Risk Intelligence in the Energy & Resources Industry
Enterprise Risk Management Benchmark Survey
In a changing world where energy and resource scarcity and climate change have become key themes, Energy & Resources companies face a myriad of new emerging risks. Resource scarcity, political instability, infrastructure obsolescence, potentially adverse weather events, greenhouse gas emissions, and risks related to disruptive technologies such as distributed electricity generation or oil extraction from oil sands are just a few of the perils faced by Energy & Resources companies.

The recent financial and economic crisis had also an impact on the Energy & Resources industry. Many companies in the industry experienced turbulent times, with still many challenges ahead for the near future.

While some traditional risk management approaches may have served the industry well in the past, the scope, complexity, and interdependencies of emerging risks are forcing many Energy & Resources companies to adopt comprehensive and integrated approaches.

Deloitte has recently launched an Energy & Resources Enterprise Risk Management Benchmark Survey for the Europe, Middle East and Africa (EMEA) region. The goal of the survey was to capture and report feedback on the current state of Enterprise Risk Management (ERM) implementation for a cross-section of organizations within the Energy & Resources industry. This report presents a compilation of the responses and develops profiles of the leading and prevailing ERM practices in the Energy & Resources industry.

Organizations were invited to participate in the survey through direct communication as representatives of selected sub-industries. Organizations participated by means of completing the survey questionnaire complemented with face-to-face interviews.

There were 49 responses from Europe, the Middle East, and Africa representing organizations active within the Electric Power & Utility, Oil & Gas, Water, and Metallurgy & Mining industries.
Executive summary

Substantial effort has been directed toward developing enhanced approaches to risk management in the Energy & Resources industry, particularly in the past decade. Half of the organizations polled report having a fully operational ERM program, whereas the majority of the other half indicates having an ERM program in development for more than 1 year. Amongst these companies, some key themes about ERM emerged in the survey:

ERM programs are achieving enterprise-wide coverage and risk-informed decision making by developing ERM scopes have expanded in recent years, progressing towards a real enterprise-wide management practice. Risk information is increasingly incorporated into the critical decision-making processes. Leading organizations are making the critical link between risk and performance management through the emerging discipline of risk-adjusted performance measurement (RAPM).

ERM frameworks, methodologies, and tools are becoming more mature and advanced, risk management practices are developing. Almost half of organizations report having an ERM practice that has progressed beyond its early stages. The fundamentals of the ERM program, i.e. the framework, methodology, and tools have been established and serve as the basis for the development of more advanced risk management practices. Amongst those are:

- The integration of ERM with other management practices (performance management, process management, compliance management, quality management, etc.);
- The use of Key Risk Indicators (KRIs) and other tools to monitor risks on a continuous basis;
- The application of quantitative techniques for evaluation of risk, risk measurement, and risk prediction; and
- The use of network- and pattern-recognition techniques to analyze risk and, more accurately, to model failure predictions, to model interdependencies between risks and to understand concentrations of risk exposures.

The focus is shifting from the unrewarded risks to the rewarded risks. The respondents in this survey, for the most part, indicate that their organizations are using the information from their ERM programs to deal with unrewarded risks. These typically include risks to financial reporting, compliance, and operations, such as business continuity, operational performance, inventory, treasury, insurance, etc. This is the traditional domain of risk management because it focuses on the protection of existing assets. More risk mature organizations are starting to focus more on unrewarded risks. These risks are related to strategy and its execution. These typically include the development of new products, entry into new markets, and acquisitions. The management of these risks holds the potential for gain and reward if they are intelligently managed, but they can have seriously negative effects if they are not. Once there is a stable and proven ERM methodology in place and ERM starts to focus more on risk-related strategy, ERM rises on the agenda of the CEO as it moves closer to the interest of operating management.

ERM processes are implemented but organizations still face challenges with respect to effective monitoring and reporting. Organizations report being mature on risk identification, risk assessment and risk prioritization, and design and implementation of mitigating actions. Many organizations, however, still struggle with monitoring and reporting risks. A lack of appropriate tools is one of the reasons. Other reasons are the lack of suitable methodology for aggregating risks, the lack of ability to measure and integrate risk exposures from both the top-down (organizational level) and the bottom-up (operational level), and the lack of key risk indicators to monitor risks in a cost-efficient way.

ERM training is still limited to risk specialists and people directly involved in the Risk Management activities. Few organizations provide ERM training to all employees. Best practices organizations integrate ERM training in their corporate training programs, going from basic risk management principles (what’s a risk and what does it mean for daily operations) to more in-depth training for senior management.

