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Where there's smoke …

Achieving safe and reliable operations with enterprise risk management

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Chemical and Petroleum

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IBM Global Business Services, through the IBM Institute for Business Value, develops fact-based strategic insights for senior executives around critical public and private sector issues. This executive brief is based on an in-depth study by the Institute's research team. It is part of an ongoing commitment by IBM Global Business Services to provide analysis and viewpoints that help companies realize business value. You may contact the authors or send an e-mail to iibv@us.ibm.com for more information.

Where there's smoke …

Achieving safe and reliable operations with enterprise risk management

By Steve Edwards, Stephen Williamson, Jacquie Glass, Michel Anderson, Penny Koppinger

Chemical and petroleum companies today face complex challenges threatening their business, information and people. These risks have traditionally been viewed through a finance or health, safety and environmental (HSE) lens – often too narrowly focused. Companies often undervalue and under invest in end-to-end risk management activities, despite a distinct correlation between enterprise risk management and market success. Elevating risk management to the enterprise level can provide an opportunity to improve business reliability, resilience, and predictability across the board.

"The discussion in the board rooms today is whether management and the Board can "smell the smoke" before the fire. Do they have a way to know what the risks are and if so, do we have the capabilities to mitigate that risk?"

– Petroleum company executive

Risk: Taking a wide angle view

Seemingly, the only constant in today's chemical and petroleum (C&P) businesses is change. There is volatility in what is sold, where it is sold and to whom. Logistics and operational environments are increasingly complex as companies expand in hostile or distant locations. And the infrastructure required to manage it all gets more costly by the day. As a result, companies face a broad spectrum of complex risks threatening their businesses, information and people. The

industry has been rocked by a number of catastrophes, ranging from refinery explosions to information concealment penalties. Often, many of these events can be traced back to failed business practices, whether they be complex environmental impact programs or simply managing behavioral changes as part of implementing new standard operating practices.

Despite the increasing exposure to risk events, many companies view risk management as primarily a finance or health, safety and environmental (HSE) problem. And, consequently, C&P companies tend to treat risk as a "cost center" and undervalue or under invest in integrated risk management practices.

Yet, according to a recent survey by the IBM Institute for Business Value, which included more than 100 in-depth interviews of chemical and petroleum executives, a distinct correlation exists between more sophisticated risk management and market performance. Enterprises with broader integrated risk management characteristics tend to outperform others in the chemical and petroleum industries. Admittedly, these numbers must be taken in context of the entire business, but our research shows C&P outperformers have both a greater return on net assets (9.3 percent versus 7.9 percent), as well as a higher compound annual growth rate (18.7 percent versus 16 percent).

Like similar past evolutions – Material Requirements Planning (MRP) to Enterprise Resource Planning (ERP), for example, or order management to Customer Relationship Management (CRM) – the move to enterprise risk management has the potential to position companies to better manage their risk exposure.

Where there's smoke …

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Managing enterprise risk: execution lags behind need

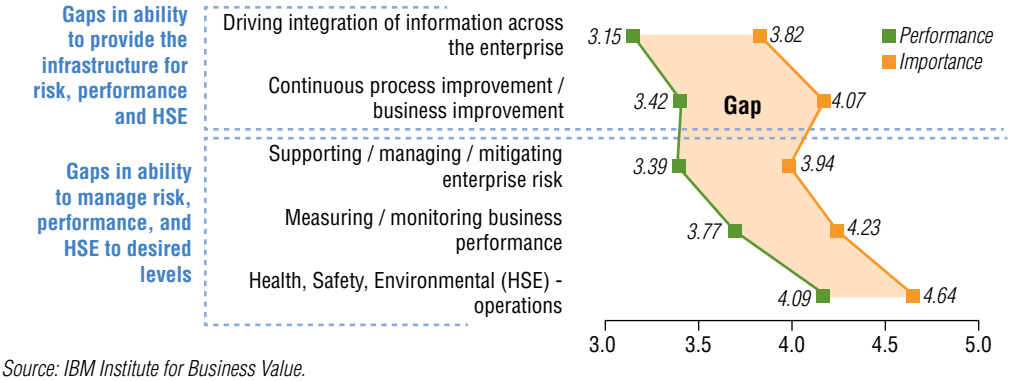
"In the past, we have not had a clear picture of our operating risk envelope. We did not have a holistic risk framework with the relevant limits and culture. The question for us going forward is more about the focus of the organization rather than what are our unknowns."

