Direct Your Learning

9

Risk Assessment and Treatment

Educational Objectives

After learning the content of this assignment, you should be able to:

- Describe risk identification and its purpose.
- Explain how an organization can use each of the following team-oriented techniques to identify its risks:
  - Facilitated workshops
  - Delphi technique
  - Scenario analysis
  - HAZOP (hazard and operability study)
  - SWOT (strengths, weaknesses, opportunities, and threats)
- Describe the purpose and the composition of a risk register.
- Describe the purpose and the composition of a risk map.
- Describe the risk treatment process and risk treatment techniques.
- Describe the activities required to manage risks in a project.

Outline

Risk Assessment and Treatment

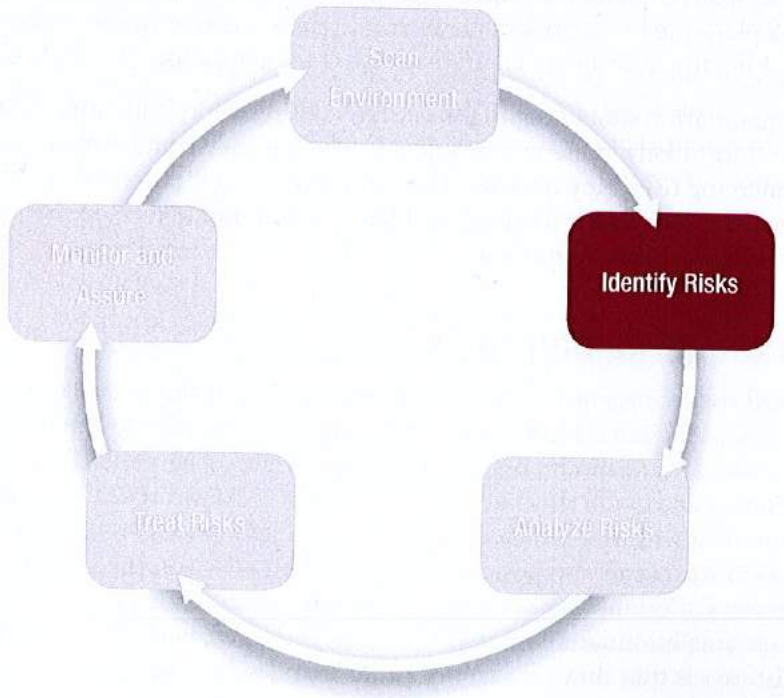
9

INTRODUCTION TO RISK IDENTIFICATION

Risks must be identified before they can be managed. To optimize risk management, organizations need to identify emerging risks in addition to existing risks.

Risk identification is one of the initial steps in the risk management process. Each organization, in tailoring a standard risk management process to its needs, should define how it will identify risk and the tools it will use in the process. A best practice for risk management professionals is a holistic approach to risk identification. See the exhibit "Enterprise Risk Management Process Model."

Enterprise Risk Management Process Model



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Definition of Risk Identification

International risk management standards such as ISO 31000 and COSO ERM, as well as traditional risk management processes, include risk identification as an initial step in the process. COSO ERM uses the term "event identification," which it defines as management identifying "potential events affecting an entity's ability to successfully implement strategy and achieve objectives."[1] The traditional definition of risk identification is to employ methods of identifying specific loss exposures that could interfere with achieving an organization's primary goals.

The traditional risk identification process involves identifying loss exposures, which are negative risks. Standards such as ISO 31000 and COSO ERM use a broader approach in identifying risks with positive as well as negative potential for the organization. Each organization must decide which definition aligns with its objectives.

Organizations should identify all known risks, which are typically those that have previously affected them. Organizations should also attempt to identify emerging risks. Each organization should define the types of emerging risk that have the greatest potential to affect the organization's ability to achieve its objectives.

It is not feasible for any organization to identify all emerging or unknown risks. Attempts to do so can result in unnecessary use of resources. For example, many organizations spent significant financial and human resources in 2005 planning for the risk of an avian flu pandemic that never occurred. Meanwhile, the 2008 financial crisis took most organizations by surprise.

Each organization should highlight key risks during the risk identification process. Most likely, these will be known risks, but they could include significant emerging risks. Key risks are those with the greatest potential effect on the organization's ability to meet its objectives and should receive the most intensive risk management focus.

Risk Identification Tools

Standard risk management processes provide tools that organizations can adapt to identify risks. Most risk management professionals use loss histories as part of risk identification. Loss histories offer several advantages. They provide quantitative and qualitative information regarding known risks. They usually are contained within a database that can be adapted to various types of analysis. Loss histories can also be correlated with their effect on the organization's objectives. For example, loss histories of an organization's liability or credit losses provide information on their financial cost. However, a disadvantage of loss histories is that they are lagging rather than leading indicators of risk.

Various techniques are available to identify current and future risks:

- Checklists—An advantage of checklists is their ease of use by non-risk-management professionals. They can be divided into the four quadrants of risk (financial, strategic, operational, and hazard) and completed by managers in each area of an organization. For example, the manager of each branch of a bank could use a checklist to identify risks. The results for all of the branches could then be compiled and analyzed by a risk management professional. Questionnaires can be sent to customers to identify risks in providing products and services. Disadvantages of checklists include the possibility of failing to identify key risks or not identifying the effects of risks on other areas of the organization.
- Interviews and workshops—Risk management professionals or consultants can interview various people either internally or externally to identify risks. Managers and other employees can identify risks in their work activities, sometimes before an event occurs. For example, an employee could identify a lapse in the product inspection process.
- Escalation or threshold triggers—These can identify risk by comparing current transactions or events to prescribed criteria. For example, if the number of bank loans that do not conform to standards exceeds a threshold, this may indicate an escalation of risky lending practices.
- Process flow analysis—This technique analyzes processes within the organization from input to output. For example, a pharmaceutical company may analyze quality checks of ingredients used to make drugs, quality controls during the manufacturing process, and inspection of final products.
- Audits—Internal and external audits can identify areas of negative risk as well as opportunity risks. For example, audits of an organization's customer service telecommunications can identify opportunity risks where representatives offered or failed to offer products or services to customers. Safety audits can identify hazard and operational risks.
- Computer software—Various software can assist with risk identification. Examples include RISKMASTER™, RiskTrak™, and the Microsoft Excel-based Vulnerability Assessment Workbook. Advantages of software include its ability to identify risks as an integral part of business processes and to produce reports. For example, software systems can analyze financial transactions to determine whether they followed protocols and generate reports on questionable transactions. However, software applications may have limitations on the type of risk that can be identified and the methods used in identification.
- Team approaches to risk identification—Various team approaches can be used to identify risks. Teams that include key organizational stakeholders can use brainstorming and scenario analysis. The team approach identifies risks and the interconnectedness of risk across organizational functions. For example, a weather catastrophe may result in property damage or injury as well as production problems and supply chain interruption. The Delphi method provides input from a select group of experts. HAZOP and SWOT analyses are often used to identify the risks associated with a new product or procedure.

Holistic Approach to Risk Identification

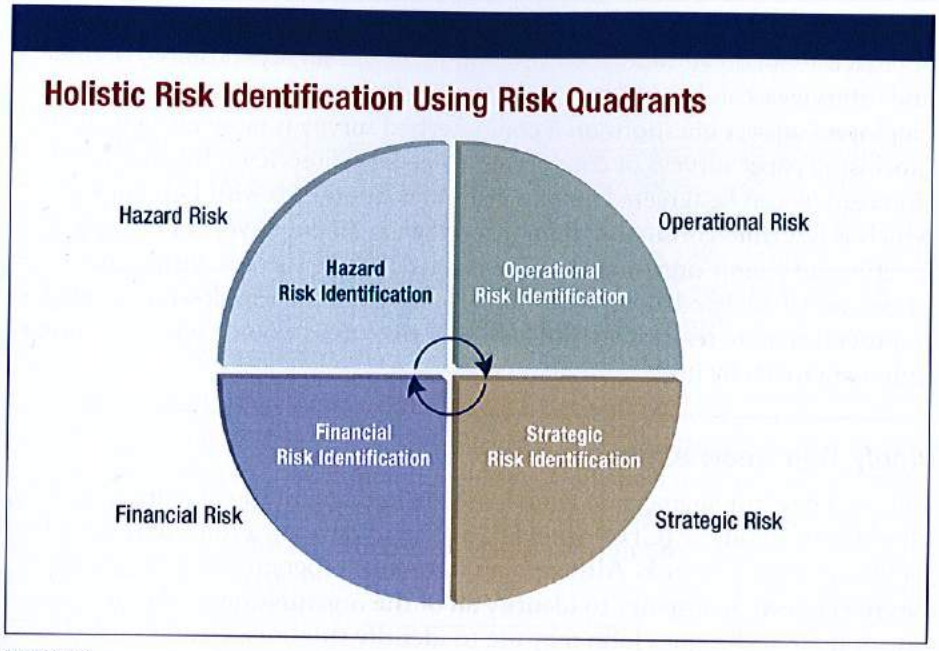
The concept of a holistic approach to risk identification is easier for organizations to embrace conceptually than to put into practice. For most organizations, different types of risks are concentrated in specific areas. Financial risk exists in the accounting and financial areas of the organization, while products liability risk exists in the manufacturing areas. This silo nature of risk can prevent or delay risk identification and an understanding of how risk may ripple through an organization. For example, failure to recognize problems with a supplier could result in delayed or inferior product inputs that, in turn, could result in production difficulties that later result in employee injuries and product defects.

