

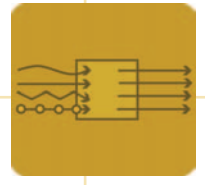
TITLE

ENTERPRISE RISK MANAGEMENT: TOOLS AND TECHNIQUES FOR EFFECTIVE IMPLEMENTATION

CREDITS

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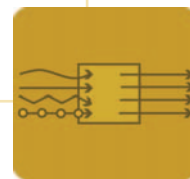
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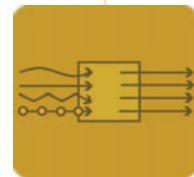
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I. EXECUTIVE SUMMARY

Enterprise risk management (ERM) takes a broad perspective on identifying the risks that could cause an organization to fail to meet its strategies and objectives. In this Statement on Management Accounting (SMA), several techniques for identifying risks are discussed and illustrated with examples from company experiences. Once risks are identified, the next issue is to determine the root causes or what drives the risks. A suggested approach is described and followed by a discussion of several qualitative and quantitative procedures for assessing risks. Some practical ERM implementation considerations are also explored, including infrastructure and maturity models, staging adoption, the role of the management accountant, education and training, technology, aligning corporate culture, building a case for ERM, and the ROI of ERM. Any organization—large or small; public, private, or not-for-profit; U.S.-based or global—that has a stakeholder with expectations for business success can benefit from the tools and techniques provided in this SMA.

II. INTRODUCTION

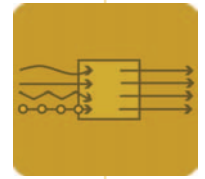
In the economic landscape of the 21st century, an organization's business model is challenged constantly by competitors and events that could give rise to substantial risks. An organization must strive to find creative ways to continuously reinvent its business model in order to sustain growth and create value for stakeholders. Companies make money and increase stakeholder value by engaging in activities that have some risk, yet stakeholders also tend to appreciate and reward some level of stability in their expected returns. Failure to identify, assess, and manage the major risks facing the organization's business model, however, may unexpectedly result in significant loss of stakeholder value. Thus, senior leadership must implement

processes to manage effectively any substantial risks confronting the organization. This dual responsibility of growing the business and managing risk has been noted by Jeffrey Immelt, Chairman and CEO at General Electric Co., when he described his position at GE: "My job is to figure out how to grow and manage risk and volatility at the same time."¹

While leaders of successful organizations have always had some focus on managing risks, it typically has been from a reactive exposure-by-exposure standpoint or a silo approach rather than a proactive, integrated, across-the-organization perspective. Under a silo approach, individual organizational units deal with their own risks, and often no single group or person in the organization has a grasp of the entire exposure confronting the company (especially the overall organization's "reputation" risk). To correct such a situation, enterprise risk management (ERM) has emerged in recent years and takes an integrated and holistic view of the risks facing the organization.

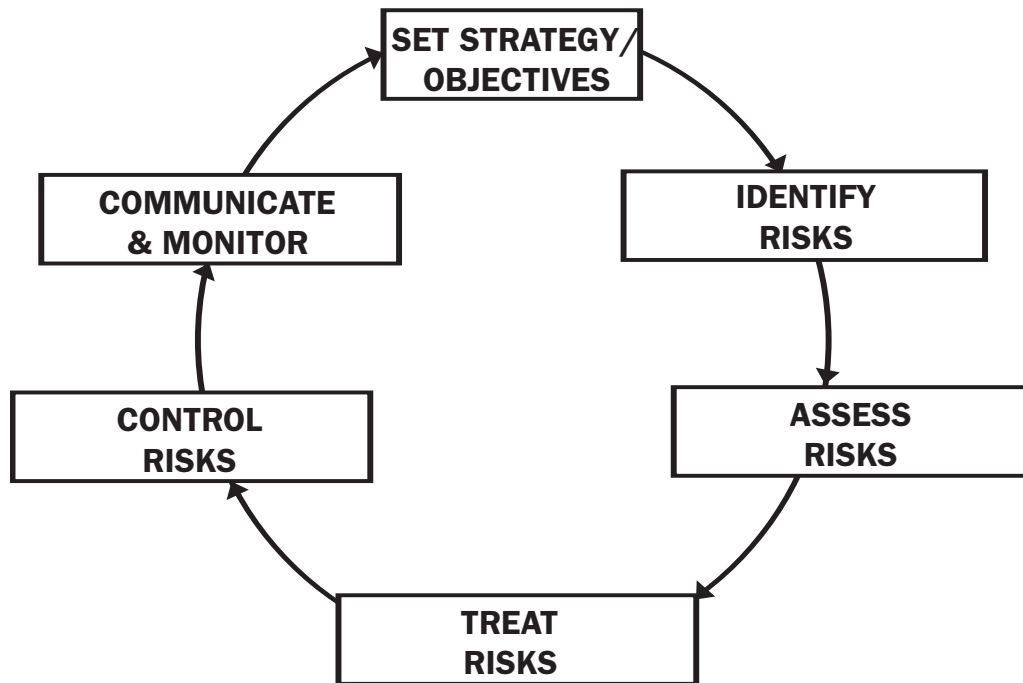
This SMA is the second one to address enterprise risk management. The first, *Enterprise Risk Management: Frameworks, Elements, and Integration*, serves as the foundation for understanding and implementing ERM. It highlights the various risk frameworks and statements that professional organizations around the world have published. In addition, it discusses and illustrates through company experiences the core components of a generic ERM framework. It also points out some entrepreneurial opportunities for change within an organization (with specific leadership roles for the management accountant articulated) when ERM is incorporated in such ongoing management activities

¹ Diane Brady, "General Electric, the Immelt Way," *Business Week*, September 11, 2006, p. 33.



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EXHIBIT 1. A CONTINUOUS RISK MANAGEMENT PROCESS



Source: Adapted from Institute of Chartered Accountants in England and Wales, *No Surprises: The Case for Better Risk Reporting*, ICAEW, London, U.K., 1999, p. 47.

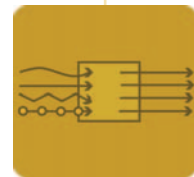
as strategic planning, the balanced scorecard, budgeting, business continuity planning, and corporate governance. Finally, it takes up the issue of transitioning from compliance under the Sarbanes-Oxley Act (SOX), where the focus is on risks related to financial reporting, to an enterprise-wide perspective on risks, including strategic risks.

III. SCOPE

This SMA is addressed to management accounting and finance professionals who serve as strategic business partners with management in the implementation of ERM in their organization. Others within the organization responsible for

risk management, information technology, and internal audit will also find this SMA useful.

Like many other change initiatives going on within dynamic organizations, ERM provides an opportunity for management accounting and finance professionals to alter how they are perceived by others in the organization. By becoming a strategic partner in ERM implementation, they can be seen as “bean sprouters” of new management initiatives rather than merely “bean counters.” They also can move from being the historians and custodians of accounts to futuristic thinkers. They can become coaches and players in a new management initiative important to the future overall well-being of the company



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rather than merely scorekeepers on what has or has not been accomplished.²

The focus of this SMA is on *core* tools and techniques to facilitate successful ERM implementation. While other tools and techniques can be found in the Additional Resources section, this document emphasizes those that are critical for most ERM initiatives. Since all organizations have stakeholders with ever increasing expectations, the tools and techniques discussed here are generally relevant to:

- large and small organizations,
- enterprises in the manufacturing and services sectors,
- public and private organizations, and
- for-profit and not-for-profit organizations.

IV. RISK IDENTIFICATION TECHNIQUES

Exhibit 1 shows the generic ERM framework presented in *Enterprise Risk Management: Frameworks, Elements, and Integration*. The initial focus is on clarity of strategies and objectives. The focal point for risk identification may be at any level, such as the overall company, a strategic business unit, function, project, process, or activity. Without clear objectives it is impossible to identify events that might give rise to risks that could impede the accomplishment of a particular strategy or objective—regardless of the scope of the inquiry. Assuming those involved in identifying risks have a clear understanding of the strategies and objectives, the appropriate questions to ask, as suggested by

² The authors acknowledge that the ideas in this paragraph about the changing role of financial professionals were taken from a presentation heard some years ago (uncertain as to date and place) and given by Jim Smith of The Marmon Group, Inc. While the original remarks were not given in the context of ERM, they have been adapted accordingly.

one company's senior enterprise risk manager, are: "What could stop us from reaching our top goals and objectives?" and "What would materially damage our ability to survive?" These questions can be modified for the appropriate level of inquiry.

In the risk identification process, those involved should recognize that it is a misperception to think of a risk "as a sudden event."³ Identifying an issue that is facing the organization and discussing it in advance can potentially lead to the risk being mitigated. Two benefits are possible:

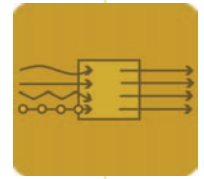
"One, if you mitigate the risk and your peers do not—in a catastrophic, continuity-destroying event that hits an industry—say a financial scandal—you get what is called the survivor's bonus. Two, if you survive or survive better than others, then you have an upside after the fact, and this should be part of the board's strategic thinking."⁴

Before considering some of the specific techniques available for organizations to identify risks, several important factors should be noted about this process:

- The end result of the process should be a risk language specific to the company or the unit, function, activity, or process (whatever is the focal point);
- Using a combination of techniques may produce a more comprehensive list of risks than would reliance on a single method;
- The techniques used should encourage open and frank discussion, and individuals should not fear reprisal for expressing their concerns

³ Corporate Board Member, 2006 Academic Council Supplement: *Emerging Trends in Corporate Governance*, Board Member, Inc., Brentwood, Tenn., p. 20.

⁴ *Ibid.*



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about potential events that would give rise to risks resulting in major loss to the company;

- The process should involve a cross-functional and diverse team both for the perspectives that such a group provides and to build commitment to ERM; and
- Finally, the process will probably generate a lengthy list of risks, and the key is to focus on the “vital few” rather than the “trivial many.”

Some techniques for identifying risk are:

- Brainstorming
- Event inventories and loss event data
- Interviews and self-assessment
- Facilitated workshops
- SWOT analysis
- Risk questionnaires and risk surveys
- Scenario analysis
- Using technology
- Other techniques

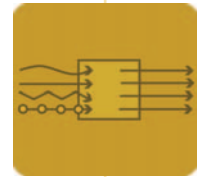
Brainstorming

When objectives are stated clearly and understood by the participants, a brainstorming session drawing on the creativity of the participants can be used to generate a list of risks. In a well-facilitated brainstorming session, the participants are collaborators, comprising a team that works together to articulate the risks that may be known by some in the group. In the session, risks that are known unknowns may emerge, and perhaps even some risks that were previously unknown unknowns may become known. Facilitating a brainstorming session takes special leadership skills, and, in some organizations, members of the internal audit and ERM staff have been trained and certified to conduct risk brainstorming sessions. In addition to well-trained facilitators, the participants need to understand the ERM framework and how the brainstorming session fits into the ERM process.