– Petroleum company executive

Over half of the C&P companies we surveyed have encountered high-risk events since 2005. And despite an industry-wide depth of knowledge and expertise in safety, less than one third considered themselves prepared. This is hardly surprising, given the fact that executives interviewed in our survey indicated a substantial gap exists between the desire of their organizations to comprehensively manage risk and their ability to execute. Gaps are greatest in the study participants' ability to provide the infrastructure for risk management, as well as in the ability to manage risk to desired levels (see Figure 1). It appears that, while organizations rate themselves highly in HSE expertise (highest in fact), the largest gap centers on their ability to drive continuous improvement in this area, which is hindered by the lack of information integration.

Certainly, a major reason for the gap is that risk management has been a lower priority in the already overloaded executive agenda than other issues. While a large number of respondents to our study were concerned about such issues as regulatory compliance, performance measurement and cost reduction, only 25 percent of top executives surveyed considered managing enterprise risk to be highly important (see Figure 2).

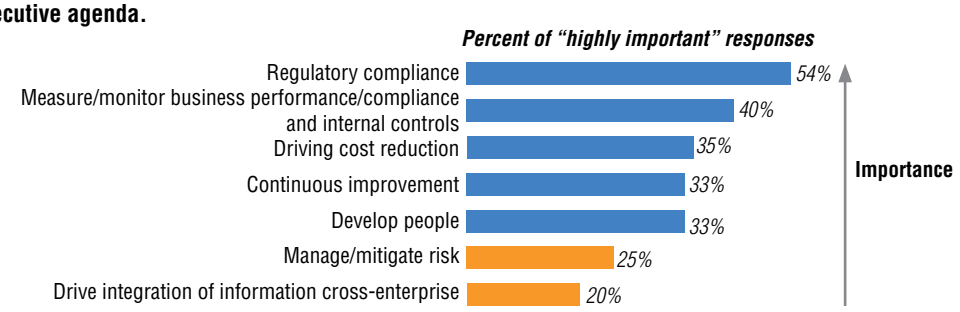
FIGURE 1.
The gap between C&P organizations' desire to manage risk and their ability to execute.



Source: IBM Institute for Business Value.

Risk management entails delivering business objectives without surprise.

FIGURE 2.
Managing risk and maintaining the required infrastructure have been lower priorities in the C&P executive agenda.



Source: IBM Institute for Business Value.

Elevating risk to the enterprise level

"Our sustainability board represents all businesses and functions within the company. They define the sustainability strategy with specific improvement objectives. This is combined with the group risk management process where each major function identifies risk factors to be reviewed and monitored."

– Chemical company executive

Risk management entails delivering business objectives – without surprises – to the enterprise, shareholders and stakeholders through the day-to-day execution of safe and reliable operations. In today's complex business environment, C&P companies may look to develop specific elements to manage those risks that threaten their physical or business assets. Each is best accomplished, we believe, within an enterprisewide risk management framework. These include:

- *Beyond the traditional:* Creating a broader focus for risk management entails developing an expanded and prioritized definition of risk that goes beyond the traditional financial and HSE standards.
- *Insight to risk:* Gaining insight into potential risks requires cross-enterprise standardization and convergence of risk and performance.
- *The risk aware culture*: Establishing a corporate culture conducive to enterprise risk management requires fostering an environment of risk awareness and empowerment to act.