The use of risk quadrants to identify and categorize risk can provide a framework for holistic risk identification. Within the quadrants of strategic, financial, operational, and hazard risk, risks should be identified as internal or external. After the risks have been identified in each quadrant, a scenario analysis can be performed to assign event likelihoods and consequences. Developed scenarios can represent different levels of severity. For example, tornado risk can be developed in scenarios ranging from a tornado warning that stops production for two hours to a tornado that destroys a building and injures workers.[2]

The exhibit illustrates that risk is identified for each quadrant, and then the effects of each quadrant's risk on the other quadrants are also identified. In the previous example, the tornado represents a hazard risk that can cause damage or injury. However, related operational risks are also present, such as the loss of production capability. Depending on the tornado's severity, there could also be strategic and financial risks to the organization. See the exhibit "Holistic Risk Identification Using Risk Quadrants."

There are other methods of holistic risk identification. The COSO ERM standard also recommends categorizing risks, but in addition to doing so by type of risk, it suggests using a cascading hierarchy, beginning with high-level objectives and cascading down to risks related to the objectives of business units or functions. The University of California uses a computerized information system dashboard to identify risks across the organization.[3] Risk management professionals should develop a customized holistic approach that will work well within their organizations.

Some organizations use a top-down approach for holistic risk identification. With this approach, senior management decides which risks pose a significant threat or opportunity for the organization. The advantage of the top-down approach is that it provides a high-level view of the entire organization and the risks that are central to meeting the organization's objectives. Two disadvantages are its dependence on reports from middle management to senior management and its limited view of risks that may be percolating in various areas of the organization.



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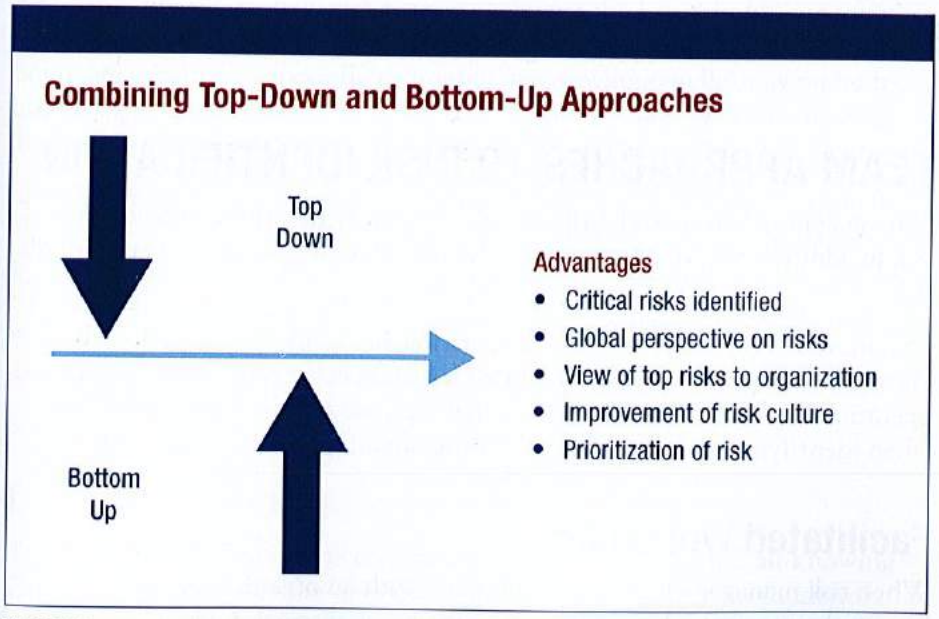
Another approach to holistic risk identification is the bottom-up approach. One of the advantages of this approach is that the views of employees are included, which contributes to a realistic observation of the organization's operations and operating environments. Disadvantages are the time it takes to compile and analyze risk indicators and the possibility of details obscuring the desired holistic view. See the exhibit "Combining Top-Down and Bottom-Up Approaches."



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Top-down and bottom-up approaches can be combined to develop a global approach to an organization's risks.[4] Computerized surveys or selected visits and interviews can be used to streamline the bottom-up approach. Having employees answer questions on a computerized survey is more efficient than processing paper surveys or conducting in-person interviews. Key production centers can be targeted for site visits and interviews with key employees, which is less time-consuming than interviewing all employees or visiting all locations in a large organization. The results of these surveys, visits, and interviews can be analyzed along with information from the top-down perspective to provide a more realistic identification of risks than would be possible using either approach by itself.

Apply Your Knowledge

John is a new risk manager at a medium-size manufacturing organization. The chief financial officer (CFO) would like John to develop a holistic approach to the organization's risk. Although an insurance program is in place, there has never been an attempt to identify all of the organization's risks. Describe one or more techniques John may use to identify this organization's risks.

Feedback: Because John is a new risk manager, it would be helpful for him to have checklists prepared by managers of different areas of the organization. Each of the manufacturing, shipping, procurement, legal, human resources, and other key managers could prepare checklists outlining the risks in their areas. Because these checklists may omit key risks and would not evaluate how risks can combine or affect other areas, John could then have a team workshop to discuss these risks. He could also use a combined top-down and bottom-up approach by receiving the CFO's perspective on risk, along with an employee survey.

TEAM APPROACHES TO RISK IDENTIFICATION

A team approach to risk identification can identify the interconnectedness of risk in addition to providing a comprehensive description of an organization's risks.

Organizations can adapt various team approaches to identifying risks. The chosen technique should be customized for the specific project, process, or operation. Risk management professionals can use several team approaches when identifying risks that affect all of the organization's objectives.

Facilitated Workshops

When risk management professionals meet with an organization's leaders, key employees, and other stakeholders, the group discussion identifies risks

in a dynamic way. The groups can brainstorm to initiate discussion and allow a free flow of ideas. A skilled facilitator can design workshops to encourage brainstorming and follow-up discussion.

It is helpful to include representatives from diverse groups in the organization during these workshops because discussion of the combined and cascading effects of risks provides valuable information on level of risk and priority. Such discussion can identify opportunity risks as well as risks with potentially negative consequences. The facilitated workshops technique can be used for a specific project or process, and it can also be used to identify those risks that affect overall organizational objectives.

If facilitated workshops are used to identify all organizational risks, the facilitator must be skilled in risk identification and management as well as in group communication. Such action would typically be a long-term project. If the facilitator is a consultant, he or she could meet with the team at defined intervals after the team has worked independently on identifying the risks in each of the risk quadrants.

ERM in Practice

Hydro One

At Hydro One, a corporate risk management group was formed under the CRO. In 2000, this group planned an ERM workshop at a subsidiary to pilot the risk management process. The workshop began with eighty risks identified by the team. Using the Delphi method, with which experts in a structured group submit and review forecasts or decisions, the workshop narrowed the key risks to eight. Each risk was then assigned a priority level.

The corporate risk management group evaluated the key risks from the workshop with the organization's strategic objectives and risk tolerance in mind. Some organizations, especially those that are growing rapidly, may prefer to use risk appetite instead of or in addition to risk tolerance when evaluating key risks.

Hydro One's risk management group then developed a risk map showing the expected effect of each key risk on strategic objectives along with the effectiveness of the current treatment for each risk. The risk map was used as the basis for the gap analysis and determining where additional risk treatment was needed.

Delphi Technique

The Delphi technique—which originates from the myth of the all-knowing Oracle at Delphi—uses the opinions of a select group of experts to identify risks. Typically, these experts do not meet but respond to a survey or inquiry.

The standard Delphi technique involves submitting two rounds of queries to the selected experts. First, each expert is asked a question, and the combined answers, which remain anonymous, are presented to the group. The same question is then posed again to the individual experts, who are instructed to consider revising their responses based on the results that were reported to the group. This question-and-response cycle continues for a predetermined number of rounds or until consensus is achieved.

The Delphi technique was originally used to forecast new developments, such as innovations in technology. Now used for a range of different projects or processes, it is more cost-effective than assembling a facilitated workshop of experts and also eliminates some group bias by keeping responses anonymous. However, it has the possible disadvantage of obtaining current thinking on a particular project based on the group's consensus. If an organization is considering a novel product or project, the current expert opinion may not be as useful as the opinion of a group of potential product users or the community where a project is proposed.

ERM in Practice

The TechCast Project

The TechCast Project is an online think tank that pools data and expert knowledge from worldwide thinkers to develop forecasts and assess their potential effect on economic and social issues. The system was pioneered by professor William E. Halal and others from George Washington University. It is now a collective research system that provides answers that help transition individuals, governments, and organizations into a future phase of business strategy successfully and confidently. Futuristic issues considered by the system include using robots in everyday life, replacing routine tasks with artificial intelligence, and estimating when space tourism will be a reality.

This is a modern and technologically improved use of the Delphi method. Although an earlier version of this project was organized by mail, the system is now online. Researchers utilize trend-tracking sites on the Internet, gather background data, and conduct interviews. This collected information guides the group of more than 100 scientists, scholars, and other experts in evaluating and estimating what is likely to happen and when. These estimations are authenticated by comparing them with the actual arrival of events—and results have been deemed accurate roughly within three years of an event's arrival.

The award-winning TechCast Project has been recognized for its accuracy in forecasting, and its work is cited in many scientific and national publications. Because the forecasts are of a general nature, they are applicable to many different disciplines and organizations and promote greater understanding not only of the predicted event, but also of the social and economic consequences for the event in both the present and future.

