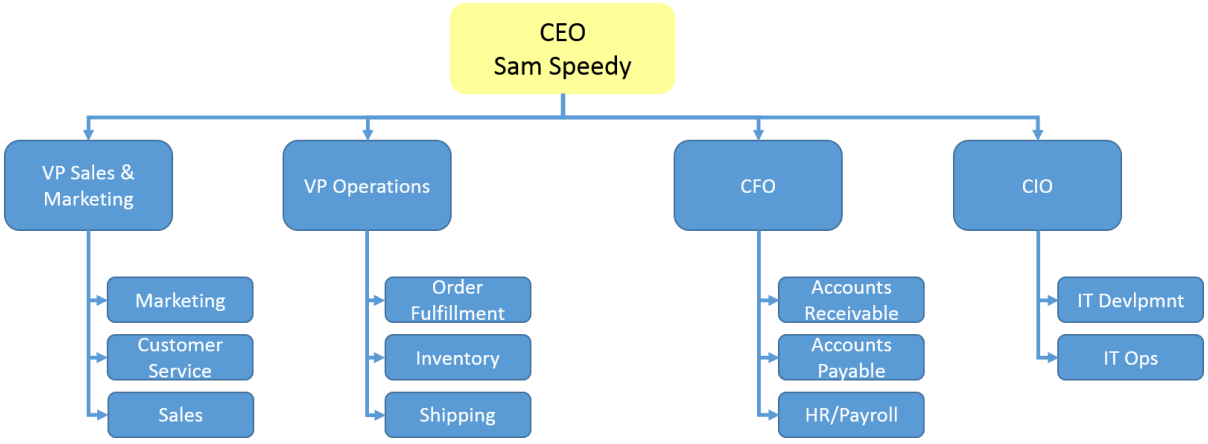
The training manager should be pleased with the cost performance, but he / she is not meeting the schedule and has completed 67% of the planned training program, which is a cause for concern

Case Study – Speedy Office Supplies Web Expansion Project

Company Overview

Speedy Office Supplies, led by founder and CEO Sam Speedy, has been in business for 30 years and is recognized as the leader in discount office supplies. We have a reputation of providing high quality products at reasonable prices and offering superior customer service. We are selling to corporate clients, governmental agencies, and individuals nationwide. Our customers are served by over 40,000 employees through direct sales, catalogs, e-commerce and more than 2,000 stores. Eighty percent of our business is currently done in our 2,000 retail stores with total annual sales of 700 million dollars.

Organizational Structure



Business Objectives

Objective Number	Business Objective	Strategic Objective
1	Increase sales by 30% over the next 5 years	Increase sales
2	Reduce overhead costs by 40% over the next 5 years	Reduce cost
3	Expand customer base by 25% over the next 5 years	Increase market share
4	Innovate internal systems and processes within 2 years	Increase effectiveness

Problem Definition

Over the past five years the Retail Store Division has shown a steady decline in sales from 900 million dollars to the current 700 million dollars, a 22% decline; energy costs have increased by 30% for our fleet vehicles and retail stores; employee health care costs have increased by 75% and continue to rise due to federal regulations.

Market trends and customer preferences are indicating that customers desire the ability to order their products on-line at times convenient to them. The SOS management team believes if we phase-out or reduce the number of stores in the Retail Store Division and implement a web-based

ordering system and consolidation of our distribution network, we anticipate a savings of nearly 10 million dollars per year. This system would also need to integrate into the existing legacy supply chain systems. Customer satisfaction surveys also indicate a favorable reaction to the concept of web-based sales, which could increase our current sales by at least 30% over the next 5 years, which will put SOS back on track to reach financial goals.

Current State

Currently orders for products are received via in-store requests, phone calls, or catalog mail-in from customers. We access our online system to check inventory, prices, and estimated shipping dates. If the order total is over $10,000 we turn it over to a supervisor. We then call the Credit Card Authorization Company to check the customer's credit card account. If the credit card charge is authorized we enter the order into the system. The current system is an old mainframe application and is very cumbersome.

There are purchasing agreements, special discounts, and payment terms for our clients purchasing over $50,000 per year. In the past, we have billed these customers on a monthly basis, providing them with a detailed listing by location of their purchases. We want to make it easier for them to pay via credit card each time they place an order to increase our cash flow and lower our Accounts Receivable. If possible, we still want to provide select customers the same reporting on a monthly basis for their purchases by location.

Federal Express and UPS are currently bidding on the exclusive rights for delivery of all customer office supplies. Each company is proposing an online interface to track shipments, including the name of the person who signs for the delivery. The shipment will need to have a label and detailed purchase order slip with the package. The cost of shipping is determined by the size of the package, weight, location, insurance, and timeliness of delivery. The customer will need an accurate shipping cost at the time of purchase.

Project Proposal

Based on this information SOS management is considering a decision to close or reduce the number of the brick and mortar stores within 18 months. We believe this decision will significantly cut costs and that we can be just as successful selling our products on our website.

Our main focus for this project is to create the shopping experience for our retail customer on the website and to place product orders on the Internet. We want to have real time information regarding product description; quantities; pricing; availability; payment processing; shipping method options with associated costs; delivery date; and order tracking. All information currently available at the retail stores and in the catalogs should be available and consistent with the Internet.

It would be nice if there were a place on the Internet for the customer to build a profile and store frequently purchased items in a list to use for future purchases. This would be very beneficial for large organizations that purchase the same products frequently.

We envision using our existing customer number and allowing each customer to create a password to ensure security. Anyone could look at the products online, but only registered customers would be allowed to place orders. The web site should have search ability by several options: product item number (from the catalog), product type, color, and size.