Technology can help leveraging the ERM process, though many organizations still struggle with it. Technology can facilitate the ERM process (risk identification, documentation, aggregation, assessments, quantitative techniques, risk monitoring & reporting etc.) through a large number of organizations indicate they are not yet at that level. Despite a proliferation of vendors competing in the ERM marketplace, no single package solution has emerged to provide the necessary functionality to support the entire ERM capability.

ERM done right: the Risk Intelligent Enterprise™

The management of risk is inherent to the survival of mankind. When early man built a fire at night to ward off predatory animals while he slept, he was managing risk. All of us manage risk on a daily basis, often without being aware we are doing it.

Risk management is not new but ERM, an approach to managing risk, is relatively recent. Risk Intelligent Enterprises™ manage risk for two reasons: to protect what they have and to grow the value of what they have. The premise of ERM is that it attempts to present an overall and integrated view of the risks to which an enterprise is exposed. Ideally, with this information, the enterprise is then able to make better informed decisions about how it can protect what it has and how it can, in an intelligent manner, add value to what it has. In other words, the organization can be smarter about the risks it needs to take. It can be “Risk Intelligent.”

ERM is an enabler of risk intelligence; its true value lies in its ability to enable the systematic identification of possible causes of failure — failure to protect existing assets and failure to achieve future growth, i.e., failure to manage both unrewarded and rewarded risk. Unrewarded risks are typically associated with lack of integrity in financial reporting, noncompliance with laws and regulations, and operational failures; there is no premium to be obtained for taking these types of risks. Rewarded risks are those that typically have to do with strategy and its execution.

The extent to which an organization uses risk information from its ERM framework to influence decision making in both areas (unrewarded and rewarded risk) is a direct reflection of the maturity of its ERM program and of its risk intelligence.

Of course, the path to this lofty designation is long and sometimes arduous. Every organization that charts its progress will find itself in a different location on the map, depending on the unique business challenges it faces and the competencies and capabilities it possesses. But every organization that attains the status of a Risk Intelligent Enterprise will find that they share similar characteristics, including the following:

- risk management practices that encompass the entire business, creating connections between the so-called “silos” that often arise within large, mature, and/or diverse corporations;
- risk management strategies that address the full spectrum of risks, including industry-specific, compliance, competitive, environmental, security, privacy, business continuity, strategic, reporting, and operational risks;
- risk management approaches that do not solely consider single events, but also take into account risk scenarios and the interaction of multiple risks;
- risk management practices that are infused into the corporate culture, so that strategy and decision-making evolve out of a risk-informed process, instead of having risk considerations imposed after the fact (if at all); and
- risk management philosophy that focuses not only on risk avoidance, but also on risk-taking as a means to value creation.

Source: Deloitte Risk Intelligence Series
Objective of the survey
The objective of this Enterprise Risk Management Benchmark Survey is to provide a broad perspective on the state of risk management across the Energy & Resources Industry. The assessment has been structured around the four ERM capabilities: governance, process, people, and technology.

This survey is based on self-assessments. Self-assessment, by definition, entails an unknown degree of subjectivity and Deloitte did not attempt to validate the responses. In addition, there is no statistical significance to the responses — they are merely the opinions held at the time by those who responded. It is also important to emphasize that prevailing practice is not necessarily “leading practice.”

Approach
The benchmark survey, from which the findings are taken for the basis of this report, was conducted online and via paper in the period between June 2009 and February 2010, complemented with one-on-one interviews with the party responsible for risk management in the responding organizations. By far, the functions most represented by respondents are CFOs, CEOs, Chief Risk Officers, and Internal Audit Directors/Managers. The preliminary results of the benchmark survey have been discussed at the “Risk Intelligence in the Energy & Resources Industry Seminar” organized in March 2010 in Brussels (Belgium) with a high representation of the survey respondents. The relevant discussions and comments from the seminar have been integrated in the results that are presented hereafter.

Respondents information
Geographical coverage
Respondents were mostly European with some answers coming from Africa and the Middle-East.

Region | %
--- | ---
Europe | 90%
Middle-East | 6%
Africa | 4%

Sub-industry | %
--- | ---
Power & Utilities | 70%
• Generation & Supply (Electricity/Gas) | 61%
• System Operators (Electricity/Gas) | 39%
Water | 13%
Oil & Gas | 9%
Metallurgy & Mining | 8%

Industry breakdown
A wide variety of different sub-industries/segments from the Energy & Resources industry are represented, with the heaviest concentration in Power & Utilities.
Participants in the survey represent mostly small and medium-sized organizations with a turnover smaller than €500 million (50%) and a headcount of less than 5000 full-time employees (69%).