Beyond the traditional

"Risk is not a once-per-year exercise, but part of the overall business strategy. We look at enterprise risk through a number of different lenses: external stakeholder, board, corporate management, business management. This helps to catch risks that we might otherwise miss. For example, the business units do not look at reputational risk."

– Chemical company executive

It is important for executives to accurately assess the risks their companies face. Typically, many companies have placed heavy emphasis on managing traditional risks, such as liquidity, compliance (regulatory, financial reporting), credit and fraud. Although risk management practices tend to focus on these traditional aspects, our respondents noted an increasing emphasis on non-traditional risks (see Figure 3). In fact, when asked to identify emerging risks that pose a significant threat, two-thirds of our respondents identified non-traditional risks such as environmental, reputational or key skill shortages.

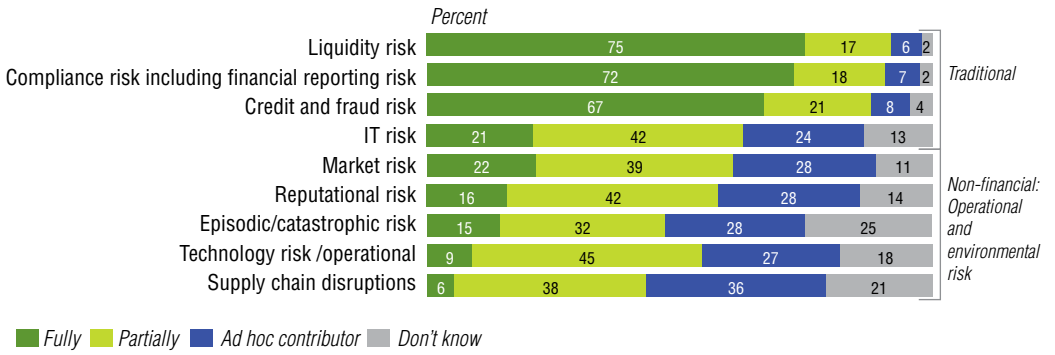
By recognizing these emerging nontraditional risks and incorporating them, along with traditional risks, into their strategic and operational planning, organizations can build more resiliency into the way they operate. To facilitate this, we believe C&P companies should:

- Identify risk hot spots
- Prioritize risks based on potential impact
- Incorporate high-priority risk into planning.

Identify risk hot spots

Risk hot spots can be identified by their impact on the business value drivers of each individual company or industry. For example, revenue growth in the upstream oil and gas industry might be impacted by production growth, the price of crude oil or the U.S. exchange rate. For the chemical industry, risk hot spots affecting revenue growth might include product pricing, new product development or production growth. Abandonment rates may be critical to oil and gas profit margins, and geopolitical problems may cause the cost of capital to increase for any industry.

FIGURE 3.
Contribution to risk management by C&P executives.



Source: IBM Institute for Business Value.

Risk hot spots should be evaluated according to their impact on key business drivers.

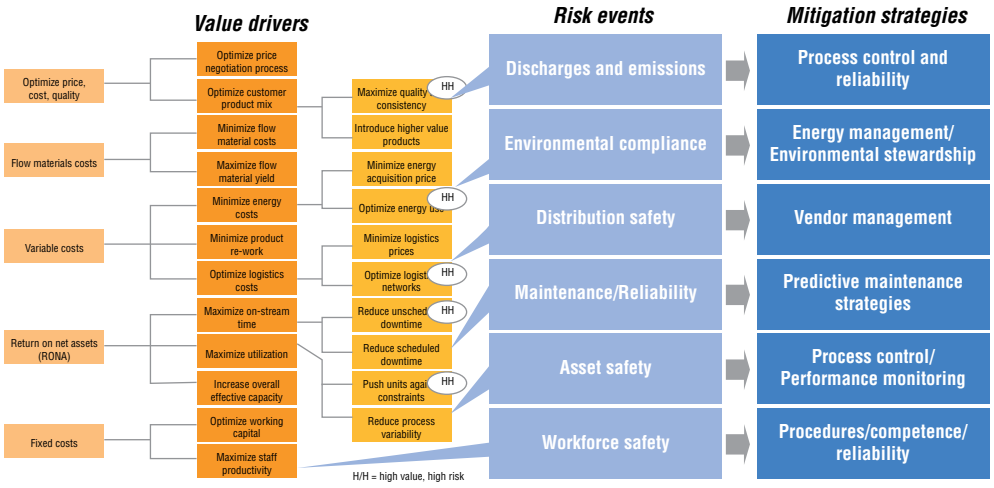
Prioritize risks based on potential impact