The participants may very well be required to do some preparation prior to the session.

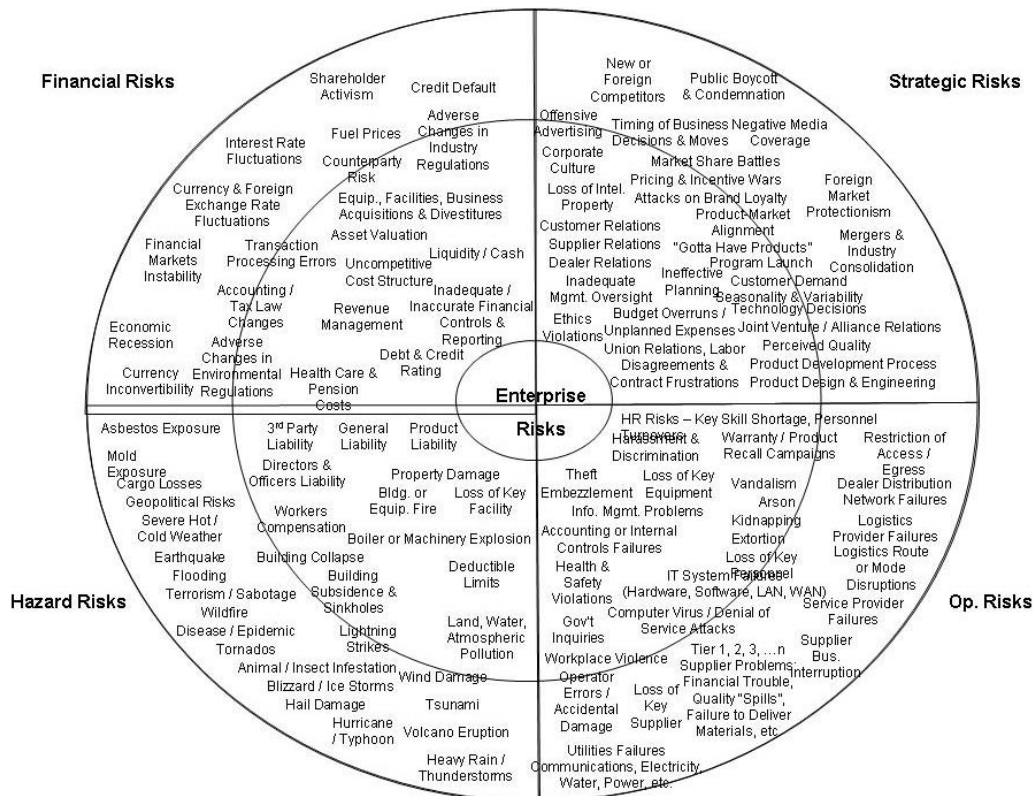
In using this technique, one company familiar to the authors noted that because the objectives were unclear to some of the participants, the process had to back up and clarify the objectives before proceeding. Using a cross-functional team of employees greatly increases the value of the process because it sheds light on how risks and objectives are correlated and how they can impact business units differently. Often in brainstorming sessions focused on risk identification, a participant may mention a risk only to have another person say: “Come to think of it, my area has that risk, and I have never thought of it before.” With the team sharing experiences, coming from different backgrounds, and having different perspectives, brainstorming can be successful in identifying risk. It is also powerful when used at the executive level or with the audit committee and/or board of directors.

In a brainstorming session, the participants must have assurance that their ideas will not result in humiliation or demotion. Otherwise, they may feel inhibited in expressing what they believe are major risks facing the organization. As an example, a set of often overlooked risks are “people risks” vs. environmental risks, financial risks, and other more technical risks. People risks include succession planning (What if our very competent leader departs the organization?) and competency and skills building (What if we continue with a team that does not have the requisite skills for success?). Once a list of risks is generated, reducing the risks to what the group considers the top few can be accomplished using group software to enable participants to anonymously vote on the objectives and risks. Anonymity is believed to increase the veracity of the rankings. Some of the interactive



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EXHIBIT 2. INDUSTRY PORTFOLIO OF RISKS



Source: Debra Elkins, "Managing Enterprise Risks in Global Automatic Manufacturing Operations," presentation at the University of Virginia, January 23, 2006. Permission granted for use.

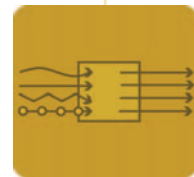
voting software that could be used in the risk identification process includes Sharpe Decisions, Resolver*Ballot, OptionFinder, and FacilitatePro. With the availability of interactive voting software and Web polling, the brainstorming session might be conducted as a virtual meeting with participants working from their office location, also enabling them to identify and rank the risks anonymously.

Event Inventories and Loss Event Data

Seeding or providing participants with some form of stimulation on risks is very important in a brainstorming session. One possibility is to provide an event inventory for the industry (see

Exhibit 2) or a generic inventory of risks. Examples of the latter are readily available from various consulting firms and publications.⁵ In the first SMA on ERM, a general risk classification scheme is given that could also be used to "seed" the discussion. In a brainstorming session or facilitated workshop (discussed below), the goal is to reduce the event inventory to those relevant to the company and define each risk specific to the company. The risk identification process can also be seeded by available loss

⁵ Economist Intelligence Unit, *Managing Business Risks—An Integrated Approach*, The Economist Intelligent Unit, New York, 1995.



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EXHIBIT 3A. RISK IDENTIFICATION TEMPLATE

Please list the major strategies and/or objectives for your area of responsibility.

Please list the major risks your unit faces in achieving its objectives. List no more than 10 risks.

Please assess the overall risk management capability within your area of responsibility to seize opportunities and manage the risks you have identified.

EXHIBIT 3B. MAJOR STRATEGIES/OBJECTIVES FOR YOUR UNIT

Please list the major strategies/objectives for your unit.

EXHIBIT 3C. MAJOR RISKS FOR YOUR UNIT

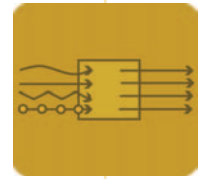
Please list the major risks your unit faces in achieving your objectives. List no more than 10 risks.

event data. A database on relevant loss events for a specific industry can stimulate a “fact-based discussion.”⁶

Interviews and Self-Assessment

This technique combines two different processes. First, each individual of the organizational or operating units is given a template with instructions to list the key strategies and/or objectives within his or her area of responsibility and the risks that could impede the achievement of the objectives. Each unit is also asked to assess its risk management capability using practical framework categories such as those contained in the ERM framework from the Committee of Sponsoring Organizations of the Treadway

⁶ Committee of Sponsoring Organizations of the Treadway Commission (COSO), *Enterprise Risk Management—Integrated Framework: Application Techniques*, AICPA, New York, 2004, p. 28.



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EXHIBIT 3D. RISK MANAGEMENT CAPABILITY

Use the following categories* to assess the overall risk management capability within your area of responsibility to seize opportunities and manage risks using the scale at the bottom of the page.

Internal Environment	VL	L	M	H	VH
Objective Setting	VL	L	M	H	VH
Event Identification	VL	L	M	H	VH
Risk Assessment	VL	L	M	H	VH
Risk Response	VL	L	M	H	VH
Control Activities	VL	L	M	H	VH
Information/Communication	VL	L	M	H	VH
Monitoring	VL	L	M	H	VH

What is your level of concern with respect to the overall risk management capability of your area of responsibility to seize opportunities and manage risks? Please circle the most appropriate response:

VL= Very Low L=Low M=Medium H=High VH=Very High

*The categories are taken from COSO, *Enterprise Risk Management—Integrated Framework: Executive Summary*, AICPA, New York, 2004.

Commission (COSO). A sample template is presented in Exhibits 3A-D. The completed documents are submitted to the ERM staff or coordinator, which could be the CFO, controller, COO, or CRO (chief risk officer). That group follows up with interviews to clarify issues. Eventually, the risks for the unit are identified and defined, and a risk management capability score can be determined from a five-point scale, as used in Exhibit 3D. This technique might also be used in conjunction with a facilitated workshop.

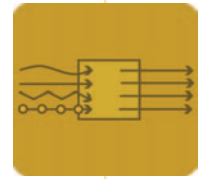
Facilitated Workshops

After the information is completed and collected, a cross-functional management team from the unit or from several units might participate in a facilitated workshop to discuss it. Again, using voting software, the various risks can be ranked to arrive at a consensus of the top five to 10, for example. As noted previously, using interactive voting software allows the individuals to identify and rank the risks anonymously without fear of

reprisal should their superior be a member of the group.

SWOT Analysis

SWOT (strengths-weaknesses-opportunities-threats) analysis is a technique often used in the formulation of strategy. The strengths and weaknesses are internal to the company and include the company's culture, structure, and financial and human resources. The major strengths of the company combine to form the core competencies that provide the basis for the company to achieve a competitive advantage. The opportunities and threats consist of variables outside the company and typically are not under the control of senior management in the short run, such as the broad spectrum of political, societal, environmental, and industry risks.



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For SWOT analysis to be effective in risk identification, the appropriate time and effort must be spent on thinking seriously about the organization's weaknesses and threats. The tendency is to devote more time to strengths and opportunities and give the discussion of weaknesses and threats short shrift. Taking the latter discussion further and developing a risk map based on consensus will ensure that this side of the discussion gets a robust analysis. In a possible acquisition or merger consideration, a company familiar to the authors uses a SWOT analysis that includes explicit identification of risks. The written business case presented to the board for the proposed acquisition includes a discussion of the top risks together with a risk map.

Risk Questionnaires and Risk Surveys

A risk questionnaire that includes a series of questions on both internal and external events can also be used effectively to identify risks. For the external area, questions might be directed at political and social risk, regulatory risk, industry risk, economic risk, environmental risk, competition risk, and so forth. Questions on the internal perspective might address risk relating to customers, creditors/investors, suppliers, operations, products, production processes, facilities, information systems, and so on. Questionnaires are valuable because they can help a company think through its own risks by providing a list of questions around certain risks. The disadvantage of questionnaires is that they usually are not linked to strategy.

Rather than a lengthy questionnaire, a risk survey can be used. In one company, surveys were sent to both lower- and senior-level management. The survey for lower management asked respondents to "List the five most important risks to achieving your unit's goals/objectives." The survey to senior management asked partici-

pants to "List the five most important risks to achieving the company's strategic objectives." The survey instruments included a column for respondents to rank the effectiveness of management for each of the five risks listed, using a range of one (ineffective) to 10 (highly effective). Whether using a questionnaire or survey, the consolidated information can be used in conjunction with a facilitated workshop. In that session, the risks are discussed and defined further. Then interactive voting software is used to narrow that risk list to the vital few.