Organizations can use such forecasts to better predict customer needs and responses, developing environmental concerns, emerging regulatory action, potential new competitors, and financial and economic trends. Such information would be useful in developing future products and services, determining the timing for such projects, and identifying and managing associated risks.

Scenario Analysis

Scenario analysis identifies various risks and projects the potential consequences of those risks. For example, windstorm is identified as a risk. The outcomes associated with windstorm are not limited to the hazard risks of property damage and bodily injury. They also include business interruption, disruptions in customer relations, and possibly reputational risk based on how an organization responds during and after a windstorm. For example, after the 2011 earthquake and tsunami in Japan, in addition to coping with damage to its nuclear reactors at the Fukushima power plant, Tokyo Electric Power Company (TEPCO) had to deal with intense publicity of its pre- and post-crisis response to the earthquake and tsunami threat.

Scenario analysis is useful in identifying a range of potential consequences and in prioritizing risks. An organization should assemble an internal cross-functional team to obtain a multidimensional view of the potential consequences of a risk. For example, an operations manager may be primarily concerned with damage to a facility and employees in the event of windstorm. A member of the legal team may be concerned with liability if flammable materials are stored at the facility. A financial representative may be concerned about the effect on input prices if there are supply chain disruptions.

Disadvantages to scenario analysis include the possibility of missing key risks and limits in the imagination of the team conducting the analysis. Although cross-functional teams reduce these disadvantages, they do not eliminate them, especially if all of the team members are members of the organization who have never experienced a particular risk.

HAZOP

The term "HAZOP" is derived from hazard and operability study, which is a comprehensive review of a process or system. A team of appropriate experts and stakeholders identifies the risks associated with a given process and recommends a solution.

HAZOP is primarily used to design complex, scientific systems such as those used in engineering, chemical, mechanical, electronic, and computer operations. It can be adapted to analyze certain organizational strategies and initiatives.

A study team assembles in a facilitated workshop and follows these steps:

- Subdivides the project or system design into small components
- Reviews each component to identify risks
- Identifies cause and potential outcome for each risk
- Develops a solution for each risk

The level of expertise and time involved in this process make it appropriate for projects and systems where virtually all risks must be eliminated. For example, aircraft and biomedical engineering projects require risks to be identified and eliminated during the project design.

SWOT

The term "SWOT" is an acronym for strengths, weaknesses, opportunities, and threats. This type of team approach is useful in analyzing a new project or product. The strengths and weaknesses are internal factors to be considered. The opportunities and threats are external factors.

Different team members, representing different organizational functions, may analyze specific quadrants. For example, the marketing and legal functions may analyze the opportunities and threats. The research, operations, and financial functions may analyze the internal strengths and weaknesses. See the exhibit "SWOT Analysis."

SWOT Analysis

Environmental Factors	Strengths (S)	Weaknesses (W)
Internal	Technology	High cost structure
	Distribution channels	Absence of key skills
	Customer loyalty	Staff turnover
	Product quality	Brand recognition
	Opportunities (O)	**Threats (T)**
External	New technology	Shift in customer tastes
	New distribution channels	Emergence of competitors
	Unmet customer needs	New regulations
	Change in demographics	Tax increases

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A SWOT analysis is useful when there is a specific goal, such as determining whether engaging in a new product or project is feasible. It is less useful in

analyzing current processes and procedures to identify risks unless there is a specific objective, such as whether a procedure conforms to new regulations or customer specifications. A goal is necessary to keep the SWOT analysis from becoming too general or from failing to provide actionable information.

The SWOT analysis should ideally conclude with a "Go" or "No Go" recommendation for a specific project and should include discussion on whether weaknesses or threats can be converted into strengths or opportunities. For example, if competitors have emerged in the organization's space, can the proposed project or product differentiate the organization and help it gain market share? If high costs are an obstacle to undertaking the project, can solutions be found that will not only help the project succeed but also help the organization gain a competitive advantage?

Apply Your Knowledge

You are a risk management professional for a computer software organization. The new products division has just developed a design for software to be used in a biomedical research project. Several key pharmaceutical organizations have expressed a need for this type of product. With previous projects, the organization spent a great deal of time working out problems after software was designed. The chief executive officer would like to eliminate that time and better meet customers' needs. Which team approach would you recommend to provide a solution?

a. Facilitated workshops
b. Delphi technique
c. HAZOP
d. SWOT

Feedback: c. A HAZOP technique will subdivide the design process into components and identify the risks associated with each. The HAZOP team can develop risk solutions for each component during the design and before the product's final development.

RISK REGISTERS

Risk management professionals can use a risk register to identify and prioritize the risks associated with a project, a process, a department, or an entire organization.

Scenario models capture the risks associated with events to provide a realistic view of what could happen to an organization under various circumstances. A **risk register** provides a matrix to record the likelihood of a scenario and its associated risks along with their probability, consequences, and impacts for the organization.

Risk register

A tool developed at the risk owner level that links specific activities, processes, projects, or plans to a list of identified risks and results of risk analysis and evaluation and that is ultimately consolidated at the enterprise level.

Purpose of Risk Registers

Risk registers can be used for specific projects, departments, business units, and processes. Risk management professionals can use these individual risk registers as the basis for an organizational risk register that displays key risks in order of priority. To be effective, the organizational risk register must be a dynamic matrix rather than a compilation of documents. A best practice is to use an interactive computer system in which risk owners, such as department managers and project managers, continually update risk information, and risk management professionals continually evaluate the information.

Each organization should design its risk register with parameters that adequately reflect its risks. A best practice is for the organizational risk register to provide a platform for managing risks after they have been identified.

Use of Risk Registers With Scenario Models

A risk register can be developed to depict the risks associated with a scenario model. For example, Airygen, an organization in the United States, supplies oxygen for medical use. Airygen's risk manager worked with each branch of the organization to complete a risk register for a windstorm scenario. The scenario presented for each branch manager to identify in the risk register is the occurrence of a windstorm, ranging from a severe thunderstorm to a major hurricane or tornado. See the exhibit "Airygen's Windstorm Risk Register—Miami Branch."

The likelihood of the windstorm scenario will vary significantly according to the location of Airygen's branches. The Miami branch has a high likelihood of experiencing the severe windstorm scenario because, in south Florida, severe thunderstorms are frequent and hurricanes are relatively common. Similarly, the branches in the Midwestern plains will have a relatively high likelihood of windstorm because of tornado threats. In contrast, the Pennsylvania branches will have a relatively low likelihood for this scenario. After each branch completes the risk register, the risk manager can combine them into regional and organizational risk registers for the windstorm scenario.

The level of risk indicated in the risk register is determined by the significance to the organization, not merely by a formula multiplying likelihood by consequences and impacts. In the Airygen example, the disruption of medical supplies to customers has a high level of risk relative to its estimated likelihood and financial consequences. Because many medical supplies, particularly oxygen, are critical to hospitals and individuals with serious medical conditions, the risk of not being able to deliver them can potentially damage Airygen's reputation. This risk is not quantifiable.

In a location where a major windstorm, such as a hurricane, could affect transportation as well as the branch itself, Airygen needs a plan to address the transportation risk. The catastrophe plan could include discussion of

Airygen's Windstorm Risk Register—Miami Branch

Scenario	Risk Description	Risk Owner	Likelihood	Consequences	Level of Risk	Improvement Action	Review Date
Windstorm	Storm damage range: minimal to catastrophic	Risk management Regional and branch management	90	$0 – $100 M+	10	Develop catastrophe plan Review property insurance	3/1/20X3
Risk Quadrant							
Hazard Risks	Wind damage	Risk management	40	$0 – $10 M	5	Safety procedures	1/1/20X3
	Oxygen explosion	Regional and branch management	10	$0 – $100 M+	10	Safety plan for employees	
	Fire	Safety and human resources	20	$0 – $100 M+	8		
Operational Risks	Emergency disruption of medical supplies to customers	Operations management	50	$0 – $50 K	9	Develop backup plan with Ft. Lauderdale	2/1/20X3
	Loss of business records	Regional management	60	$0 – $25 K	2	Review system backup	4/1/20X3
	Period of repair/ rebuilding	Information technology	40	$0 – $20 M	7	Review business interruption coverage	1/1/20X3
		Risk management				Plan with Ft. Lauderdale and Orlando	2/1/20X3
		Operations management					
Financial Risks	Credit risk—customers will be unable or delayed in ability to pay	Finance	5	$0 – $100 K	1	Develop emergency payment plans for customers	5/1/20X3
	Price risk—the cost of product will increase after a major storm	Procurement Finance	6	$0 – $50K	1	Backup supplies from other branches	3/1/20X3
Strategic Risks	Reputational damage if customers cannot receive critical medical oxygen	Legal Operations Management Marketing	25	Potentially major damage	10	Catastrophe plan	3/1/20X3

Measurement Scales:

Likelihood: 1 – 100, 1 = lowest

Level of Risk: 1 – 10, 1 = lowest

Consequences: Estimated dollar range for quantitative measures

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emergency plans with customers before hurricane season and a computer record of customers' plans, such as a plan to evacuate if a hurricane watch is issued or a plan to order additional supplies. System backups of computer records would ensure that this information is available in the event of a power loss or damage to the branch's computers.

Organizational Risk Register

In addition to their use with specific scenario models, risk registers can be used to depict all of the organization's risk scenarios. The specific-scenario risk registers can be combined into one risk register for the entire organization.