It is not cost effective to mitigate every risk, so prioritization is key. C&P companies can look to evaluate risk hot spots based on their potential impact to key business drivers, such as return on net assets (RONA). The correlations between risk types and possible consequences can be evaluated and understood. Companies can identify and segment risks according to likelihood and impact. The intersection of high impact and high probability, for example, may signal a risk requiring immediate action. Others might be deemed as usually safe, those that could become potential problem areas, and, finally, those that, while not likely to occur, could have catastrophic impact on the company.

Incorporate high-priority risk into planning

Once potential risk events are prioritized, C&P companies can then begin working on mitigation strategies. As one executive said, "We identify risk as what keeps you up at night and what would keep you from meeting your business objectives. The risk owners are identified, mitigation steps are taken, and then reviewed as appropriate by the executive committee." Mitigation strategies drive the necessary measurements and monitoring required (see Figure 4). Businesses should look toward incorporating these metrics into their day to day activities and overall plan. Where enterprise risk management focuses on risk, merging risk and performance creates metrics that strive to manage both risk and operations. Combined analyses of these metrics can drive informed decisions based on business performance.

FIGURE 4.
With potential risk events prioritized, mitigation strategies can be identified (illustrative).



Source: IBM Institute for Business Value.

Case study:
BASF and process risk management[1]

BASF uses several enterprisewide tools and methods to manage its risk – from product environmental impact to emergency response.

As the company develops products, it uses a process risk management system that incorporates an eco-friendly analysis framework. The BASF Eco-Efficiency Analysis is a tool to evaluate which future products and processes to pursue. The company can evaluate the products based on both cost and environmental impact over the entire product lifecycle. The model uses an analysis that includes land use, energy and material consumption, hazard or risk potential, toxicity and emissions. Each product is analyzed against potential alternatives to select the best normalized cost and environmental impact alternative.

A recent addition to the BASF process includes SEEBALANCE, what the company calls a "cradle to grave, costs, and social aspects" comprehensive method to monitor sustainability. Working with several universities, BASF is incorporating societal impacts into its analysis to create a three dimensional model of cost, environmental and societal impact analysis. The societal leg of the tool considers areas such as working conditions, international community (e.g. child labor), future generations, consumers, and local and national community impacts.

On the operation side of the business, BASF employs an emergency response management system that encompasses its own facilities, subsidiaries and joint ventures, as well as its suppliers, customers and neighboring cities in which the company operates. BASF uses a five-step review system to prevent plant disasters such as fires or chemical leaks. The process considers the HSE aspects of how plants are designed and operated. The BASF risk matrix is used to assess potential hazards and classify potential risks according to their impact and estimated frequency.

Insight to risk

"We need to change the culture so that management information is regarded as a corporate asset and then put in place the standard processes to collect it"

– Petroleum company executive

To manage the broader definition of enterprisewide risk – encompassing HSE, reputational risk, product risk and others – requires underlying integration capabilities. An enterprisewide infrastructure of standard business practices and information allows monitoring of risks and provides guidance for the necessary actions when a situation arises. In our study, outperforming companies were a third more likely to have standard processes, global process ownership and global information standards. And they were twice as likely to have global processes in place. These elements, recognized as important by outperformers, make up what we term *integrated risk management*.