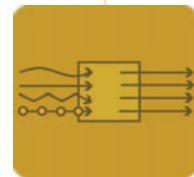
Scenario Analysis

Scenario analysis is a particularly useful technique in identifying strategic risks where the situation is less defined and "what-if" questions should be explored. Essentially, this technique is one way to uncover risks where the event is high impact/low probability.⁷ In this process,

"Managers invent and then consider, in depth, several varied stories of equally plausible futures. The stories are carefully researched, full of relevant detail, oriented toward real-life decisions, and designed (one hopes) to bring forward surprises and unexpected leaps of understanding."⁸

Using this technique, a cross-functional team could consider the long-term effects resulting from a loss of reputation or customers or from the lack of capability to meet demand. Another relevant question to ask is, "What paradigm shifts in the industry could occur, and how would they impact the business?"

7 Deloitte & Touche LLP, *The Risk Intelligent Enterprise: ERM Done Right*, Deloitte Development LLC, 2006, p. 4.
8 Peter Schwartz, *The Art of the Long View*, Currency Doubleday, New York, 1991, p. xiii.



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The risk management group of one company uses scenario analysis to identify some of its major business risks.⁹ One risk for this company is an earthquake. Its campus of more than 50 buildings is located in the area of a geological fault. From a holistic perspective, the loss from an earthquake is not so much the loss of the buildings but the business interruption in the product development cycle and the inability to serve customers. The company's risk management group analyzed this disaster scenario with its outside advisors and attempted to quantify the real cost of such a disaster, taking into account how risks are correlated. In the process, the group identified many risks in addition to property damage, including:

- "Director and officer liability if some people think management was not properly prepared,
- Key personnel risk,
- Capital market risk because of the firm's inability to trade,
- Worker compensation or employee benefit risk,
- Supplier risks for those in the area of the earthquake,
- Risk related to loss of market share because the business is interrupted,
- Research and development risks because those activities are interrupted and product delays occur, and
- Product support risks because the company cannot respond to customer inquiries."¹⁰

This example reveals the value of using scenario analysis: A number of risks are potentially present within a single event, and the total impact could be very large. Another scenario that this

9 Thomas L. Barton, William G. Shenkir, and Paul L. Walker, *Making Enterprise Risk Management Pay Off*, Financial Executives Research Foundation, Upper Saddle River, N.J., 2001, pp. 132-135.

10 *Ibid.*, p. 133.

company's risk management group analyzed was a stock market downturn (or bear market). The group also defined five or six other scenarios. Under each one, it identified as many material risks as could be related to the scenario and developed white papers on each one for executive management and the board.¹¹

Using Technology

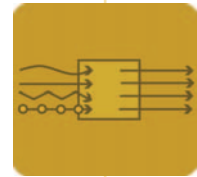
The risk identification process can also utilize the company's existing technology infrastructure. For example, most organizations utilize an intranet in their management processes. The group responsible for a company's ERM process can encourage units to place their best risk practices on the ERM site. Risk checklists, anecdotes, and best practices on the intranet serve as stimulation and motivation for operating management to think seriously about risks in their unit. Also, tools that have been found particularly useful to various units can be catalogued. As new projects are launched, business managers are encouraged to consult the risk management group's intranet site.

Another use of technology is to recognize the company's potential risk that resides with the Internet. For example, a company's products, services, and overall reputation are vulnerable to Internet-based new media like blogs, message boards, e-mailing lists, chat rooms, and independent news websites. Some companies devote information technology resources to scan the blogosphere continuously for risks related to the company's products, services, and reputation.

Other Techniques

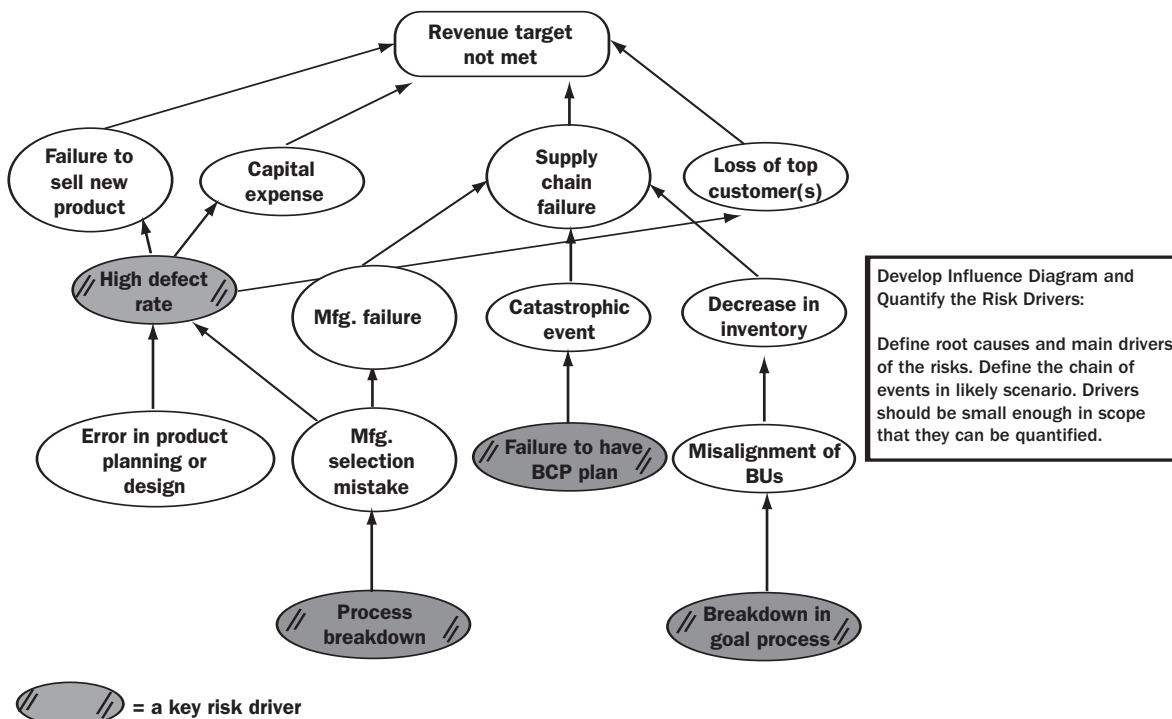
Other possible approaches for identifying risks include value chain analysis, system design review, process analysis, and benchmarking with

11 *Ibid.*, p. 133.



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EXHIBIT 4. INFLUENCE DIAGRAM



other similar as well as dissimilar organizations. Also, external consultants can add value in the risk identification process by bringing in knowledge from other companies and industries and by challenging the company's list of identified risks.

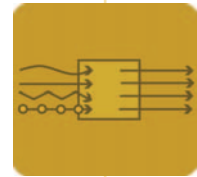
V. ANALYSIS OF RISK BY DRIVERS

After a risk is identified, the temptation to quantify it before further analysis is completed should be avoided. Additional understanding of the risk's potential causes is required by the ERM team and management before its impact can be quantified. Working with the various units of the organization that own parts of the risk, the ERM team should drill into the risk to uncover what is beneath the surface and to get a better understanding of the potential risk drivers. An influence diagram or root cause analysis can be

developed using scenario analysis. This can be done by using supporting documentation and interviewing those who own parts of the risk. Exhibit 4 presents an influence diagram for a strategic risk provided by a senior manager of ERM at a major company. In this exhibit, a chain of likely events within a given scenario is spelled out where a strategic risk—revenue target not met—has been identified.

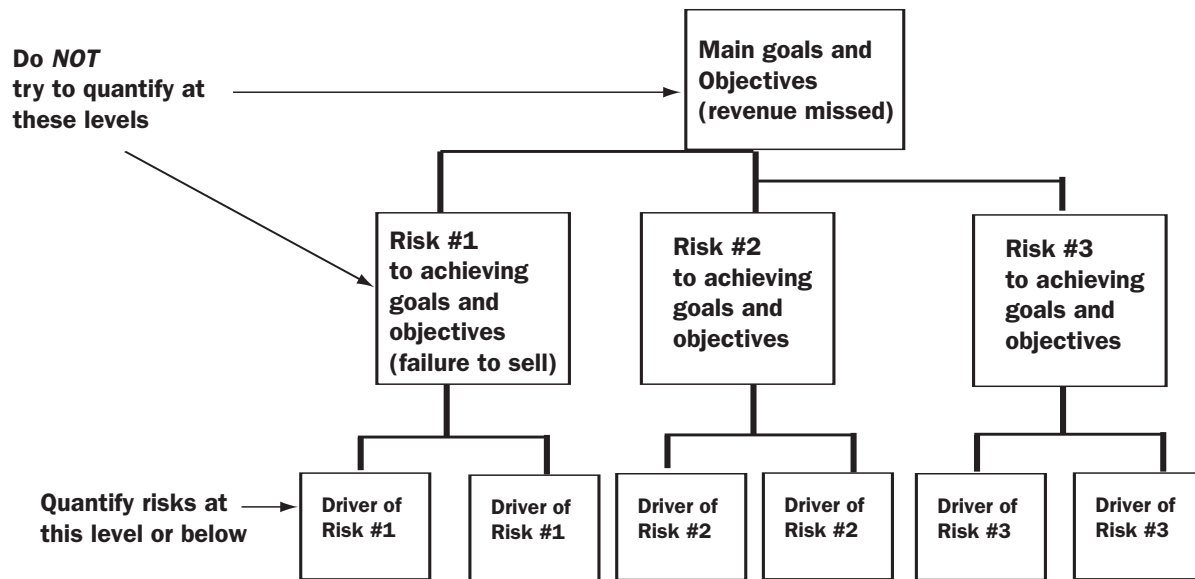
Studying Exhibit 4, the inquiry to determine the likely drivers in a scenario for the risk of not meeting the revenue target could be the following:

- Failure to sell a new product;
- The new machinery and equipment purchased for making the new product was not selected properly because of a process breakdown in the acquisition. This led to manufacturing failures attributed to product design problems,



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EXHIBIT 5. QUANTIFYING RISK: DETERMINE THE DRIVERS



which led to a high rate of product defect;

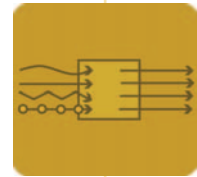
- Failure in the supply chain impacted the ability to meet the revenue target. A catastrophic event occurred at a major supplier, and the business continuity plan recognized this event too late to find alternative suppliers;
- Together, the above events would result in losing some top customers because high-quality products could not be delivered when required; furthermore, in digging deeper, some misalignment of specific goals might exist in the silos involved. For example, manufacturing might have a goal of cutting cost; customer service naturally will want low defects in the products; the pricing function will be seeking high margins for the products; and the sales force is motivated to generate revenue.

With an in-depth understanding of how the strategic risk could occur, more information is now available to assist in quantifying the risk. This information can be framed as noted in Exhibit 5 in order to begin estimating the impact.

The point of this analysis is to understand the level at which quantification can best occur. If the risk is quantified at too high a level, it could be too broad or not actionable. Using a building block approach around risk drivers facilitates the quantification process. At the end of the process, however, quantification is still an estimate and should be viewed as merely providing an “order of magnitude” of the impact.