Airygen's organizational risk register would include many risks in addition to those arising from the windstorm scenario. The scenario method is only one approach to identifying risks for the risk register. Other methods include a list of known and potential risks by risk quadrant, business unit, or risk owner. See the exhibit "Airygen's Windstorm Risk Register—Organizational Roll-Up."

Color codes can be used in reports produced from the risk register to highlight the level of risk. Potentially severe risks and moderate risks could be highlighted in different colors, as indicated in the Airygen example. If a computer risk management information system (RMIS) is used, a dashboard can list the highest-priority risks. Another advantage of a computer system is that a diary feature can trigger follow-up actions, such as insurance-program or safety reviews.

However an organization chooses to design its risk register, risk management professionals should ensure the risk register has these characteristics:

- Adequately identifies the organization's risks
- Prioritizes risk according to the potential effect on the organization
- Provides interactive use for risk owners
- Forms a matrix to manage risks

Airygen's Windstorm Risk Register—Organizational Roll-Up

Scenario	Risk Description	Risk Owner	Risk Quadrant	Likelihood	Consequences	Level of Risk	Improvement Action
Windstorm	Cat 3 or > hurricane strikes Miami	Risk management Operations management Regional and branch management Legal Finance Information technology (IT) Human resources	**Hazard:** Loss of property Injury Liability **Operational:** Business interruption **Financial:** Customer credit Input price **Strategic:** Reputational risk	40	$0–$100 M+	**10**	Develop catastrophe plan with all stakeholders Review property and liability insurance
Data Breach	Theft of customer information	IT Risk management Legal	**Hazard:** Liability **Operational:** Interruptions to business processes **Financial:** Possible decline in stock value **Strategic:** Reputational risk	30	$10K–$100M	**8**	Review IT security Review insurance coverage
Rail Strike	Rail strike prevents delivery of oxygen to regional centers	Operations management Procurement	**Operational:** Disruption in supply **Strategic:** Reputational risk if medical supply is interrupted	25	$10K–$100K	**3**	Backup distribution plan

Measurement Scales:

Likelihood: 1–100, 1 = lowest

Level of Risk: 1–10, 1 = lowest

Consequences: Estimated dollar range for quantitative measures

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RISK MAPS

Risk mapping is a technique that can be used to provide a visual perspective of an organization's risks and to prioritize those risks.

Basic risk maps provide a matrix of the likelihood and impact (consequences) of risks identified on an organization's risk register. Variations of these maps can add other dimensions or aspects of risk. These maps can also be used to categorize risk in relation to an organization's risk appetite, which is the "total exposed amount that an organization wishes to undertake on the basis of risk-return trade-offs for one or more desired and expected outcomes."[5] The categorization of risk relative to risk appetite will help determine the appropriate level of risk management.

Basic Risk Map

A basic risk map translates the risks identified in the risk register into a risk matrix. This matrix can be used to analyze the risks that are within or outside an organization's risk appetite. Risk management professionals can then use the risk map as a basis to prioritize risk management and treatment for the risks that are outside the organization's risk appetite.

The exhibit illustrates an example of a risk map for Airygen, a national organization supplying oxygen for medical use. The term "impact" is used to convey the concept that the outcome can be either positive or negative. For example, if Airygen assumes the risk of acquiring another company, the organization will anticipate a positive outcome. The different colors represent the different levels of impact and likelihood combined. The technique of using colors to indicate different levels is sometimes referred to as heat mapping. See the exhibit "Basic Risk Map—Airygen Risks."

Risk Map Variations

Risk management professionals can use variations of the risk map to bring in different dimensions, such as time.[6] The exhibit illustrates how Airygen's risk manager can use this type of risk map to identify the urgency in time for each of the risks. Because this risk map was prepared on April 1 (near the beginning of hurricane season), the Miami windstorm risk is an urgent time priority. The catastrophe plan should be reviewed along with the property insurance. The change in healthcare regulations is imminent, and this becomes a high priority. The major acquisition is in the early stages and, therefore, is less urgent.

Time dimension risk maps can be used with the basic risk map to set monthly, quarterly, or annual priorities. These maps can be used to assist in the design and implementation of the risk management process as well as for follow-up in existing programs. See the exhibit "Impact and Time Risk Map—Airygen: 4/1/20X2."

Basic Risk Map—Airygen Risks

Impact/Consequences	1. Rare	2. Unlikely	3. Moderate	4. Likely	5. Almost Certain
5. Extreme	Volcano eruption Terrorist attack Pandemic	Earthquake	Data breach Wildfire Arson Flood	Midwestern windstorm (tornado)	Florida windstorm (hurricane)
4. Very High	Sudden, unexpected loss of C-suite-level manager Public incident damaging to reputation (for example, scandal involving senior-level manager)	Financial crisis (interruption in credit facilities) Major workforce disruption (strike)	Interruption in regional product supply (strike, supply chain interruption) New strategic opportunity (acquisition)	Vehicle accident with injury Customer accident with injury	Fire/explosion
3. Medium	Repairs requiring branch closure for a period of time	Employee dishonesty Robbery/burglary	Minor incidents with products (for example, stuck valve) Loss/gain of key customer	Moderate vehicle accidents (property damage) Competitor pricing Human resources issues	Employee injury
2. Low	Travel problems cause delay in meeting with key customer	Interruption of communication with a branch office for more than one hour (for example, power outage) Sudden, unexpected loss of branch manager	Customer service problems Branch closure because of inclement weather	Minor vehicle accidents (property damage)	Employee illness/ time off Customer credit issues
1. Negligible	New computer system requiring staff training	Interruptions in noncritical supply chain (for example, office supplies)	Computer system unavailable for more than one day Traffic delays in major distribution routes	Property and equipment maintenance issues	Billing errors
	Likelihood				

■ = highest impact/likelihood ■ = medium impact/likelihood ■ = low impact/likelihood

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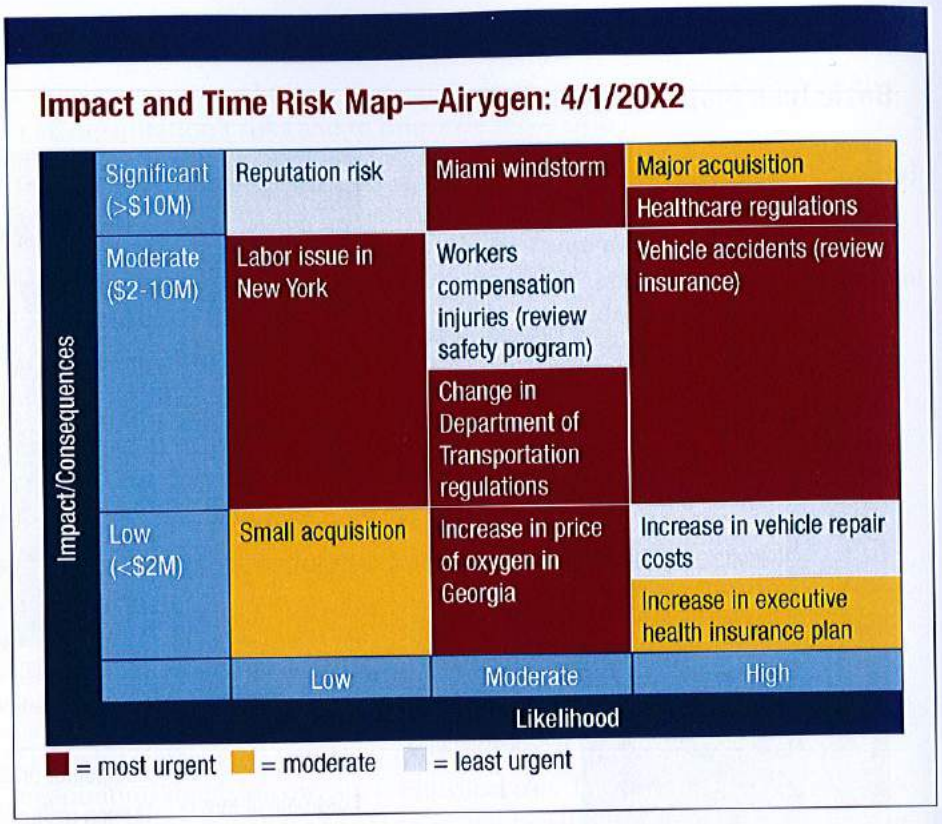