Hopefully when a customer places an order the software would quickly calculate a shipping charge and present the order total to the customer. We would not allow orders totaling more than $1,000 to be placed on the web. The software should also email a confirmation to the customer if requested.

Project Objectives

Project Objective	Project Objective Description	Business Objective
1	Provide a web-based order entry system	1, 2, 3, 4
2	Close or reduce retail stores	2, 4
3	Create distribution centers from some existing stores	2, 4
4	Provide superior shopping experience on web site	3

A feasibility team was formed and evaluated the business and project objectives to establish detailed specifications around the structural aspects of the project. The company also allocated a budget to invest in highly capable individuals who could provide a complete structural solution.

Project Implementation

Specialists recruited by the feasibility team subsequently presented a work breakdown structure (WBS) for the project as seen below, which subdivides the project work into the major elements and then their sub-elements. For example, a major element of work is the web-based order entry system work, which is subdivided into five sections. These sections include customer profile, search and scan products, ordering products, order billing and shipping, and integration to legacy system.

- WBS level 1 – Program/Phase: vision of the end product
- WBS level 2 – Project: the project's major deliverables
- WBS level 3 – Project units: the main work packages associated with each deliverable
- WBS level 4 – Further decomposition of Project units

The specialist team proposed that once the contracts are identified, the project could then be outsourced to different contractors.

Project Management

The feasibility team has proposed that a dedicated project management team be established within Speedy Office Supplies. The team would have total control over budgets and schedules and would report directly to the CEO.

The control, planning, and management of the project present complex logistical issues. The scheme may entail numerous individual contract packages, which will require coordination.

At a very early stage, the feasibility team settled the key project management objectives as

- effective and efficient communication of information
- utilization of thorough project control techniques
- efficient and widely understood procurement and contractor processes

This standardization is necessary to ensure that all contractors are working in unison. To furnish timely and accurate cost reports, the project control team needs a comprehensive system that

integrates cost and schedule, provides reporting capabilities consistent with the project requirements, and improves operating efficiency.

The system has to be capable of processing and analyzing a vast amount of incoming monthly cost data quickly and accurately. Also, the team could use integrated systems to perform risk and schedule simulation analysis where the relationship between the schedule and cost is not always clear.

Although technology has simplified data collection and scheduling, the feasibility team has identified that professionals must carefully study and analyze the system output to provide a logical, meaningful explanation of the causes of any cost and schedule variances. In this way, sound project control methodologies reduce cost overruns, control cost growth, help meet project schedule objectives, and ultimately satisfy the client's expectations.

Feasibility Report

The feasibility team completed their study on schedule with an outline of strategy, detailed recommendations, and a list of preferred suppliers.

The main outcomes from the team are the following:

- The web-based order entry system should be piloted in one region. Based on the relative success of the pilot and after a period of “customization”, the initiative can be deployed in other areas.
- Contractor participation is a key aspect to the success of the project, and Speedy Office Supplies should establish and work with a set of preferred suppliers.
- Speedy Office Supplies should establish a detailed project management office that has the authority to manage and control the project and report to senior management.

The feasibility team gave the green light for the project, based on these recommendations.

Internal Stakeholders

The **Marketing Department** is responsible for customer reporting and the negotiations for preferred customer status including volume discounts. Our largest customers receive one monthly bill for all their departments’ purchases and a report showing the detailed purchases. Additionally, marketing maintains the customer profiles, which are used to process orders, verify billing information, discounts, and reduce redundancy by eliminating the need for the customer to always enter their company information.

The **Customer Service Department** will need access to all information regarding customer orders to assist with the web site usage and handle any possible complaints.

Accounts Receivable is responsible for processing and sending bills to our preferred customers. The web ordering system will need to notify accounts receivable when one of our preferred customers request their order to be direct billed. Some customers have negotiated payment terms and discount rates based on volumes. They work with the Collections Department for any outstanding receivables beyond 90 days. On a monthly basis Accounts Receivable produces an aging report.

Inventory Management is impacted by a reduction in inventory from placed orders and an increase in inventory from cancellations and returns. They are responsible for managing the inventory and placing orders with vendors. Inventory Management is also responsible for handling returns, including items that have to be returned to the suppliers as defective.

Order Fulfillment receives an order notification from the order processing system containing all necessary information required to assemble the order. They are responsible for producing the packaging slips, retrieving the supplies, assembling the order into a bin or crate, and delivering the order to the Shipping Department.

The **Shipping Department** receives the order from fulfillment and prepares the order for shipment. The packing slip contains the shipping method requested by the customer and the estimated shipping timeframe. The Shipping Department is responsible for notifying the shipping company and updating the order status.

The **IT Department** manages and maintains a legacy supply chain system on mainframes at the corporate offices. Each retail store maintains its own sales and inventory on local servers that are integrated to the mainframe via communications lines. Sales and inventory data are downloaded nightly in batches to update corporate databases on the mainframe.

The **Employees** working in the retail stores. These may include stock clerks, cashiers, customer support, back office warehouse, drivers, and store managers. These employees will be directly impacted by a decision to close retail stores or consolidate them into distribution centers.

External Stakeholders

The **Shipping Company** currently has an online tracking system. Our web ordering system will have a direct link to the shipping company's web site for the customer to track packages using the tracking number provided by the Shipping Department to the order status system.

The **Credit Card Processor** currently authorizes customer purchases made in the stores, over the phone, or via fax. An additional interface will need to be established between the web application to receive the customer and order information and to return an authorization code.

The **Customers** ordering from the retail stores and from the web site. These customers will be directly impacted by a decision to close or limit the number of retail stores and purchasing goods via the web site.