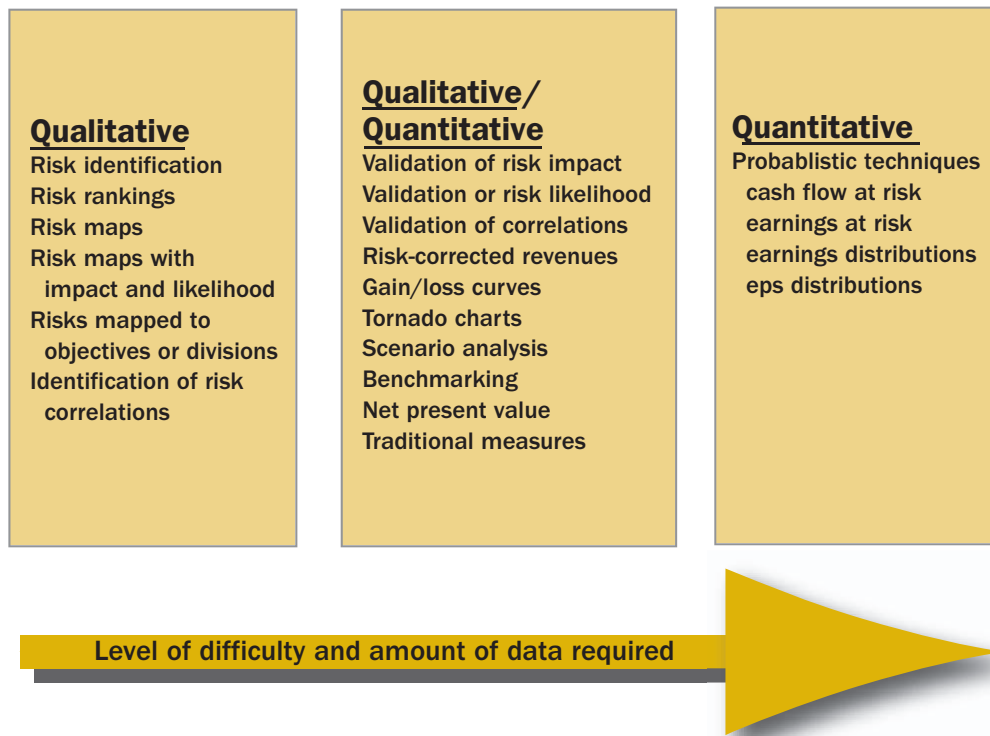
VI. RISK ASSESSMENT TOOLS

Risks must be identified correctly before an organization can take the next step. Assessing the wrong list of risks or an incomplete list of risks is futile. Organizations should make every possible effort to ensure they have identified their risks correctly using some or all of the approaches discussed. The act of identifying risks is itself a step on the risk assessment road. Any risks identified, almost by default, have some probability of influencing the organization.



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EXHIBIT 6. QUALITATIVE AND QUANTITATIVE APPROACHES TO RISK ASSESSMENT



Categories

Once risks are identified, some organizations find it helpful to categorize them. This may be a necessity if the risk identification process produces hundreds of risks, which can be overwhelming and seem unmanageable. Risk categories include hazard, operational, financial, and strategic. Other categories are controllable or noncontrollable and external or internal. Categorizing risk requires an internal risk language or vocabulary that is common or unique to the organization in total, not just to a particular subunit or silo. Studies have shown that an inconsistent language defining risks across an organization is an impediment to an effective ERM strategy. Risk terms would certainly vary between a pharmaceutical company and a tech-

nology company or between a nonprofit and an energy company. Several risks could be grouped around a broader risk, such as reputation risk. Other methods for categorizing risk can be financial or nonfinancial and insurable or noninsurable. Some companies also categorize risks as quantifiable or nonquantifiable.

Qualitative vs. Quantitative

As Exhibit 6 shows, risk assessment techniques can vary from qualitative to quantitative. The qualitative techniques can be a simple list of all risks, risk rankings, or risk maps. A list of risks is a good starting point. Even though no quantitative analysis or formal assessment has been applied to the initial list of risks, the list and accompanying knowledge is valuable. Some

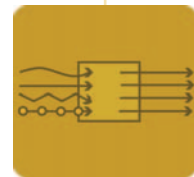


EXHIBIT 7. RISK MAP

Impact	High	High Impact Low Likelihood	High Impact High Likelihood
	Low	Low Impact Low Likelihood	Low Impact High Likelihood
		Low	High

Likelihood of Occurrence

risks on the list may not be quantifiable. For these risks, identifying them and adding them to a priority list may be the only quantification possible. Organizations should not be concerned that they cannot apply sophisticated modeling to every risk.

Risk Rankings

Once an organization has created its list of risks, it can begin to rank them. Ranking requires the ERM team to prioritize the risks on a scale of importance, such as low, moderate, and high. Although this seems unsophisticated, the results can be dramatic. Organizations find considerable value in having conversations about the importance of a risk. The conversations usually lead to questions about why one group believes the risk is important and why others disagree. Again, this process should use a cross-functional risk team so that perspectives from across the entire organization are factored into the rankings. This is a critical task requiring open debate, candid discussion, and data (e.g., tracking, recording,

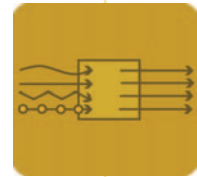
and analysis of historical error rates on a business process) where possible.

Impact and Probability

The importance of an event includes not just its impact but also its likelihood of occurring. Therefore, many ERM organizations generate risk maps using impact and probability. In ERM implementation, companies not only generate risk maps to capture impact and likelihood but also to demonstrate how risks look when put together in one place. The value of the map is that it reflects the collective wisdom of the parties involved. Furthermore, risk maps capture considerable risk information in one place that is easily reviewed. A basic risk map, such as in Exhibit 7, captures both impact and likelihood.

When assessing likelihood or probability, the ERM team can use a variety of scales:

- Low, medium, or high;
 - Improbable, possible, probably, or near certainty; and
 - Slight, not likely, likely, highly likely, expected.
- The same is true for assessing impact:



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EXHIBIT 8. RISK MAP MODEL

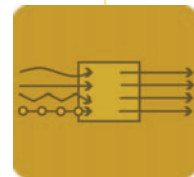
Criticality of Achievement Process/Business Level Impact Segment/Intersegment Level Impact Level Impact	6 Yellow (Level III) <i>Close monitoring for increased impact and/or variability</i>	8 Red (Level IV) <ul style="list-style-type: none"> • <i>Segment <u>Commitment</u></i> • <i>Reported to Segment Leadership</i> • <i>Close monitoring of risk action plan</i> 	9 Red (Level V) <ul style="list-style-type: none"> • <i>Commitment</i> • <i>Reported to Audit Committee</i> • <i>Reported to Segment Leadership</i> • <i>Close monitoring of risk action plan</i>
	3 Green (Level II) <i>High-level monitoring for increased impact and/or variability</i>	5 Yellow (Level III) <i>Close monitoring for increased impact and/or variability</i>	7 Red (Level IV) <ul style="list-style-type: none"> • <i>Segment <u>Commitment</u></i> • <i>Reported to Segment Leadership</i> • <i>Close monitoring of risk action plan</i>
	1 Green (Level I) <i>High-level monitoring for increased impact and/or variability</i>	2 Green (Level II) <i>High-level monitoring for increased impact and/or variability</i>	4 Yellow (Level III) <i>Close monitoring for increased impact and/or variability</i>
	Low <i>(Consistently within tolerable variance in key metric improvement or target)</i>	Moderate <i>(Sometimes within tolerable variance in key metric improvement or target)</i>	High <i>(Mostly outside of tolerable variance in key metric improvement or target)</i>
	Actual/Potential Performance Variability Around Targets Achievement of Objective/Execution of Process/Implementation of Change/Management of Risk		

- Low, medium, or high impact;
- Minor, moderate, critical, or survival; and
- Dollar levels, such as \$1 million, \$5 million, etc.

When qualitatively assessing these risks, it is also possible to estimate ranges. For example, a company might determine that there is a low probability of a customer-related risk having an impact of \$100 million, a moderate probability (or best guess) of a \$50 million impact, and a

high probability of a \$10 million impact. For example, when Apple announced its entrance into the cell phone market, other cell phone makers likely began making calculations to gauge the risk of the new entrant into their market.

Risk maps can help an organization determine how to respond to a risk. As organizations see the greater risks, they can plan a response. For example, one risk map approach used by a company is shown in Exhibit 8. For risks that are in



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the lower levels of impact and probability—the green zone on the map—a company should respond with high-level monitoring. For risks with higher levels of impact and probability—the red zone on the map—a company should take a stronger response and a higher level of commitment to managing them.

Keys to Risk Maps

Several keys need to be considered when generating risk maps: confidentiality, definitions, time-frame, direction, and correlations. Organizations may want to consider doing impact and probability in a confidential manner. As noted previously, software tools are available to facilitate confidential sharing. On the other hand, some companies find that openly sharing assessments within the group is acceptable. Even with confidentiality, good risk facilitators can bring out the risk source and root problems.

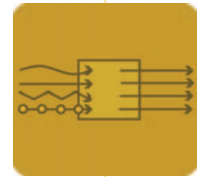
Definitions used during the risk map generation are critical. What is “important” to one work unit or individual may not seem “important” to another. If organizations measure impact in dollars, the dollars must be without ambiguity. Does the risk influence dollars on one product, dollars for a certain division, or earnings per share? Similarly, “improbable” might be interpreted by some to be 1% while others could think it means 15%. These definitions and terms should be clearly established before the risk map sessions are conducted.

Closely related to definitions are timeframes, which need to be established up front so that any understanding of the risk and its impact is clear as to when it will affect the organization. An assessment of risk at one point in time has the same failings as strategic plans and objectives, which do not take a longer-term perspective on market trends, customer needs, competitors,

etc. What seems important today or this week may not seem important in five years. Similarly, although some longer-range risks may not seem important today, these risks could threaten the organization’s survival if left unmanaged.