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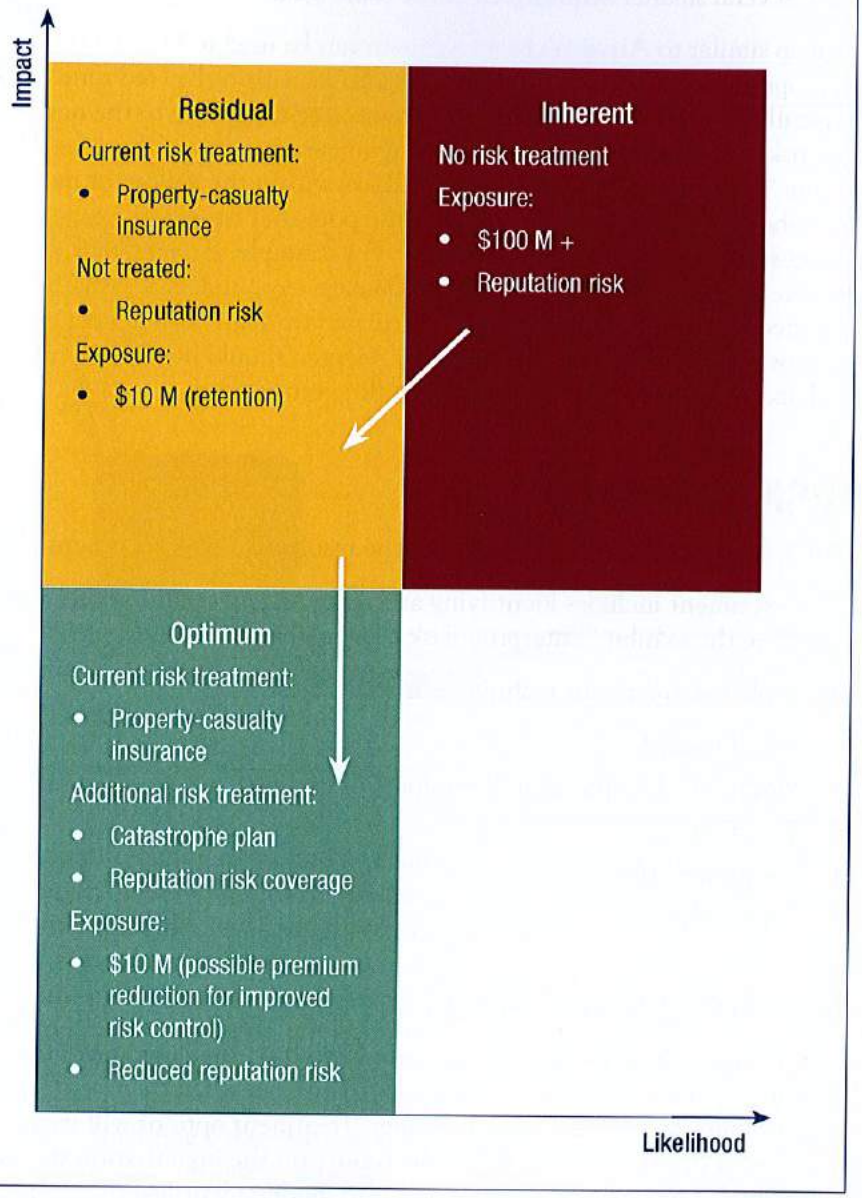
Risk management professionals can also use risk mapping to identify inherent, residual (current), and optimum levels of risk. Inherent risk is important because the difference between inherent and residual risk provides a measure of the necessity and the effectiveness of the current risk treatment. If the difference between inherent and residual risk is small, either the risk does not need to be treated or the treatment is ineffective. The difference between the residual (current) level of risk and the **optimum risk** represents the risk treatment opportunity to further reduce the risk. A risk map can be used to depict the effects of the current risk treatment techniques on the likelihood and impact of risks. It can also show opportunities to improve risk treatment. See the exhibit "Inherent, Residual, and Optimum Risk Map—Airygen's Miami Windstorm Risk."

Optimum risk

The level of risk that is within an organization's risk appetite.

The difference between the inherent and residual risk for Airygen's Miami windstorm risk is $90 million; therefore, the current risk treatment, which focuses on risk transfer, is still necessary and effective. However, the current risk treatment does not address all of Airygen's risks associated with a severe Miami windstorm. Reputation risk is potentially significant for the organization if Airygen's customers, such as hospitals, do not have adequate supplies of oxygen after a major hurricane. Implementing a catastrophe plan to address these critical customer needs will help treat this risk. The catastrophe plan can also help reduce the likelihood as well as the consequences of risk.

Inherent, Residual, and Optimum Risk Map—Airygen's Miami Windstorm Risk



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Illustrating Risk Treatment Decisions

Risk management professionals can use a risk map to prioritize risks and select risk treatment options. Whenever practical, the organization may choose to avoid negative risks with the highest levels of likelihood and impact. For example, when considering several possible locations for expansion, Airygen

may choose not to open a branch in an earthquake-prone area. Similarly, the organization may select the opportunity risks with the highest likelihood of producing the most significant impact. For example, Airygen may decide to make one major acquisition that will increase its national footprint rather than several smaller acquisitions at the same cost.

A map similar to Airygen's basic risk map can be used to identify the most appropriate risk treatment opportunities. Risks within the "red zone" should typically be exploited, controlled, or transferred according to the nature of the risk. Airygen will likely transfer a significant portion of the risks identified in the "red" area on its basic risk map. Risks within the yellow, or moderate, area should be evaluated according to the potential benefit or exposure and the cost of treating or pursuing the risk. For example, Airygen may decide it prefers to retain its vehicle property damage exposure. Risks that fall into the green, or low-risk, area are usually treated through normal operational processes and procedures. For example, Airygen should have customer service and accounting procedures to address billing errors.

RISK TREATMENT

Risk treatment decisions are based on the results of a risk assessment.

The assessment includes identifying and analyzing an organization's various risks. See the exhibit "Enterprise Risk Management Process Model."

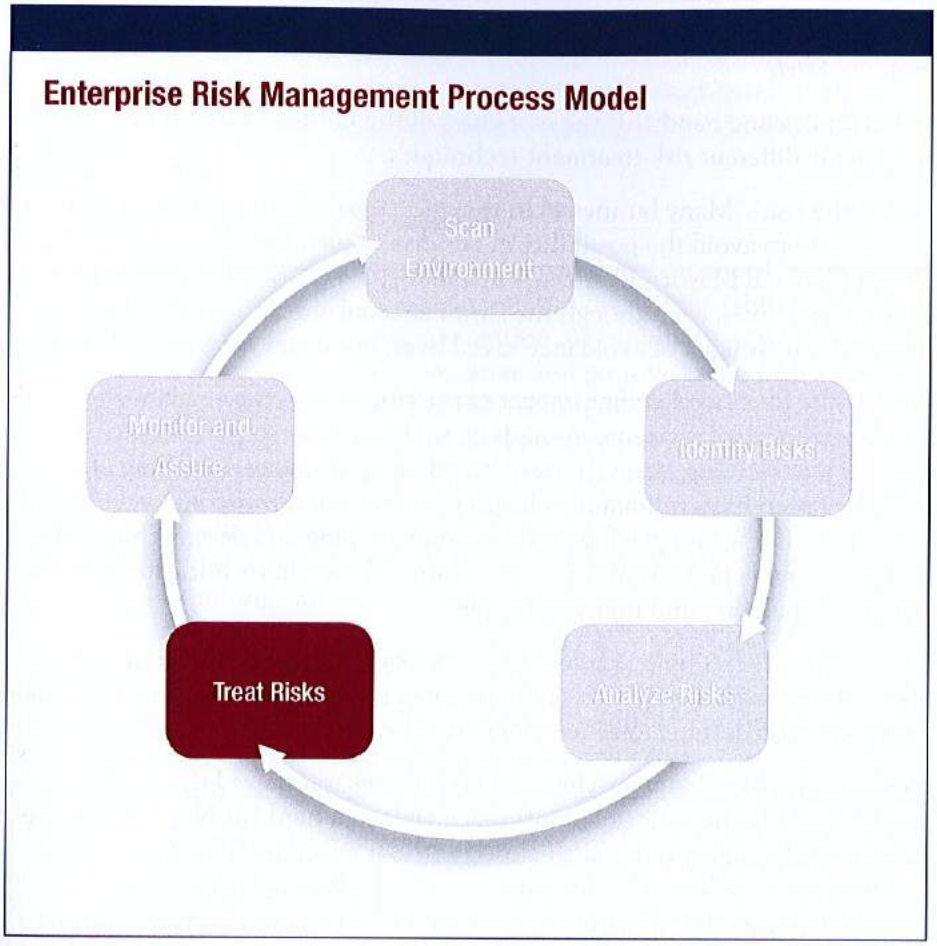
Available risk treatment techniques include these:

- Avoid the risk
- Modify the likelihood and/or impact of the risk
- Transfer the risk
- Retain the risk
- Exploit the risk

Risk Treatment Process

Risk treatment involves making decisions based on the outcome of the risk identification and analysis. For risks identified as needing treatment, specific options must be selected to modify them. Treatment options will vary, and the negative or positive effects of the uncertainty on the organization should be considered. The goal of risk treatment is to modify identified risks to assist the organization in meeting its objectives.

The risk treatment process is continuous and entails examining each risk treatment option (or combination of options) in terms of whether it leads to a tolerable level of residual risk. It also involves selecting and implementing a risk treatment option or options, and measuring the effectiveness of each option selected.



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Risk treatment techniques are not mutually exclusive, and many risks require a combination of techniques. The risk treatment plan should indicate risk priorities and the order in which chosen techniques will be implemented. Review of risk treatment plans as part of overall monitoring of the risk management process is important. Risks may change based on changes in the organization's operation or on environmental factors, such as economic conditions or legal and regulatory requirements. Previous risk treatment decisions may no longer be valid, and implemented controls may no longer be effective. Furthermore, emerging risks—such as those arising from new technology or the acquisition of a new business unit—must be identified and assessed. The risk treatment process should also include a cost-benefit analysis to assess whether the benefits of the chosen treatment option outweigh the related costs.

ERM in Practice

Hurricane Sandy

When Hurricane Sandy hit the east coast of the United States, businesses used many different risk treatment techniques.