Current state of ERM
Risk management activities are performed in almost all organizations.

The survey reveals that a vast majority of the respondents (95%) perform risk management activities. The respondents who stated they do not perform risk management activities (4%) are smaller organizations (<110 FTE’s). Those respondents indicated having considered the implementation of a risk management process and some plan the implementation in a time horizon of two years. Until now, those respondents did not perform risk management activities either because risk management was not high on the agenda of their governance bodies (Board of Directors, Audit Committee, or Management Committee) or because they did not see the benefits of an ERM process.

In small organizations, governance bodies and senior management typically have a good overview on what happens within the company. This creates the feeling of having the company ‘under control’ and weakens the perceived need for implementing risk management activities. Besides the higher complexity and difficulty of having a clear overview of risks in larger organizations, regulations tend to require reporting on risk management in the annual statements.

Half of the respondents have a fully operational ERM program
ERM has become an industry wide practice. Almost half of the participants (48%) report to have a fully operational ERM program. For ERM programs in development, 76% of the respondents indicate being in development for more than 1 year.

On average, organizations need 3 to 7 years to bring ERM to an operational level. This timeframe largely depends on the size of the company and the number of geographical locations.

The operational status of the ERM program does not depend on the size of the organization in terms of revenues or number of employees. In addition, there is some rating influence building. A higher proportion of organizations which mentioned having a rating also have a fully operational risk organization. This can be explained by the rating agencies taking risk management more and more into consideration when giving external ratings.
Operational performance and regulatory compliance appear to be the key drivers of ERM, strategy is an emerging driver of ERM programs. Respondents state their organization’s ERM efforts are being driven for the most part by the need to improve the operational performance and the need to comply with regulations. Operational performance is typically embedded in each business department in a more or less formalized way through a long history of silo risk management. Most of the department managers have an overview of their risks whether it was built in a documented process or in a more unofficial way.

Boards are the primary drivers of ERM but senior management tendency to pull ERM through their organization is growing. The key groups driving ERM within organizations are the Board of Directors, the Management Committee, and the Audit Committee. The Board, including the Audit Committee, jointly accounts for at least 47% of the champions who push for ERM within an organization. For 25% of the respondents, the Management Committee is aligning ERM to more strategic risk management activities and more operational performance. This is consistent with the observation that strategy and growth are becoming increasingly important development elements in the risk management program. This can also explain the appearance of strategy as an emerging driver of ERM. As Boards of Directors usually focus more on asset protection and Management Committees focus more on future growth, there may be a possible disconnection between program goals (asset protection) and expectations (value creation). Where regulation and compliance appear to be the primary drivers of ERM, Management Committees are not the key program driver. When the risk management system is driven by the Board or its committees, it may be perceived by the Management Committee as yet another form of compliance, something that “must” be done and which is not driven by business needs. Management Committees may be more interested in improving operational performance and value creation than in the protection of existing assets. In those cases, ERM will be mostly pushed through organizations instead of pulled by the business departments.

Benefits of ERM

The top five experienced benefits are all laudable benefits. These benefits as identified by the survey respondents are: create a risk-aware culture, enable focus on the risks that matter most through integrated management reporting, identify and manage cross-enterprise risks, reduce vulnerability to adverse events and enhance risk response decisions. Although interest in integrating risk management in the decision making process is growing, most of the respondents are still in development.

Interesting to observe is that the experienced benefits are evolving in the same way as the implementation of the process. The first step in the process is setting up the ERM framework and training people to create a risk-aware culture and prioritize risks to focus on the ones that matter most. The second step of an ERM process is to manage the identified risks and reduce the vulnerability to adverse events. Finally, the last step is to monitor risk responses and incorporate risk information into the decision making process. Further benefits may still be realized given that 50% of those who responded to this survey represent organizations that have an ERM program in place for less than 5 years.

Current ERM programs are typically focused on having the right balance between growth, risk, and return but tend slowly towards more strategic risk management. The top five benefits expected to be realized in the future seem to relate more to the management of future growth and potentially rewarded risk. This has a direct correlation with risk maturity: organizations begin by focusing on protecting assets (unrewarded risks) and then later use ERM information as the basis for strategic decisions and their execution (rewarded risks).
Previous studies demonstrated that risk management was mostly focused on risks to existing assets and were missing the connection to future growth. The conservative side of risk management is still highly present but most respondents indicate that their expected benefit is on the link between growth, risk, and return.