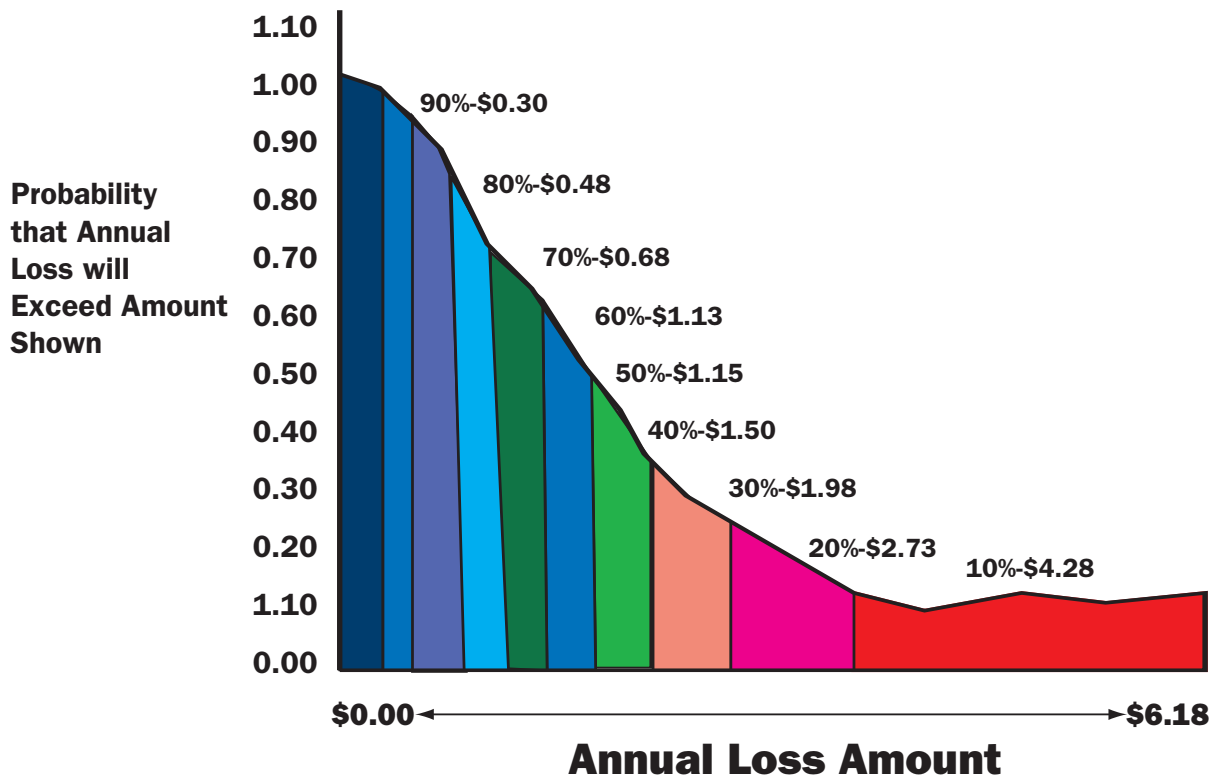
Some organizations find it valuable to capture the direction of the risk. This can be labeled on the risk map or communicated separately. Direction of risk can be captured using terms such as “increasing,” “stable,” or “decreasing.” Related to the risk direction is the risk trend. Knowing the direction and trend of a risk as well as its dollar impact and likelihood can be crucial to managing that risk. For example, risk trends can reveal that the risk was decreasing over the last several years but has increased recently.

One weakness in risk maps (and in silo risk management) is that maps do not capture any risk correlations. Ignoring risk correlations can lead to ineffective and inefficient risk management. Risk correlations can be considered for financial risks or nonfinancial risks. Clearly, how some companies manage one foreign currency exposure should be considered with how they manage another foreign currency exposure. Managing these in silos (without an enterprise-wide approach) can be inefficient because dollar exposures to only the yen or euro ignore that the yen and euro are correlated. Similarly, silo risk management would ignore the fact that the movement of interest rates could influence an organization’s pension obligations and debt obligations differently. As another example, how an organization manages commodity exposure today should be factored in with how it plans to change its long-term strategy to manage that same exposure. Short-term solutions of foreign currency risk management are different from long-term solutions of building plants in other countries. As is evident, correlations among risks and an enterprise-wide approach are critical.



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EXHIBIT 9. GAIN/LOSS PROBABILITY CURVE



Note: All loss amounts are in millions of dollars.

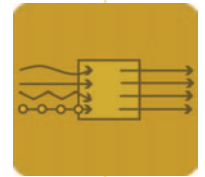
Link to Objectives at Risk or Divisions at Risk

Identifying risks by objective gives an organization the option to map risks by objectives. For nonprofit organizations, this may be more important because earnings per share is not the biggest concern. A risk map by objective captures all the risks related to a single objective, helping the organization understand the broad spectrum of risks facing that objective. For example, the objective of maintaining the corporate reputation at a certain level could have many risks to be mapped. Using such a map, the organization can see the biggest risks to reputation. Similarly, risks can also be identified by divi-

sion, which may be more informative for division managers. Organizations can generate risk maps for each division and for the organization overall.

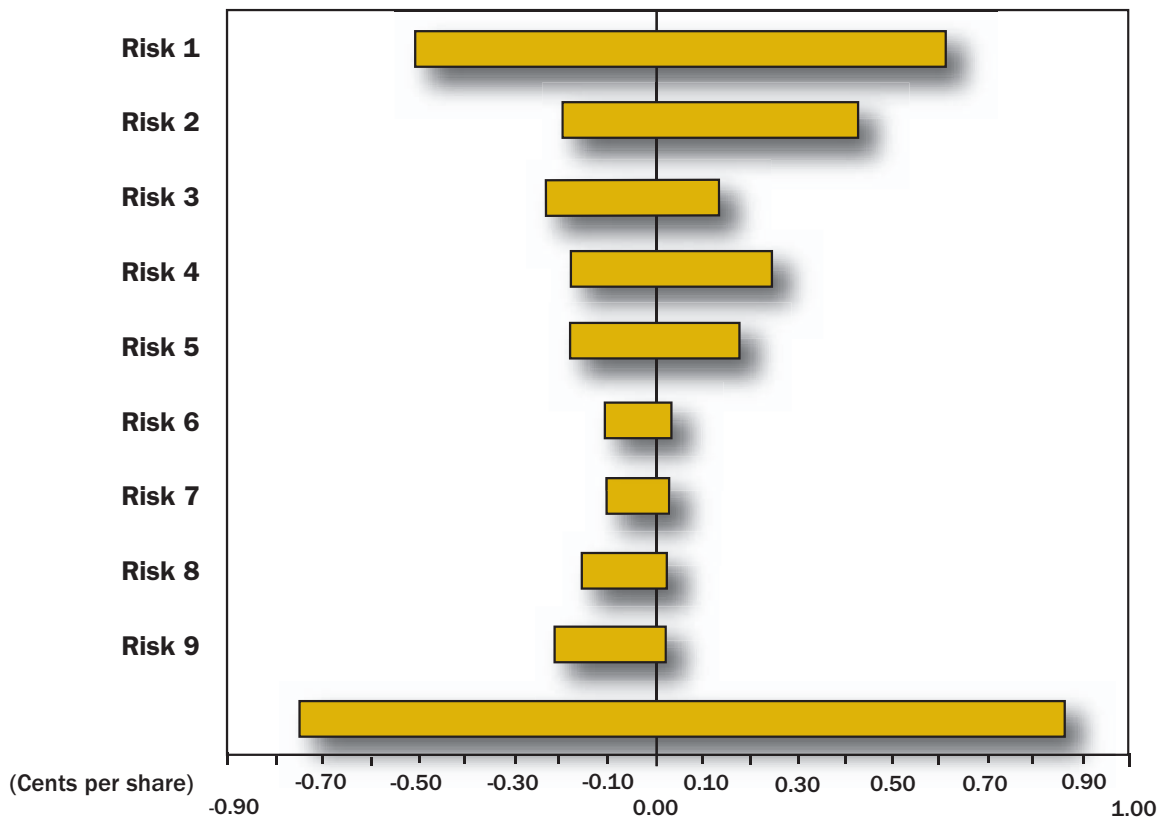
Residual Risk

After organizations assess risks, they should also consider any related controls so that the residual risk is known. A residual risk is the remaining risk after mitigation efforts and controls are in place to address the initially identified inherent risks that threaten the achievement of objectives. Risk maps can show overall risks, or they can be shown with just residual risks. Understanding residual risk can provide major



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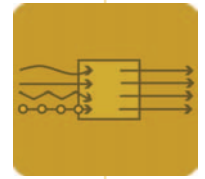
EXHIBIT 10. TORNADO CHART: EARNINGS VARIABILITY BY SAMPLE RISKS



benefits because companies do not want to over- or under-manage a risk that may be deemed by management and stakeholders to be “tolerable” or acceptable relative to stated business objectives. This is a major reason why some companies adopt ERM and try to understand, even qualitatively, the return on investment (ROI) of an ERM program. In the process of identifying risks and controls, the management team/process owners clearly play a leadership role, but there is a system of “checks and balances” in the control environment. For example, the control environment for internal controls over financial reporting includes the audit committee as well as internal and external auditors.

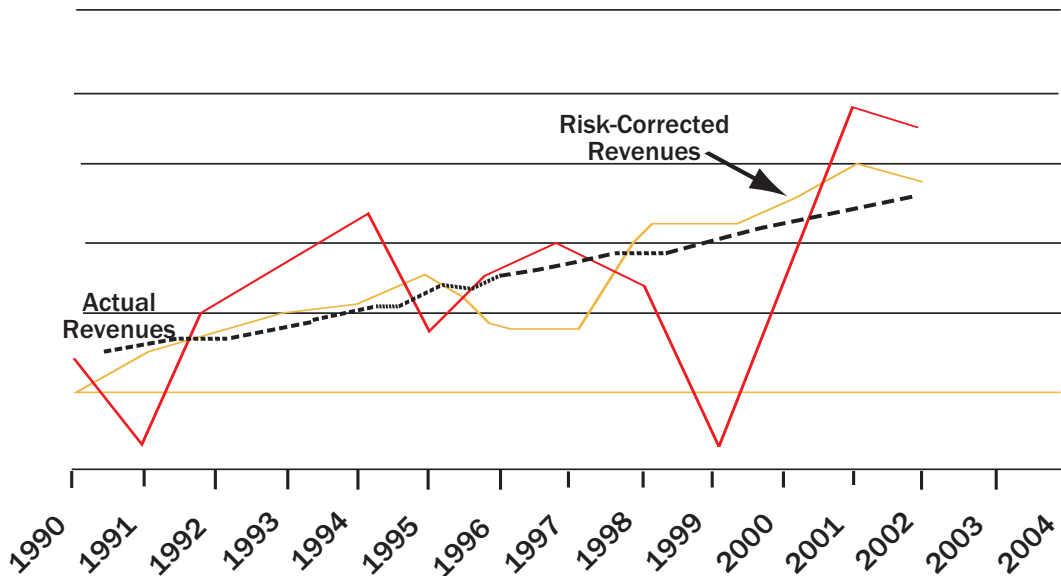
Validating the Impact and Probability

Organizations can validate the qualitative assessments of initial impact and probability by examining historical data to determine the frequency of events or the impact such events have had in the past. Events that have happened to other organizations can be used to understand how a similar event might impact your own organization. Gathering such data can be time consuming, but it has certain advantages. Knowing the real frequency or likelihood of a major drop in sales, for example, can provide an organization with the information necessary to make informed cost-benefit decisions about potential solutions.