According to our study, C&P companies understand the need for an integrated infrastructure to support risk management operations, but, surprisingly, only 1 percent of executives believe they are currently managing risk in an integrated environment. The vast majority of executives do believe, however, that while building an integrated infrastructure is difficult, it must become a top priority for their companies. And they know that obstacles stand in the way.

Barriers to the integration of risk management are significant. In fact, three of the top four barriers identified by our study respondents are tied to global standardization of processes, technologies or information (see Figure 5).

To overcome these barriers and provide insight into potential risk, companies should look to create a systemwide view of integrated risk management across the entire enterprise, built on standards and merging a balance of risk and performance into daily activities. Key actions to providing risk insight are:

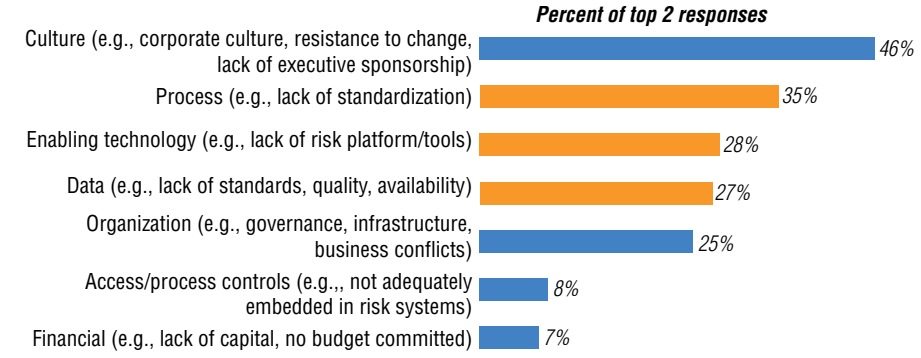
- Establish global, cross-enterprise standards through process ownership
- Simplify enabling systems and organizational structures
- Formalize risk management activities to close performance gaps.

Establish global, cross-enterprise standards

Process ownership drives common processes across large organizations. Formal safety practices should be established, for example, with broadly communicated performance expectations, to enable the analysis of safety across the enterprise.

Almost half of companies we surveyed have no enforced global standards or do not think they are necessary. But when asked to assess the benefits of an integrated infrastructure, our respondents identified greater efficiency through economies of scale (42 percent), reduced cycle time for decisions (38 percent), increased collaboration (31 percent), better return on assets (27 percent) and increased ability to respond to risk events (25 percent). Additional benefits identified included increased resiliency, effective leveraging of global human assets, continuous business transformation and enhancement of customer experience.

FIGURE 5.
Barriers to integration of risk management are significant – with three of the top four tied to global standardization.



Source: IBM Institute for Business Value.

Enterprisewide standards increase ability to simplify systems and organizational structures.

Simplify enabling systems and organizations

Not only do standard processes, ownership and information create a common business language, they simplify the resulting world around them. Enterprisewide process and data standards increase the ability to simplify systems and organizational structures. Technologies and the associated delivery models help maintain global standards while providing greater flexibility and speed to adapt to change. The integrated risk management respondents were 2.5 times more likely to have simplified their operations infrastructure than non-integrated companies in the areas of: fewer enterprise resource planning instances or data warehouses, reduced the number of other supporting applications, encouraged the use of shared services for repetitive or transactional activities, provided centers of excellence for decision support and created the opportunity for greater focus on core business performance.