Avoid the risk—Many businesses in the affected states chose or were ordered to evacuate to avoid the possibility of personal injury. New York City's Coastal Storm Plan and Mayor Bloomberg's mandatory evacuation are credited with saving many lives, even though the storm affected a region greater than those areas. The technique of avoidance saved lives, but could not save property.[7]

Modify the likelihood and/or impact of the risk—With the available lead time to prepare for the hurricane, insureds were able to take steps to modify the risk, such as securing storm shutters, boarding up windows, installing clips to securely fasten roofs to framing, cleaning gutters and downspouts, purchasing generators, filling and placing sandbags, or equipping and designating a safe room to provide protection during the storm. These efforts mitigate both the damage to property and injury to people.

Retain the risk—A policy deductible is an example of risk retention. For those businesses whose policies did not cover the damage or business interruption that ensued, these losses were retained by the insured.

Transfer the risk—Many residents and businesses transferred their risk to insurers. While the majority of insurance claims in hard-hit New Jersey have been settled, roughly one-fourth closed without payment. This statistic does not necessarily reflect outright denials, as claims were opened in hope of providing payment, but many times were closed as either coverage was not provided under the contract or the loss did not exceed the deductible. Many standard property policies do not cover flood damage, which is the cause of loss if a storm surge is blamed for the damage. In contrast, auto policies generally do cover flood damage, and so most auto claims from Sandy were paid. If an insured had purchased a separate policy for flood coverage, that insurer would handle the claim under that specific policy.[8]

Some insureds were covered for business interruption or contingent business interruption. A company could be directly affected by hurricane damage to its business, or a company away from the hurricane zone could experience a supply chain interruption when parts were not available because of a manufacturer's hurricane damage. If access to a business is prevented by civil authority evacuation mandate, an insurer may provide business income coverage based on the contract provisions. However, endorsements are usually necessary for this coverage or for coverage for interruption of service from utility providers.

The risk treatment plan should document the process and designate the chosen risk treatment options as well as people responsible for implementing the plan. The plan should also include a timetable for implementing the risk treatment options and for monitoring and reviewing the established plan.

Risk Treatment Techniques

Risk treatment techniques apply to hazard, operational, financial, and strategic risks. In general, available risk treatment options fall into the categories of avoidance, modification, transfer, retention, or exploitation. Because speculative risks can result in both negative and positive consequences, the organization must consider a range of risk treatment techniques or a combination of techniques to manage negative and positive outcomes. For pure risks, the focus of risk treatment is on managing negative outcomes.

For events that appear to have primarily positive potential outcomes, such as a major competitor leaving the market, treatment would focus on exploiting the risk by maximizing expected gains. Techniques would include modifying the likelihood of an event to increase the opportunity to meet objectives while also considering treatment options for potential negative outcomes.

In some cases, risk **avoidance** is an appropriate option; when considering it, organizations must take into account any opportunity costs of not accepting a particular risk. See the exhibit "Risk Treatment Techniques."

Avoidance

A technique that involves ceasing or never undertaking an activity so that the possibility of future gains or losses occurring from that activity is eliminated.

Identified risks can also be treated by modifying the likelihood and/or impact of events resulting in positive or negative outcomes. For hazard risks, modifying the likelihood of events focuses on **loss prevention** efforts to reduce overall loss frequency. Techniques designed to modify the impact of events recognize that not all negative outcomes can be avoided, but that the financial consequences of these events can be decreased. Techniques such as sprinkler systems in buildings or driver training for commercial truck operators are **loss reduction** efforts aimed at reducing the severity of losses. An organization can use contingency plans to modify the consequences of an operational risk, such as a disruption in its supply chain resulting from a permanent or temporary loss of a major supplier of raw materials.

Loss prevention

A risk control technique that reduces the frequency of a particular loss.

Loss reduction

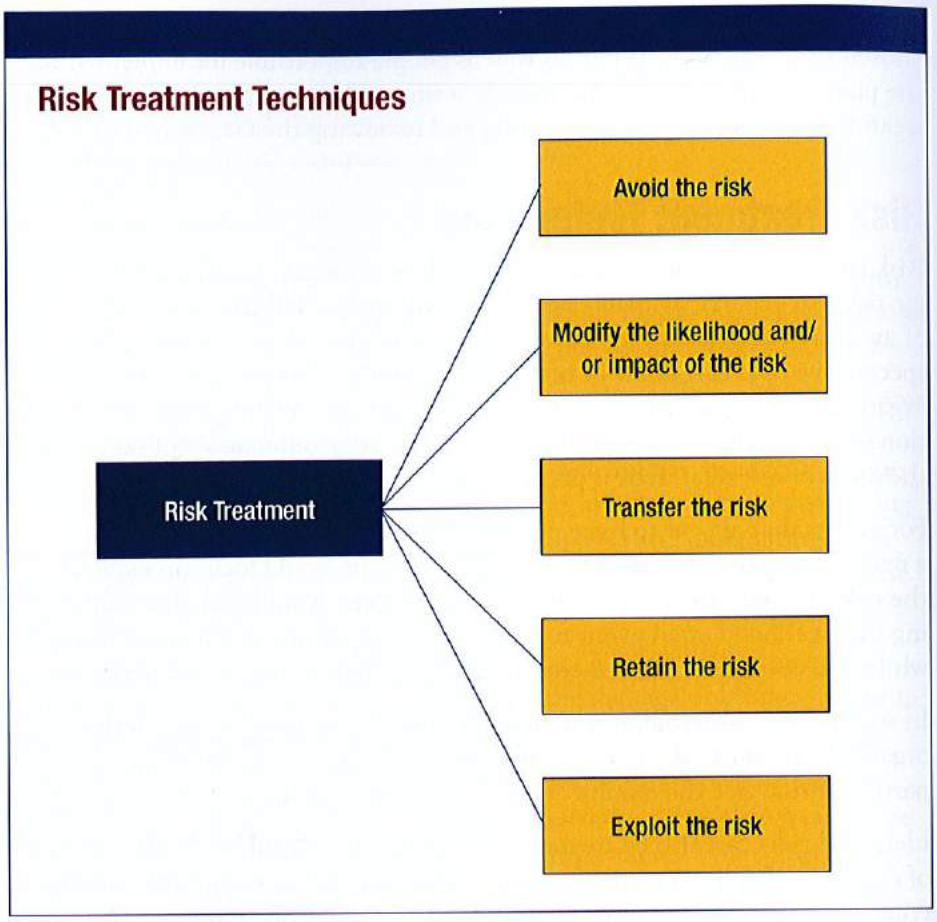
A risk control technique that reduces the severity of a particular loss.

Risks can be transferred, or shared, through contractual arrangements or joint ventures with other organizations. Outsourcing is a method of risk sharing that can be used to transfer noncritical operations and their related risks to another organization. For hazard risks, insurance is the primary technique used to transfer risk. Contractual risk transfers (noninsurance), such as hedging or other contractual agreements, can be used to transfer financial consequences of risks to another party or organization.

Risk **retention** is used for residual risk after other treatment techniques have been considered. Retention is often used in combination with risk modification and transfer. Because unplanned retention of unidentified risks can result in catastrophic loss to an organization, risk retention should be used for risks

Retention

A risk financing technique that involves assumption of risk in which gains and losses are retained within the organization.



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that have been identified and analyzed so that the organization clearly understands the risks that are being retained. Organizations may also actively take or increase their risk to exploit an opportunity.

Apply Your Knowledge

An organization has just completed an extensive risk management review for its operations. As part of this effort, it has established a risk treatment plan. Explain why the organization should monitor this plan periodically going forward.

Feedback: The organization should periodically monitor the risk treatment plan because the organization's operations, economic conditions, or legal and regulatory requirements may change. The current risk treatment plan may become invalid, and previously implemented controls may become ineffective.

PROJECT RISK MANAGEMENT

A project manager should master a number of disciplines to achieve a project goal within quality, time, budget, and boundary constraints. These disciplines will vary according to the nature and complexity of the project, but risk management is one that is necessary for successful project completion.

Some losses are common to all organizations, while others are common only to projects. Managing risks in a project is similar to managing risks for an organization, but it requires an increased focus on the time and budget allocated. Project risk management involves these activities:

- Applying the risk management process
- Addressing common project risks
- Managing risks in the **critical path**

Critical path

The sequence of activities in a project that take the longest time to complete and determine the overall time length of the project.