Seizing opportunities through risk management is not mentioned by most of the respondents as one of the expected benefits of risk management. Unfortunately, such an approach means for most respondents that risk management does not include risks or opportunities that have to do more with strategy and its execution such as the development of new products, entry into new markets, or acquisitions. Too often, organizations limit their risk management to the unrewarded risks such as those who limit potential losses, instead of also taking into account the rewarded risks, those who hold the potential for gain and reward if they are intelligently managed. Calculated risk taking is essential for competitive advantage and growth. The real challenge is to develop risk intelligence; this entails becoming smarter about and better managing the risks that need to be taken and those that need to be avoided.

Current ERM programs broaden their scope to more strategic risks
In comparison with previous studies, the scope of ERM is expanding to include evaluating a practice that is enterprise-wide. This is reflected by the diversity of risks that are in scope of the risk management program. The survey demonstrated that:
• 1% of the respondents have a full scope ERM program including 16 risk areas.
• 52% have included more than 10 risk areas.
• 85% have included more than 5 risk areas.
Consistent with the focus on asset protection, almost all current ERM programs include external factors (85%), finance (85%), and compliance (84%) risk areas in their ERM scope. This reflects the historical focus on compliance and financial risks. However, as previously observed, respondents tend to focus increasingly on the strategic side as 73% of the respondents indicated that strategy is included in the scope of their ERM programs.

The integration of risk management in the decision making process is growing but is still in development for most respondents
Most respondents integrate or plan to systematically integrate risk management in all their decision making processes. In the current state, organizations have mostly fully incorporated their risk management in the decision-making process of the processes related to commodity trading (58%), and Insurance (48%). However, the survey does indicate a growing trend towards more systematic integration in other critical decision making processes such as Finance (43%) and Internal Audit (42%). These processes relate to the traditional areas of risk management whose primary focus is on the protection of existing assets rather than on future growth.

Often the low score for integration of risk management into the decision process is due to a lack of formalization of risk management in these areas. For instance, many IT organizations have integrated a risk dimension in the decision making process of ICT projects, though often not formalized or in connection with broader risk management programs.

Integrating risk management in decision making of all processes may increase the understanding of the benefits of an ERM program at Management Committee level. In order for operational management to see the value, they need to see their issues are being addressed in a beneficial way. Too often operational management perceives risk management as an administrative burden and does not realize that active risk management is required for further growth. Respondents have realized this challenge and plan to link risk with performance in the future.

Implementing ERM and organizational approaches

Governance
Most organizations have a formal risk management organization
Most respondents (77%) have a formal risk management organization. Depending on the organization, the risk management function is either a separate function or it is integrated with other functions.

The primary reason why organizations have not yet established a formal risk management organization is the lack of available resources. The organizations without a formal risk management organization are the smallest organizations. 50% of these organizations stated their companies do not have resources available (people, budget) to conduct risk management in a formal risk organization.

Exhibit 13: Scope of ERM program

Exhibit 14: Risk consideration in decisionmaking

Exhibit 15: Does your company have a formal risk management organization for your risk management activities?

Exhibit 16: What are the primary reasons your company does not have formal ERM activities?
Another 33% indicate they do not see the benefits of a formally structured risk management function. Both responses are directly linked to the relatively small size of the organizations involved. In the remaining responses (17%), respondents indicated they did not see the benefits of a formal risk management overseeing the whole organization.

Most organizations have structured their risk management in a hybrid format. A vast majority of respondents (82%) have structured their risk management organization in a hybrid format. A hybrid risk management organization combines the advantages of centralized and decentralized structures and enables adequate and timely responses to new emerging risks. In a hybrid structure, the different business functions perform their own risk management activities (e.g., identification and analysis of risks, implementation of control measures, etc.), supported and coordinated by a central risk management department. The tasks of this central team are typically:

- establishing common ERM methodology & tools;
- integrating different ERM practices;
- consolidating and integrating company-wide risks;
- monitoring and reporting on company-wide ERM dashboard; and
- disseminating best ERM practices and knowledge.

In general, no operational risk responsibilities are assigned to this central risk management function. The ownership of risk lies with the business functions. In this set-up, Boards will take on an oversight function and internal audit will provide independent assessment and monitoring services. The hybrid structure facilitates the integration of different approaches that can exist with regard to strategic and operational risks. Strategic risks will usually need a centralized approach due to their wide impact where operational risks will usually be tackled on a more decentralized way.