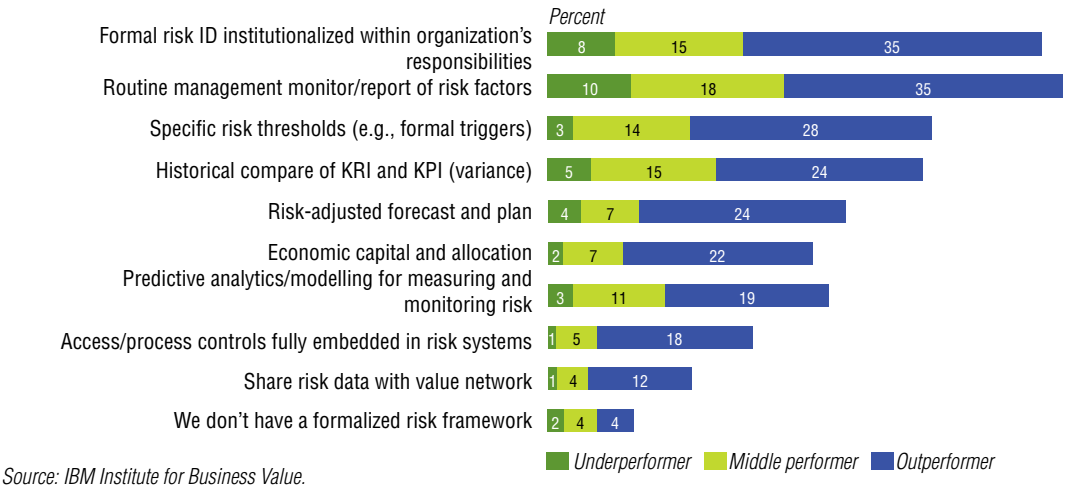
Formalize risk management activities to close performance gaps

Reducing complexity then allows for better management of risk to close performance gaps. Once there is a common business language and, wherever possible, a simplified underlying infrastructure, increasingly formalized risk management activities can be implemented. Tools like predictive analyses or embedded process controls become common. And as Figure 6 shows, C&P outperforming companies are much more likely to use formal risk management techniques than under performers.

Merging performance and risk management as part of daily operations enables companies to prioritize risk within the context of the company's overall key performance indicators.

It combines risk analyses into a single definition of performance and drives intelligent, informed business decisions based on those business performance indicators. Insight into risk provides the *visibility* to act when warranted.

FIGURE 6.
C&P outperformers are more likely to formalize and integrate risk processes into their businesses.



Source: IBM Institute for Business Value.

The risk aware culture

"Our plan is to evolve to full board accountability. The chief risk officer has a direct line to both the CFO and the board chairman."

"People tend to chase profit over safety, giving the wrong messages to operations."

– Chemical products and services company executive

Once employees have the visibility to act in a risk situation, how can a company make sure people make the best choices? What causes an experienced person to ignore a safety practice "just this once?" Despite the advantages of enterprisewide risk management, most executives we interviewed recognize that numerous people-related challenges stand in the way of implementation. Prominent among those identified are the overall culture of the company, resistance to change and lack of executive sponsorship.

Executives in risk management leadership roles are critical to the success of managing enterprise risk and must be both aware of the risk environment and empower employees to act. Companies promoting empowerment should *orchestrate and communicate risk management from the top* and *create an adaptive organizational model.*

Orchestrating and communicating risk management from the top

As companies elevate risk management to the enterprise level and combine risk and performance metrics, they have an opportunity to push accountability for action and overall direction up the corporate ladder. In fact, our survey shows that "C"-level executives in outperforming companies are 83 percent more likely to consider themselves the owners of risk as a part of their leadership role, compared with 64 percent of par and underperformers. Companies pushing risk responsibility to the top levels of the corporation sometimes assign a C-level executive, create a strategic team of executives led by a CFO or COO, or create a new chief risk officer role to lead enterprise risk management.

Top leadership should assume the role of challenging and prioritizing the risk management plan on a regular basis. Top executives can act as leaders between the board level to middle management to communicate the enterprise's official position on risk appetite and tolerance. As these areas are resolved, companies should make sure appropriate resources are allocated and progress is measured regularly.

Creating an adaptive organizational model

Once defined, risk behaviors need to be managed and adapted as conditions change over time. Companies need to create a common, yet flexible approach to match specific situations and adapt to various cultures and areas within the business. Linkages in the various aspects of human behavior can be characterized by a causal model of organizational learning. (such as

As enterprise risk management becomes more sophisticated, risk and performance converge.