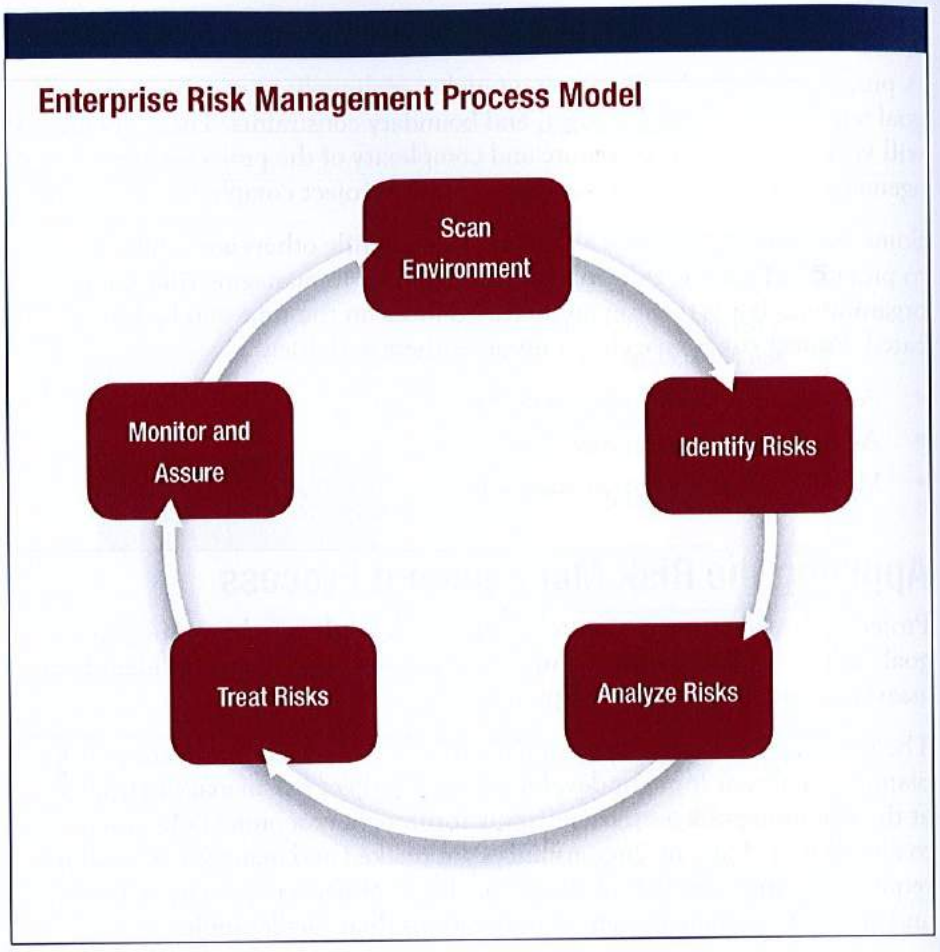
Applying the Risk Management Process

Project risk management aims to optimize risk levels to achieve the project goal. The structured process behind it allows project managers to identify and assess risk and to respond appropriately.

The team assigned to a project might consider the project risk management plan informally, or it might develop a formal project risk management plan at the beginning of a project and apply it throughout a project's life cycle to ensure that changing circumstances are tracked and managed. The effort required depends on the project's scope: larger projects require more formal and detailed risk management considerations than smaller projects.

Projects are intended to introduce change within an organization. This can include developing a new product, process, or procedure, or forming a new operating division. The enterprise risk management (ERM) process model illustrates the interconnected flow of activities in five steps. By applying the ERM process to a project, an organization synchronizes its overall risk management with the strategic goals and operational objectives of that specific project. A project is also likely to alter the risk profile of the organization. The impact of this change must be considered, addressed, and communicated to the organization's stakeholders in a timely manner. See the exhibit "Enterprise Risk Management Process Model."

The five steps of the ERM process model occur within and are supported by the risk management framework; they may take place concurrently or sequentially. The ERM process occurs at various levels of the organization and applies to various functions. Typically, the framework is established by an organization's senior management and chief risk officer, while the process may be established by just the chief risk officer or another risk management professional.



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Scan Environment

Risk management professionals should review the internal and external environments that can affect the project. Considerations of the internal environment include the project objectives, the amount and types of risk involved, key strategies, and available resources. For example, a project might require extensive training of employees or acquisition of new technology. Reviewing the available resources could determine whether contingency funds are available or whether additional costs could undermine the project's profitability.

The external environment of an organization includes economic, political, legal and regulatory, technological, natural, and competitive factors that could affect the project. For example, the impact of a project involving possible pollution emissions depends on the statutes or recent legal decisions of a particular area.

Identify Risks

While it is not feasible or practical to identify all risks, it is important to identify key and emerging risks in the project. The primary concern is determining which potential risks will require treatment. In addition, certain risks that were previously identified as one-dimensional may later be viewed in conjunction with related risks. For example, a customer's being injured by the company's product might have been viewed initially as only a hazard, but it can also be seen as a risk to the company's reputation or as the catalyst for a product recall.

Analyze Risks

Risk analysis attempts to determine the source, cause, likelihood, and potential consequences of each identified risk. One method of assessing the risks of a project involving complex activities is to break down each activity's tasks. In doing this, the parameters for each activity—such as time estimates, costs, quality measurements, staff requirements, and predecessor activities—are reviewed to determine acceptable variances between what was planned and what is acceptable while still achieving the project goals. During this assessment, the time estimates for activities on the critical path are scrutinized, because any risk that extends the critical path will also extend the project's final completion date identified in the **project constraints**.

Project constraint
Any limitation to the solutions that can be applied in achieving a project goal.

Acceptable variances for each activity become the basis for analyzing foreseeable risks that can cause results to fall outside the acceptable parameters. For each activity and associated task, the project team judges the likelihood and severity of the impact on the project. The project team can then prioritize risks according to their potential to negatively affect project results. Any risk to activities on the critical path deemed likely to extend the project beyond its completion date receives a higher priority for treatment.

Treat Risks

Once the risks are prioritized, the project team considers risk management techniques for addressing threats to the project and implements the best technique or combination of techniques for each risk. The most effective technique or techniques for managing a risk are determined by considering how the risk might affect the project's successful completion. The techniques selected should create a risk outcome that is within acceptable variances.

Some of the major options for treating risk are avoidance, modification, transfer, retention, or exploitation. The project team should not overlook the opportunities that accompany risk. Including a new technique that, despite being costly, will ultimately continue to save the company money in both implementation time and energy costs may provide a great opportunity that more than offsets the risk.

In addition to using risk management techniques, project teams address risks through contingency planning, which involves establishing alternative procedures for possible events. The alternative procedures are established in advance and should be within the variance requirement of each activity. Contingency planning facilitates keeping the entire project on track within the project constraints.

The project team should recognize that there are limits to the available resources for risk management and that it is not practical to apply risk management techniques to every identified threat. Planning should apply to high-probability losses that would significantly affect the project's outcome. Additionally, avoiding risk by not pursuing an opportunity may ultimately have negative consequences for an organization.

Monitor and Assure

Scope statement
A clarifying project document that details the objectives to be accomplished, products or deliverables, potential costs and gains, and success measurements.

As the project progresses, the project manager compares the quality, time, budget, and other constraints established in the project's **scope statement** with the project status. The variances established for each activity are useful in determining whether individual activities are progressing within acceptable parameters.

The project manager must also monitor the progression of the entire project to determine whether the project goal will be achieved. For example, each activity might be at maximum variance with its budget allocation. Any significant additional expense could push the entire project outside its budget constraints. If a project is reasonably within budget, the project manager might reallocate resources from less-critical activities to activities with greater resource requirements.

Project teams must determine how often and when to hold discussions with their organization's stakeholders who will be affected by the project's outcome and may have unresolved questions. Depending on the particular situation, an extensive communication process may be associated with different delivery phases of a project's plan.

Addressing Common Project Risks

Some risks are common to projects. By anticipating these risks, a project manager can treat them appropriately. There are risks inherent in projects that the project team can control or influence. These are several sources of common internal risks and methods of treating them:

- Project scope—Lack of a clearly defined project scope can be the source of design flaws that plague a project at any point in its life cycle. The further the project progresses, the more it costs to correct a design problem and bring activities back on track with intended goals. Therefore, it is

economical to clearly define the project goals, mission, and constraints in a detailed scope statement before any activities begin.

- Human resources—Team members and project participants are important resources in accomplishing a project goal. The loss of key team members can derail a project at a critical phase. Bringing new team members up to speed in the middle of a project can take time. If the success of a project depends on specific skills, the human resource risk can be mitigated by combining internal and external resources. For example, software programming might be outsourced to contractors for the duration of a project.
- Operational risk—Operational risks arise from a company's business functions and inadequate or failed internal processes, people, and systems. Examples of operational risks include failures of or disruption in employment practices, workplace safety, systems, workmanship, and management. Outsourcing and contingency planning may be solutions for mitigating some operational risk.

Some external risks are beyond the control of the project team. These are several sources of common external risks and methods of treating them:

- Natural perils—Natural perils are events outside human control, such as floods, windstorms, volcanic eruptions, and earthquakes. Physical property or data sources can be damaged, and employees can be injured. Depending on the nature of the property, loss prevention and control techniques can be applied to reduce the chances or the severity of loss. Transfer through insurance might be an appropriate means to replace damaged property.
- Political risks—Political risk refers to complications that result from decisions made by political or regulatory bodies that alter expected outcomes or the value of an outcome by changing the probability of achieving business goals. Political risks can be at a macro level, affecting all participants in a country equally, or at a micro level, affecting only a local area or a particular industry. Mitigation of macro-level risks can include intellectual property safeguards, risk diversification, **political risk insurance**, and exit planning. Mitigation on a micro level can include contingency planning, hedging, and building local political leverage through community activities and lobbying.

Political risk insurance
Insurance whose coverage is triggered by a macroeconomic or government action. A type of financing to pay for resulting losses.

- Commercial and social expectations—Projects that involve product or service development are launched to meet a need. Failure to meet the commercial or social need, or a need that changes during the project, is a threat. The project team can mitigate failure to meet a need by conducting adequate surveys before the project design and repeating the surveys throughout the project duration to ensure that the resulting products and services meet customers' expectations.
- Technology evolution or obsolescence—Long-term projects hold the possibility of developing products or services that are technologically obsolete before they are completed. To mitigate the loss, the project team should scan the technology horizon to determine what is in development

that might render current hardware, software, and systems obsolete. For especially long-term projects, the project design should include plans for transferring the product to new platforms by choosing portable technology.