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EXHIBIT 11. ACTUAL REVENUE VS. RISK-CORRECTED REVENUE



Gain/Loss Curves

Gain/loss curves are useful tools because they help an organization see how a risk can influence its financial statements and result in a gain or a loss. Furthermore, gain/loss curves also reveal the distribution of potential gains and losses. Gain/loss curves do not show correlations between risks, however, and they do not show all the risks in one place. A gain/loss curve is presented in Exhibit 9. The curve shows how much money the company loses or gains from a specific risk. The horizontal axis represents dollars, and the vertical axis represents probability. The sample curve in Exhibit 9 shows that the organization loses \$1.15 million dollars on average (at 50% probability in this illustration) as a result of this risk. Moving along the probability scale shows that, 90% of the time, this organization loses \$300,000 because of this risk. The organization believes it loses \$4.28 million about 10% of the time. Knowing how big of an impact a risk causes over a distribution of probabilities provides management with the informa-

tion necessary to decide how much money to spend managing the risk. Gain/loss curves can also reveal that some risks occasionally generate gains instead of losses. Developing gain/loss curves can require substantial data collection, and a company has to balance the data collection efforts with the benefits obtained.

Tornado Charts

Similar to gain/loss curves, tornado charts attempt to capture how much of an impact a risk has on a particular metric such as revenue, net income, or earnings per share. Exhibit 10 shows an example of a tornado chart. Tornado charts do not show correlations or distributions, but they are valuable because executives can see, in one place, the biggest risks in terms of a single performance metric.

Risk-Adjusted Revenues

Risk-adjusted (or risk-corrected) revenues allow management to see how revenues could look if

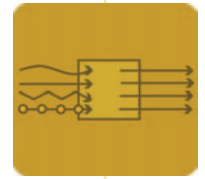
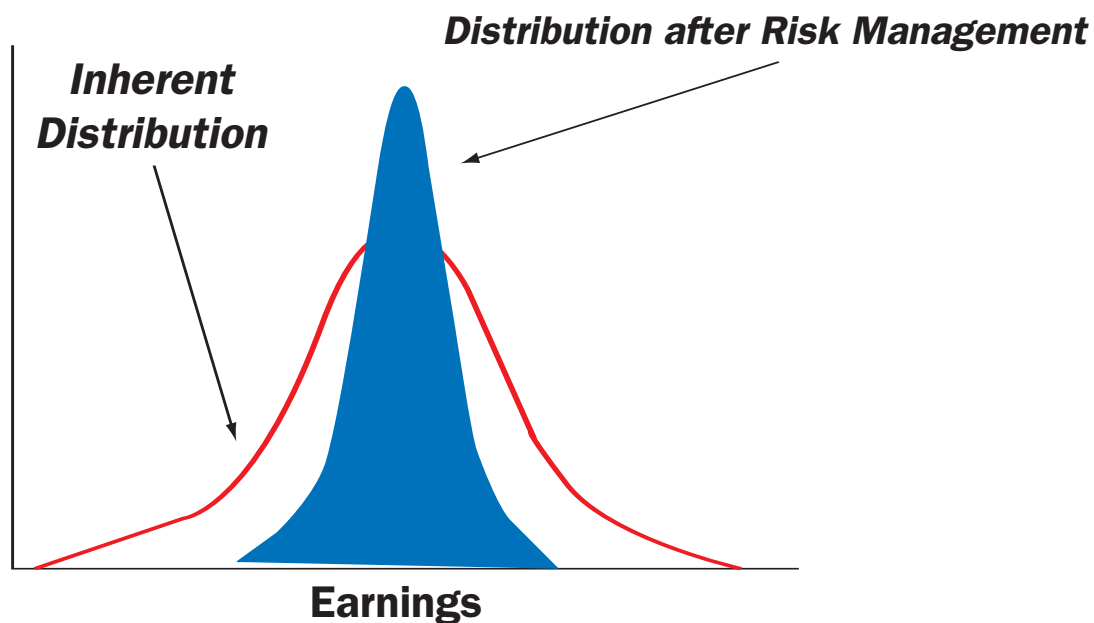


EXHIBIT 12. GOALS OF RISK MANAGEMENT



risks were managed better. As Exhibit 11 shows, risk-corrected revenues are smoother and more controllable. On a broader scale, Exhibit 12 shows one company's view of how better risk management affects the distributions of earnings. A tighter distribution of earnings could potentially lead to improved performance of its stock price. The two types of analysis shown in Exhibits 11 and 12 are why some companies want to implement ERM. While stakeholders (e.g., investors) appreciate growth in earnings, they also appreciate some level of stability and predictability and are often willing to pay a premium for these attributes.

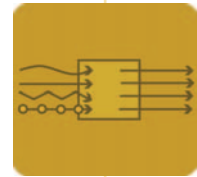
A Common Sense Approach to Risk Assessment

While some of these risk metrics and tools may seem difficult, a simple approach can yield equally good results. One approach is to measure where the company stands today on a risk issue. After implementing risk mitigation tech-

niques, the company can reassess the risk issue. Of course, not all of the improvement related to a risk can be traced to the risk mitigation techniques, but improvement is still valuable. One major retailer uses this approach to gauge the value added from their ERM efforts in addition to other value-added metrics. This retailer identified inventory in-stock rates as a risk. Measuring in-stock rates over time gave the company a good feel for the historical levels of in-stock rates. Next, after implementing risk mitigation efforts, current inventory in-stock rates were captured. Improvements in in-stock rates are traced to improvements in sales and, ultimately, to value added from the ERM process.

Probabilistic Models

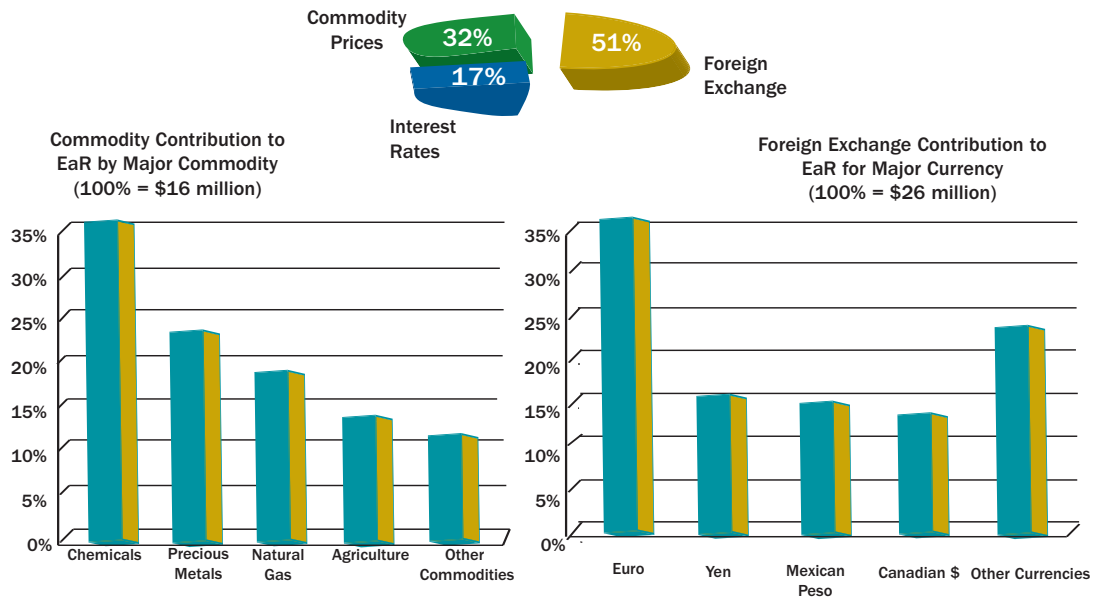
Some organizations use quantitative approaches in ERM that are built on traditional statistical and probabilistic models and techniques. The disadvantage to these approaches is that they require more time, data, and analysis and are built on



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EXHIBIT 13. EARNINGS AT RISK BY RISK FACTOR

Total EaR by Risk Category
(100% = \$35 million)



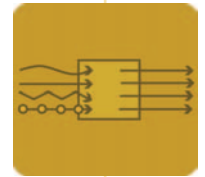
assumptions. Furthermore, using the past to predict the future has limitations even before other “explanatory” variables are included in the statistical prediction process. But some organizations still find these models very useful as a tool in their solutions toolkit when approaching risk.

One technique focuses on earnings at risk, which are determined by examining how earnings vary around expected earnings. In this approach, variables are examined to see how they influence earnings, such as determining the influence that a one-point movement in interest rates would have on earnings. Similarly, expected or budgeted cash flows can be determined and then tested for sensitivity to certain risks, yielding a cash-flow-at-risk number. As Exhibit 13 shows, some companies trace the earnings-at-risk to individual risk sources. Knowing the actual root cause or source of the risk helps to man-

age it more efficiently. Companies can also trace the earnings-at-risk to business units to help gauge the hedge effectiveness of each business unit (see Exhibit 14). Knowing which business units have the greatest risk is valuable information. With this knowledge, a company could compare a business unit’s earnings level to the earnings-at-risk. Those units that generate low earnings and high levels of risk may not be desirable business units. Having earnings-at-risk in the aggregate allows an organization to see which months have the greatest risk (see Exhibit 15). Also, distributions can be created that estimate the probability of meeting earnings targets (see Exhibit 16).

Seemingly Nonquantifiable Risks

Some risks seem to defy acceptable quantification, but a deeper look can reveal valuable information. Reputation is a risk that has become