The number of FTE involved in risk management activities largely depends on the size of the organization. The survey reveals a relation between organization’s total resources and the number of resources involved at central level in risk management. Small organizations (< 1,000 FTE) usually have either no central risk department (15%) or a central risk department constituted of 1 to 5 FTE (24%). Medium-sized organizations mostly staff their risk department with 1 to 5 FTE (24%) and often with 5 to 20 FTE (9%). For large organizations (> 10,000 FTE), no clear trend is observed.

Geographically extended organizations need larger decentralized risk management teams. Organizations have been structuring their risk management depending on their existing structure and geographic footprint. The broader the region where the organization is active, the more risk specialists will be needed in the different locations to enable rapid response to possible new emerging risks.

CFO’s and CEO’s have primary responsibility for ERM. The responsibility of the ERM program has been assigned in priority to the CFO (36%) and the CEO (27%). This may explain why risk integration is high within the finance process as well as the growing trend toward integration of risk management in the strategic process. In some cases (15%), the responsibility of the ERM program has been assigned to a specifically designated Chief Risk Officer. “Others” (20%) include other members of the Management Committee.

In comparison with previous analyses, risk management has increasingly become the responsibility the CEO. With risk management becoming more integrated in the strategy process of the company, ERM is rising higher on the agenda of the CEO. This implies that risk management is not the management of specific risks by some specialists anymore but an integrated approach steered by senior management.

Most organizations have a risk committee within their organization. A majority of the respondents (59%) has established a risk committee within their organization.
The survey reveals that an important number of organizations (29%) risk management is a separate function. For the other respondents, risk managers also perform the following functions: Insurance (17%), Internal audit (12%), Compliance (10%), Fraud Management (3%), and Other (29%). "Other" includes combinations of previously mentioned functions and other functions like controlling, quality management, and credit risk management.

In a start-up phase, risk management is often combined with other functions. As maturity of risk management evolves, organizations adapt and risk management follows its own way in the structure of the organization.

Risk management is internally performed
Most risk management activities are internally performed. However, some organizations have used assistance to implement the framework where other organizations externalized very specific parts of the risk management to increase credibility or build on experience.

The CRO reports to committees and management
On average, the Chief Risk Officer reports to more than two group of directing members. Most respondents (67%) stated the CRO reported at the Board to assist in overseeing the enterprise risks. On average, the Chief Risk Officer reports to more than two group of directing members. Among the respondents whose risk program is in development, only a small majority report to the Board of Directors (57%).

Respondents assess themselves as more mature on the governance than on the process, people or technology capability components
Implementing an ERM program starts with governance. The first task is to define and document the ERM policy as well as define the roles and responsibilities of risk management. The respondents with the most mature ERM programs (50%) have established a clear definition and documentation of the roles and responsibilities to manage risks as well as a top down and bottom up approach towards risk management. More immature ERM programs also strive for adequate power and independence to execute their tasks and duties and to build credibility. A large part of respondents indicate considering not only considering the downside of risks but also the potential upside of risks to a certain extent. Organizations realize that risk management is needed not only to protect existing risks (unrewarded risks) but also to increase growth by assessing potential opportunities (rewarded risks). The integration of risk management with other management practices (e.g. performance management, process management, quality management, compliance, etc.) is still in development in most organizations. Comparison of the governance maturity level with other capability components leads to the observation that governance is the most mature component.
How to read the maturity assessments
Respondents have assessed themselves based on the Deloitte maturity model

The figure above illustrates the five maturity steps from the least mature stage (Tribal and Heroic) at the left to the most mature stage (Risk Intelligent) at the right. The same maturity levels are represented in the diagrams representing the results of the maturity assessments, going from the least mature stage in the centre to the most mature stage in the outer. The questions asked are represented on the various axes of the figure. At each extremity, mention was made of a summarized version of the question.

Each white dotted line represents a quartile of respondents. Q4 (Quartile 4) corresponds to the 25th percent of lowest maturity responses, Q3 to the 25th percent of second lowest maturity responses, Q2 corresponds to the 25th percent of second highest maturity responses, and Q1 corresponds to the 25th percent of highest maturity response.

To illustrate this, in exhibit “Governance Maturity per Quartile”, the 25 percent top performers (Q1) assessed themselves Risk Intelligent with respect to “Integrated ERM framework/methodology”. With respect to “Written ERM policy”, the top 50 percent (Q1 and Q2) indicated having the highest maturity.