Managing Risks in the Critical Path

Protecting the value of a project includes dealing with the uncertainty associated with its timely delivery. The project manager is responsible for turning uncertain events into certain outcomes. Management of risks associated with activities on the critical path is essential to ensuring that a project is completed by its target date.

The project manager can manage the timeliness of activities by managing the buffer in the critical path, managing risks for critical path activities, and monitoring completion of activities in the critical path.

Slack time

The difference between either the latest start time and the earliest start time, or the latest finish time and the earliest finish time for activities in a project's critical path.

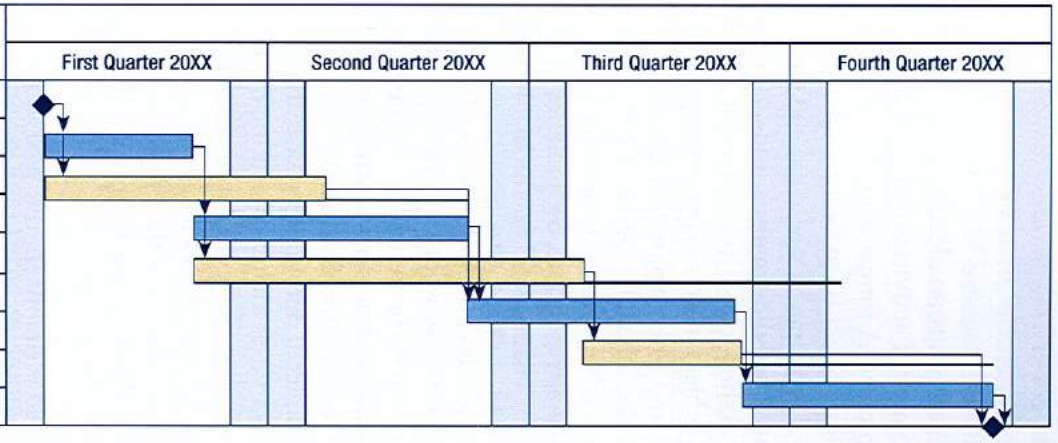
Time estimates for project activities are not exact. The start and completion of any activity might be early or late. The result is **slack time** for an activity, which is the amount of time by which an activity can be delayed without affecting the overall completion time of the project. The sum of all the slack times for activities on a critical path is the buffer available in the critical path. Throughout the project, the project manager monitors the days remaining in the buffer. If the buffer becomes critically low, resources can be added to critical path activities to ensure that the entire project is accomplished by the target deadline.

Derailment of activities on the critical path is always a key concern for the project manager. Therefore, these activities are given additional attention and higher prioritization for treatment. The project manager monitors the availability of people and expertise, funding, and materials for these activities to reduce the controllable internal loss exposures. See the exhibit "Gantt Chart."

As activities on the critical path are completed, the project manager collects data from team members to monitor the project's progress. In regularly scheduled meetings, progress of and problems with activities are discussed. Resources that can resolve bottlenecks are identified. If necessary, the project's sponsor may be asked to assist in resolving organizational issues that inhibit progress.

Gantt Chart

ID	Task Name	Predecessors	Duration
1	Start		0 Weeks
2	A	1	4.00 Weeks
3	B	1	5.33 Weeks
4	C	1	5.25 Weeks
5	D	1	6.33 Weeks
6	E	4, 5	5.40 Weeks
7	F	4, 5	4.50 Weeks
8	G	6, 7	2.00 Weeks
9	Finish		0 Weeks



Represents activities in the critical path

Represents activities that are not in the critical path

Represents additional (slack) time that might be used to accomplish noncritical activities without extending the time required for the critical path

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ERM in Practice

WSDOT Project Risk Management

The Washington State Department of Transportation (WSDOT) has a detailed plan for project risk management. In addition to its innovative approaches and "Maximum Effort = Reduced Risk" emphasis, it holds risk-based estimating workshops for all projects valued at more than $10 million. The content, duration, and number of activities involved are directly related to the estimated value of the project. A formal workshop of one to two days for a $25 million to $100 million project is led by internal and local subject matter experts; might be held at any time or when updated changes warrant it; and involves risk assessment, scheduling matters, and cost updates. A more intensive three- to five-day workshop for projects valued at over $100 million is led by internal and external subject matter experts; is typically scheduled at the beginning of the project and when major changes occur; and covers a more extensive evaluation of risks, schedules, and cost concerns. Although not participating in a formal workshop setting, teams assigned to projects valued at less than $25 million are responsible, on a smaller scale, for many of the same plans, meetings, and actions required for the higher-valued ones.

The formal five-day workshop includes pre- and postworkshop activities, each taking place over an average of forty-five working days. Preworkshop activities include identifying the appropriate teams and workshop type, preparing activities and agendas, negotiating contracts, reviewing materials, and preparing project information. If certain benchmarks (such as a properly prepared scope and schedule) are not completed during this phase, the workshop is postponed. The postworkshop activities include preparing models and final reports, reviewing consultant invoices, and completing action items from the workshop. At each stage, the process is evaluated for delays and the reasons for those delays. The time frame from the project manager's initiation of the workshop request to delivery of the final report is approximately ninety-five days.

Although the process as described is simplified, the WSDOT guidance documents provide intricate directives for each stage of risk management: risk identification, qualitative and quantitative risk analysis, allocation of team participants and roles, risk-response actions, and performance measures achieved.

WSDOT understands that project risk management is valuable, as it forecasts uncertainty, promotes innovation, allows for more realized benefits and less wasted time, fosters informed decision making, and helps senior management stay informed of ongoing projects. Its specific guidelines on this subject provide consistent methods, techniques, tools, requirements, and guidance to further public safety efforts, as well as successful project deliverables to the state of Washington.[9]

SUMMARY

Risk management professionals should be aware of how major international risk management standards define risk identification. They should then customize the definition for their organizations. Various tools can be adapted to assist in identifying existing and emerging risks. A holistic approach to risk identification is a best practice for organizations to recognize and understand their risks.

A team approach to identifying the risks associated with a project, product, or organization can provide diverse perspectives. In addition to identifying specific risks, it can illuminate interconnected risks that might not be apparent to an individual. To meet the particular needs of their organization, risk management professionals should adapt the various team approaches, such as facilitated workshops, the Delphi technique, scenario analysis, HAZOP, and SWOT. Some techniques work better for specific complex projects, while others can be used to identify organizational risks.

Risk management professionals can use a risk register when identifying the risks associated with a scenario. The scenario method provides a view of a possible event and its associated risks. The risk register is a matrix that helps to identify the likelihood, consequences, risk level, and action steps for the scenario as well as the risks in all four risk quadrants.

Risk mapping is a valuable technique for risk management professionals to use in analyzing their organizations' risks. These maps can prioritize risks and assist with risk management decisions.

The risk treatment process involves assessing specific risk treatment options to determine whether residual risks are tolerable to an organization. Risk treatment techniques include avoiding risk, modifying the likelihood and/or impact, transferring the risk, retaining the risk, and exploiting the risk. These techniques can be applied to hazard, operational, financial, and strategic risks.

Successfully managing risks in a project involves understanding the risk management process—scanning the environment, identifying risks, analyzing risks, treating risks, and monitoring and assuring the results—to identify, assess, and respond to risk appropriately. In addition, a project manager can anticipate both common internal and external risks and treat them. Ensuring the timeliness of activities involves managing the buffer in the critical path, managing risks for critical path activities, and monitoring completion of activities on the critical path.

ASSIGNMENT NOTES

1. Committee of Sponsoring Organizations of the Treadway Commission, "Enterprise Risk Management—Integrated Framework: Executive Summary," September 2004, p. 38, www.coso.org/documents/coso_erm_executivesummary.pdf (accessed February 8, 2012).

2. M. D. Abkowitz and J. S. Camp, "Identifying Risks and Scenarios Threatening the Organization as an Enterprise," pp. 6-7,www.memphis.edu/cait/pdfs/Risk___Scenario_Identificaton_-_CAIT.pdf (accessed April 26, 2012).
3. Joanne Wojcik, "Integrated RMIS Tool Aids Holistic Approach," Business Insurance, April 16, 2012, p. 22.
4. Puneet Kapoor, "Uncovering Risks: A Critical Precursor to Effective Risk Handling," presentation at the Risk and Insurance Management Society Conference on Enterprise Risk Management, November 3, 2011, San Diego, Calif.
5. RIMS, "Exploring Risk Appetite and Risk Tolerance," RIMS Executive Report: The Risk Perspective (New York: Risk and Insurance Management Society, Inc.), April 12, 2012, p. 3.
6. Harold D. Skipper and W. Jean Kwon, Risk Management and Insurance (Malden, Mass.: Blackwell Publishing, 2007), pp. 303-304.
7. Linda I. Gibbs and Caswell F. Halloway, "NYC Hurricane Sandy After Action Report and Recommendations to Mayor Michael R. Bloomberg," May 2013, www.nyc.gov/html/recovery/downloads/pdf/sandy_aar_5.2.13.pdf (accessed June 5, 2013).
8. Ed Beeson, "Many Hurricane Sandy insurance claims closed without payment, data shows," n.j.com, May 19, 2013, www.nj.com/business/index.ssf/2013/05/many_hurricane_sandy_insurance.html (accessed June 5, 2013).
9. Washington State Department of Transportation, "Project Risk Management: Guidance for WSDOT Projects," July 2010.