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EXHIBIT 14. EARNINGS AT RISK HEDGE EFFECTIVENESS COMPARISONS

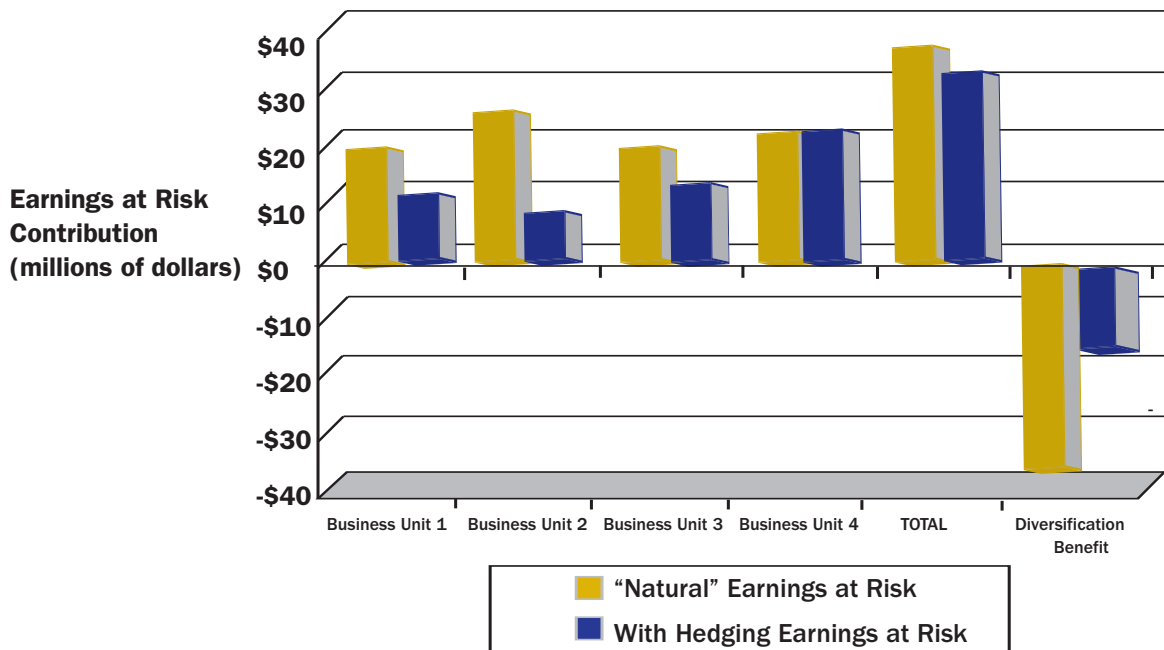
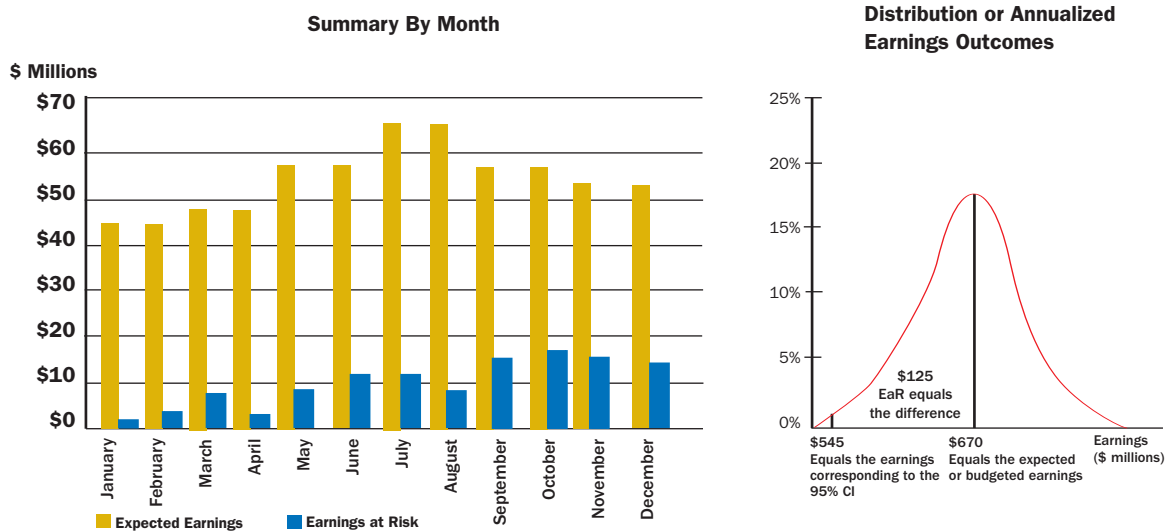
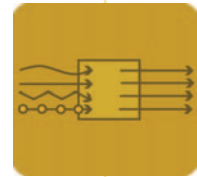


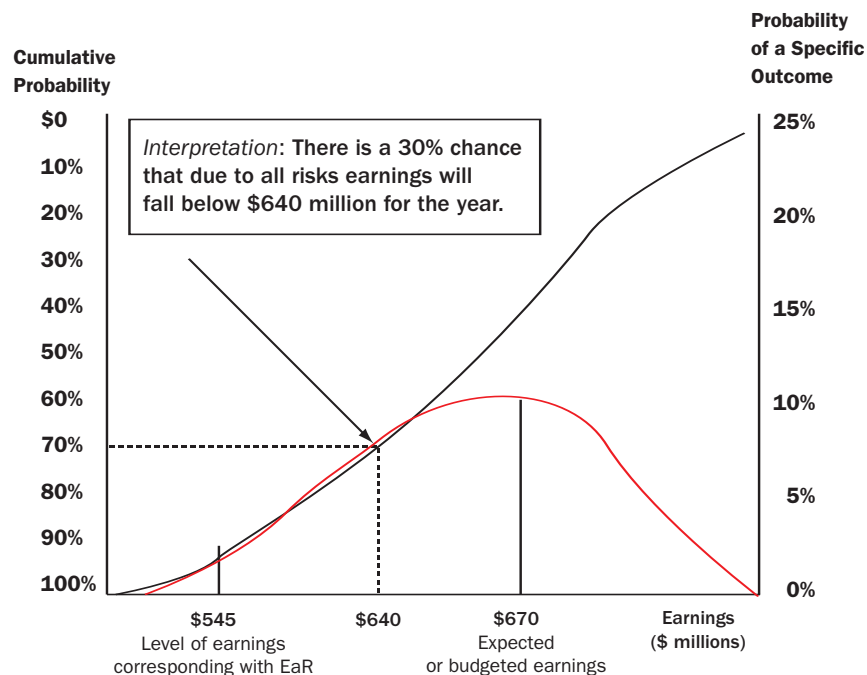
EXHIBIT 15. EXPECTED EARNINGS AND EAR





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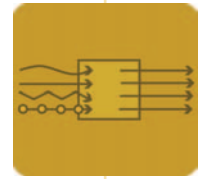
EXHIBIT 16. PROBABILITY ASSESSMENT OF EARNINGS OUTCOMES



increasingly important in today's business environment, and it must be managed. At first glance, some executives would say you cannot quantify it, but it can be in some ways. In academia, for example, a university's reputation is a prodigious risk. Tracking a drop in contributions after a scandal can provide preliminary data that could lead to the ability to quantify reputation risk. Ranges of decreases in contributions could also be developed, with the maximum risk being a major decrease in donations. Gathering data from universities or other nonprofit organizations that have experienced a drop in contributions can provide valuable external data that could assist in quantifying this risk. For public companies, the impact of reputation risk could be examined by studying decreases in stock prices surrounding an event that damaged an organization's reputation. It is important to note that while this might capture and provide a quantifi-

able risk, it still partially ignores the damage that reputation events have on supplier or vendor relations. It also ignores how future customers might be influenced by the reputation event. Although these related risks might not be quantifiable, they highlight the importance of having an ERM team study and analyze risks very closely so that conversations about the risks are focused on managing the risk and not just on identification and measurement.

Another example of a risk that appears nonquantifiable is a breach in IT security. Examining the movement in stock price around the event, however, can help a company gather a preliminary estimate of how shareholders view the event. Additionally, talking to other companies that have experienced IT security breaches can help the company understand the potential impact. Finally, understanding the organization's unique



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method of creating value for its customers can also offer critical insights regarding the impact of the breach. Companies that have customers who value trust and confidentiality, such as financial institutions, should estimate a greater impact from a potential IT security breach.

A major electronic retailer may determine that a key risk to sales is a change in gas prices. The retailer relies on consumers having discretionary income, and higher gas prices lower discretionary income and decrease the retailer's sales. The effect of gas prices on sales can be calculated and potentially planned for in advance. Another example is the risk of weather related to a snow machine company's sales. Guaranteeing a rebate to customers if the amount of snowfall is below a certain level can increase sales in years with low snow fall.¹² These examples show that while not all risks can be quantified with a sophisticated technique, valuable risk assessment and management can still be applied.

VII. PRACTICAL IMPLEMENTATION CONSIDERATIONS

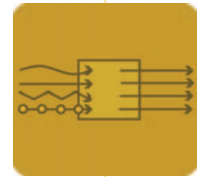
The implementation of ERM depends on a number of organizational variables and no specific recipe is available to assure successful implementation in any organization. In this section, however, a number of practical considerations are discussed that may provide helpful insights in the implementation process. These include: ERM infrastructure, ERM maturity models, staging ERM adoption for early wins, the role of the management accountant, ERM education and training, technology, aligning corporate culture, building a case for ERM, and the ROI of ERM.

ERM Infrastructure

Implementing ERM can take many shapes. Some organizations have only one person in charge of risk, while others employ a large team. Both approaches have advantages. With a large team, more resources and people are focused on the effort. Having a small ERM staff, however, encourages the organizational units, management, and employees to become highly involved and share responsibility for ERM. A common approach is to have a moderate number of people on the ERM team to facilitate risk workshops, help executives and business units understand their risks, gather data across the organization, and assist in reporting risks upwards to senior executives and the board. Broad representation, objectivity, and a look to "the big picture" are keys. Although many approaches to ERM are found in practice, common elements include:

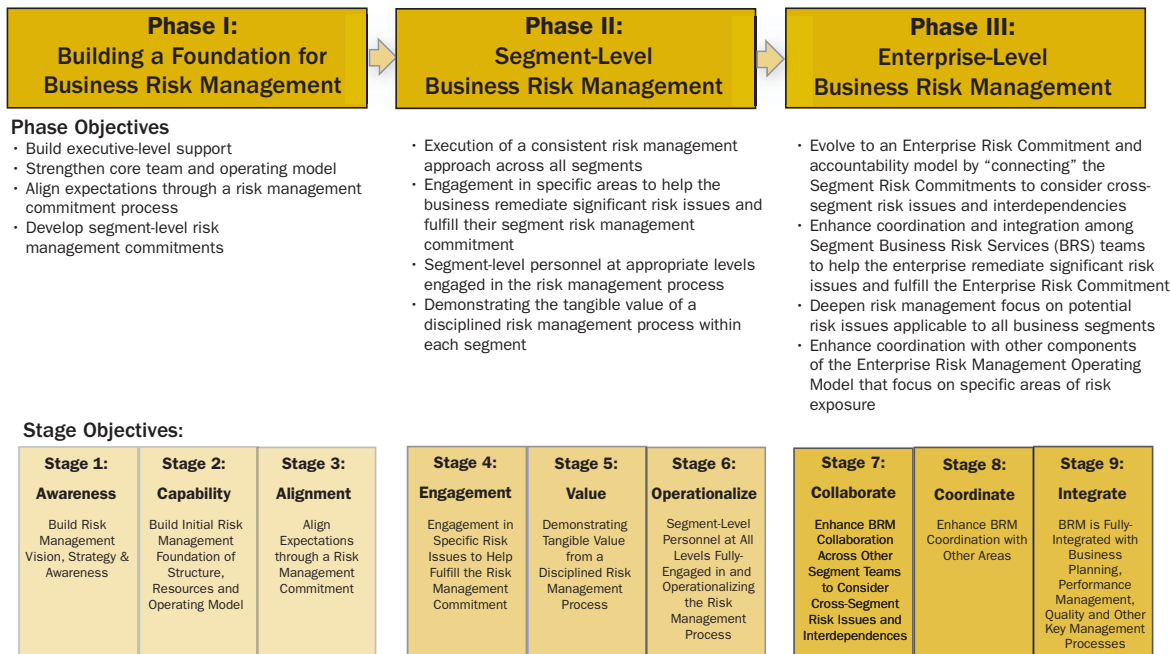
- CEO commitment (tone and messaging from the top),
- Risk policies and/or mission statements, including adapting any company risk or audit committee charter to incorporate ERM,
- Reporting to business units, executives, and the board,
- Adoption or development of a risk framework,
- Adoption or development of a common risk language,
- Techniques for identifying risk,
- Tools for assessing risks,
- Tools for reporting and monitoring risk,
- Incorporating risk into appropriate employees' job descriptions and responsibilities,
- Incorporating risk into the budgeting function, and
- Integrating risk identification and assessment into the strategy of the organization.