Burke-Litwin). System views capture cultural elements such as strategy, communication, leadership, empowerment, motivation and others to guide organizational analysis and adoption.[2]

Using a common framework linked to performance metrics provides quantifiable organizational information and trends to evaluate risk decision making and enhance corporate learning. It can enable identification, for instance, of why people at one refinery approach safety differently to another. Do their managers set a different example? Are they from a different legacy business looking at safety in a different way? Have they interpreted the mission and strategy differently?

People require normalization of behaviors to reduce variability and, therefore, risk. The key element is to create and maintain a risk awareness culture and environment that eliminates variability of results wherever possible.

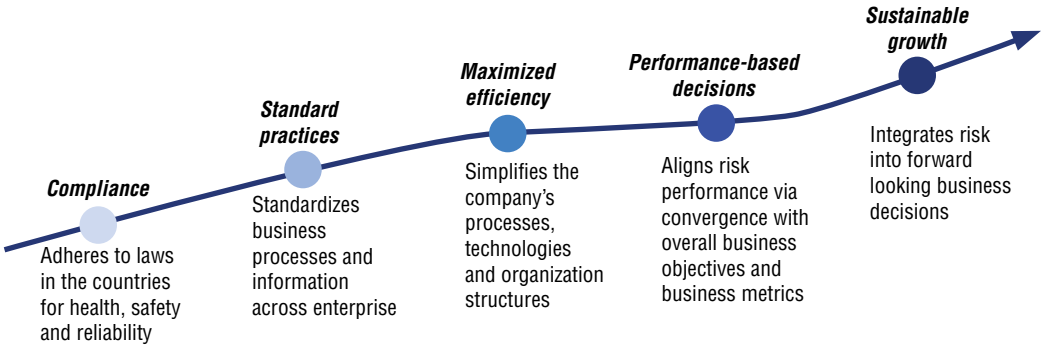
Looking Forward: How to anticipate rather than react

"We are very opportunistic in combining compliance with profits and capital planning and consider our approach a best practice."

– Petroleum company executive

Creating a forward-looking risk management approach – one that anticipates risk rather than reacting to it – requires a dedicated approach that factors where your company currently stands in the process with where you want it to go (see Figure 7). Most companies initially focus on regulatory compliance, the price of entry for any industry. As they become adept at standardizing practices, they can then move to the next phase of simplifying operations. As enterprise risk management becomes increasingly sophisticated, risk and performance converge to drive decision making. And last, the knowledge of risks acquired can then be used to make forward-looking business decisions.

FIGURE 7.
The risk management value curve: a shift from cost to growth based business decisions.



Source: IBM Institute for Business Value.

As our research clearly shows, companies with broader integrated risk management characteristics tend to be well positioned to improve reliability, resilience and predictability. What are these factors that successful companies have in common? Our research shows those with effective integrated risk management systems tend to:

- Focus on what risks are important to their company's success
- Create a common business language across their enterprises through common processes and technologies – one that will ultimately reduce complexity
- Assign enterprise risk responsibility to the highest levels of the corporation
- Provide the visibility to employees to know when to act
- Allow and encourage their people to do the right thing
- Grow and share lessons learned so that their companies and their people can adapt as conditions change
- Integrate risk into their forward-looking business decisions.

Department or site based approaches of the past have often been too incremental or isolated. Elevating risk management to the enterprise level – much like ERP – will enable systematic, enterprisewide continuous improvements in the integration of HSE and beyond. This broader approach allows the integration of risk mitigation into daily activities across the breadth of a company's lifecycle – and encompasses the depth of risk, from health and safety to product, market and financial. And like ERP, the more you do, the more you will be able to do – the culture adapts and the rate of change accelerates. No doubt, creating integrated enterprise risk management is a significant, transformative – and sometimes daunting – undertaking. But those that succeed often become the industry's top performers.

There's still room at the top. Where do you want to be?

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Produced in the United States of America
July 2008

GBE03074-USEN-00