¹² Stephen W. Bodine, Anthony Pugliese, and Paul L. Walker, "A Road Map to Risk Management." *Journal of Accountancy*, December 2001, pp. 65-70.



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EXHIBIT 17. ERM MATURITY MODEL



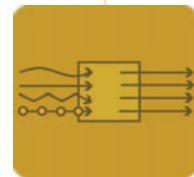
ERM Maturity Models

Once an organization has implemented ERM, an appropriate question arises about the progress being made in ERM. As a result, a number of ERM maturity models have been developed. One organization categorizes ERM development into three phases: (1) building a foundation, (2) segment-level ERM, and (3) enterprise-level ERM. Each phase is broken down into three stages, shown in Exhibit 17. Phase 1 involves building executive support, building the core model, aligning expectations, and developing segment-level risk management commitments. Phase 2 covers executing a consistent risk framework, engagement in specific areas and by segment-level personnel, and demonstrating the tangible value of a disciplined process. Phase 3 includes connecting segment risks, enhancing coordination and integration, and deepening risk management focus. While described for a multi-billion dollar entity, this approach is scalable to organizations of any size.

Maturity models do more than inform a company of its progress in ERM. They can influence a company's rating from rating agencies, too. Standard & Poor's now applies an ERM maturity model to certain companies and industries, such as the insurance and banking industries as well as some energy companies. Consequently, ERM implementation could eventually impact a company's cost of capital and capital adequacy. For example, Standard & Poor's evaluates an insurer's ERM practices by considering the risk management culture, risk controls, emerging risk management, risk and capital models, and strategic risk management. These lead to an ERM score of weak, adequate, strong, or excellent.

Staging ERM Adoption for Early Wins

ERM implementation is a change management project in which an organization moves to risk-informed decision making. The goal is to improve the confidence of decision makers through a



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more explicit understanding of the risks facing the unit. ERM is a journey that takes continuous commitment from C-level executives and where implementation cannot be achieved overnight—it should proceed in incremental steps. At the same time, an organization embarking on ERM implementation needs to recognize that bad things can happen to a good project if results are not forthcoming. Consequently, striving for early wins in the ERM implementation project is important. For example, a major company (after developing its approach to ERM) chose to implement ERM in a strategic business unit that was mature and tightly controlled. In this instance, the company preferred not to roll out ERM in a unit that it knew in advance had many problems. The roll out was successful, and the unit was used as a model to help build momentum for ERM implementation in other units.

In another company, the decision was to initially implement ERM with the senior level executives. This group went through the process of identifying and assessing risks at the enterprise level and developing mitigation strategies. Once members of this group were sold on the benefits of ERM, they became ERM champions and supported its roll out to the various operating units. See Exhibit 17 for an example of staging an implementation.

The Role of the Management Accountant

As noted in the first SMA on ERM, the management accountant and finance professional can play a major role in ERM implementation by championing the process, providing expertise on the process, serving on cross-functional ERM teams, and providing thought leadership. Other key roles include assisting with the quantification of risks, analyzing the risk correlations, developing the range and distribution of a risk's impact, determining the reasonableness of likeli-

hood estimates, benchmarking impact and likelihood against historical events and other organizations, setting and understanding risk tolerances and appetites, assessing and quantifying various alternative risk mitigation strategies, and quantifying the benefits of ERM.

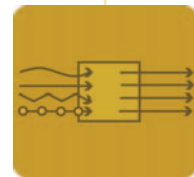
ERM Education and Training

Some control frameworks outside the United States mention the possibility of mandating ERM training. Although formal training on financial risks is more common, ERM education and training is being developed. Training needs can include:

- Understanding the nature of risk—this is not as easy as it first appears if a true enterprise-wide approach is implemented,
- Understanding the legal and regulatory requirements related to risk management,
- Knowledge of ERM frameworks,
- Facilitation skills,
- Expertise in identifying risks,
- Knowledge for building risk maps,
- Reporting structures and options (what to report to the CEO, board, and audit committee),
- Software training,
- Financial risk training (options, hedging strategies, insurance options, derivatives, etc.),
- Refocused strategy training and how risk interacts with strategy,
- Building and understanding control solutions,
- Developing and monitoring performance metrics related to risks, and
- Change management.

Technology

Some technology tools are available to assist in the facilitation/identification phase. Additionally, software is available to assist an organization with the entire ERM process. Gartner Inc. recently reviewed ERM software vendors on two



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aspects: completeness of vision and ability to execute.¹³ Some organizations choose to either develop their own ERM processes tailored to their needs or hire consultants to help with the process. Technology products not only help with the process, but they also assist with data gathering, modeling, or reporting. One risk software tool, for example, helps with capital optimization and data management. Other technology products are designed to help with issues such as time-series modeling, correlations, and other advanced modeling techniques. Finally, certain industries have software tailored for companies in that industry, such as the online maturity model available for insurance companies.¹⁴

Aligning Corporate Culture

Many organizations will notice a change in the company culture as ERM implementation progresses. One noticeable difference is a proactive focus on risks rather than a reactive approach. Other changes are related to improved accountability and responsibility. With ERM in place, managers are more responsible for risk management and controls because they helped identify the risks and controls. As solutions and metrics are developed to better manage a risk, management can also be held more accountable for it. One nonprofit organization mandates management action plans for any risk over a certain amount. This increase in accountability and responsibility can flow down to lower levels in the organization. An additional change may be from a “We need to comply” perspective to “We need to manage this risk to achieve better results.” One software company tries to build a risk management thought process into the development of all new

products; this effort has resulted in a shift in the culture and thinking about the role of risk management. Other cultural changes could occur, such as a shift from “blaming” to “identify and managing,” a change in “do not report bad news” to “report as early as possible” (so the risk can be managed), and, finally, from “How does this affect my area or unit” to “How does this affect the risks of the entire organization.” Some consultants have developed cultural diagnostic tools to enable organizations to assess this cultural change.

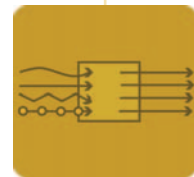
Building a Case for ERM

The New York Stock Exchange (NYSE) has incorporated elements of risk assessment and management into its listing requirements. For registrants with the Securities and Exchange Commission, item 1A of Form 10-K mandates “risk factor disclosures.” These certainly support a case for ERM implementation, yet a company’s executive management may argue that compliance with these requirements can occur without full-scale ERM implementation. In those situations, the board of directors may have to ask the tough questions about the company’s risk identification, assessment, and management process to get executive management to implement ERM. Certainly, when executive management presents the company’s strategy to the board or seeks approval of a merger, the board has an opening to ask questions about the company’s risk identification, assessment, and management process. ERM should engage and educate the board because the board members clearly have a stake in the reputation and sustainable success of the organizations they serve.

As more companies adopt ERM and disclose its adoption in their annual reports and as Standard & Poor’s incorporates a company’s ERM practices in its ratings, other companies may begin

¹³ French Caldwell and Tom Eid, *Magic Quadrant for Finance, Governance, Risk and Compliance Management Software*, 2007, Gartner, February 1, 2007, <http://mediaproducts.gartner.com/reprints/paisleyconsulting/145150.html>.

¹⁴ See www.rims.org.



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to feel pressure to implement ERM. The executive management of one company has noted that it will discuss the company's ERM process whenever meeting with financial analysts. The goal is to inform analysts that the company is serious about risk management, and, ideally, the market will recognize this management capability in its assessment of the company's future.

The ROI of ERM

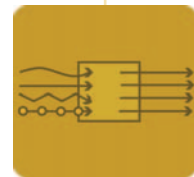
When a company has adopted ERM, the case for benefits vs. the cost and effort expended can be made by pointing to specific experiences where managing a risk added value to the bottom line. A major retailer uses metrics to track the results of its risk management initiatives. For example, the company will open many new stores in the year and must have capable store managers. From experience, the company knows that one risk is the turnover of store managers—it has historical data on turnover rates and knows the cost of recruiting and training a store manager. The human resources group adopted risk mitigation activities for the turnover risk, established targets for improvement, and monitored the results. In time, it was able to show that managing this risk reduced costs and, thus, improved the company's bottom line. The leadership of the human resources group could report to the CEO that they had indeed created shareholder value by managing this risk. In many cases, it does not take a rocket scientist to select appropriate metrics to monitor the effectiveness of risk mitigation initiatives, and, in turn, the impact on the bottom line. While it would be desirable to calculate a ROI for the ERM effort, such a measurement would be based on many assumptions. Focusing on the benefits of managing a specific risk may offer the most persuasive evidence of how ERM creates value for the company.

VIII. CONCLUSION

This Statement on Management Accounting on ERM, along with the earlier one published by IMA, provides guidance for the leaders of organizations to identify, assess, and manage risk while at the same time growing the business. Because the risks in the global economy constantly change and evolve, ERM is a never-ending journey. ERM requires strong commitment from C-level executives and an effective process tailored to each organization's unique culture. A company's implementation can benefit from the ERM knowledge that Certified Management Accountants (CMAs) and other finance professionals can bring to the process. In their quest to "drive business performance," management accounting and finance professionals should seize the opportunity to become partners with senior management and the board in ERM implementation.

GLOSSARY

- IMPACT**—The significance of a risk to an organization. Impact captures the importance of the risk. It can be measured quantitatively or qualitatively.
- INHERENT RISK**—The level of risk that resides with an event or process prior to management taking mitigation action.
- LIKELIHOOD**—An estimate of the chance or probability of the risk event occurring.
- OPPORTUNITY**—The upside of risks.
- RESIDUAL RISK**—The level of risk that remains after management has taken action to mitigate the risk.
- RISK**—Any event or action that can keep an organization from achieving its objectives.
- RISK APPETITE**—The overall level of risk an organization is willing to accept given its capabilities and the expectations of its stakeholders.



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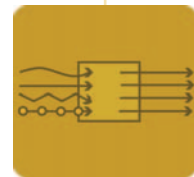
RISK TOLERANCE—The level of risk an organization is willing to accept around specific objectives. Risk tolerance is a narrower level than risk appetite.

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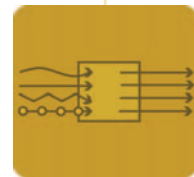
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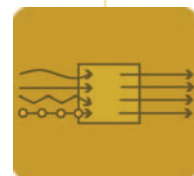
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