Exhibit 2: Clearly defined risk management procedures

(70%) in place. The documentation of processes and procedures helps to ensure a consistent enterprise-wide risk management.

Most organizations wait to formally document their risk management processes until these processes have become more or less stable. Once the ERM program is fully operational almost all organizations have a clearly defined risk management process and procedures (respectively 94%, 88%). The smaller proportion of documentation of risk management procedures can also be due to the perception that procedures have few benefits compared to the administrative burden of writing them. Moreover, the documentation of procedures is related to the operational status of the ERM program.

Risks are mostly assessed on a quarterly basis
A large number of the respondents assess their risks on a quarterly basis (24%). Other usual assessment frequencies are: semi-annual (20%); annual (20%); and ad hoc (17%). 11% of the respondents mentioned a monthly risk assessment frequency and 4% a daily risk assessment. Organizations with a fully operational ERM program mostly assess their risks on a quarterly basis (47%) whereas 24% perform a risk assessment on a more frequent basis and 30% less frequently.

Organizations whose ERM program is still in development mostly assess their risks in an ad hoc basis (28%), semi-annually (24%) or annually (21%). Still, 28% report more frequent assessments. Respondents state that in case of urgency, their risk management organization forestry escalations procedures which enable the organization to initiate risk mitigation action on an ad hoc basis. This allows the organization to integrate incidents into the risk management system and to respond appropriately and on a timely basis to these events. The frequency of assessment can vary depending on the nature of the risks. For operational risks, frequency of assessment will typically be higher than for strategic risks.

Companies primarily rely on qualitative self-assessments
Most respondents (87%) use more than one technique to assess their risks. In general the respondents currently use about 2 to 5 techniques (60%). One third of the respondents plan to implement from 1 to 3 additional

Exhibit 26: A clearly defined risk management process
Exhibit 27: Clearly defined risk management procedures are in place

| Process | Risk management process and procedures are clearly defined in a large majority of organizations |

The survey reveals that a vast majority of the respondents have a clearly defined risk management process (85%) and risk management procedures

| Exhibit 20: A clearly defined risk management process is in place |
| Exhibit 27: Clearly defined risk management procedures are in place |

| Yes | 91% |
| No | 15% |

| Yes | 70% |
| No | 30% |
assessment methods in the 12 months (26%) and half of the respondents plan to implement 1 to 6 of the cited methods in the longer run (51%). At the onset of risk management, organizations primarily rely on qualitative self-assessments. As maturity grows, organizations tend to invest in quantitative techniques to complement qualitative assessments.

A vast majority of the respondents (82%) currently use qualitative self-assessments to perform risk management. Self-assessments require little development as the risk information input is usually provided by business experts, who assess the risks based on their experiences. Therefore, organizations usually start by implementing the self-assessment technique before evolving to more sophisticated techniques. From those who implemented only one technique (4%), all assess their risks via self-assessments.

Other common techniques are probabilistic analyses (61%), scenario analyses (63%), and economic metrics (55%). Probabilistic analyses are used to estimate uncertainty in the values of input parameters by using statistical distributions. Two interpretations of risk scenario analyses currently exist: the sensitivity/probabilistic analysis (e.g., Lognormal/Weibull distributions with Monte Carlo simulations) which is most commonly used and well developed, and the modelling of interactions and interdependencies between different risks, which is less commonly used and not yet well developed. Economic metrics include value at risk, earnings at risk, cash flow at risk, all of which provide financial valuation of risk situations. From these popular methods, the scenario analysis is the method that most organizations plan to incorporate in the next 12 months (7%) or in the longer term (19%). Not so commonly used yet is the industry benchmark.

In some organizations, the benchmark is performed between organizations of the same size instead of in the same industry. 9% of the respondents plan to incorporate this technique in the next 12 months and 21% at longer term. KRI’s are as well foreseen to be implemented in the short (5%) or long term (26%).

Two thirds of the respondents currently use quantitative risk analysis methods. A majority of respondents already use quantitative risk analyses (66%).

Quantitative risk analyses are used mostly in Finance and Tax, Commodity Trading and Sourcing, and Asset Management.

These techniques are most frequently used in areas such as Finance and Tax (56%), Commodity Trading and Sourcing (51%), and Asset Management (40%). Apparently, ‘measurable’ business areas such as Finance and Commodity Trading are the primary driver for developing quantitative risk analysis techniques. Not surprisingly, a longer history of risk management exists in these business areas. Once implemented in these areas, the quantitative techniques are often applied to other business domains.

According to the respondents, the most important challenge with respect to the implementation of quantitative analyses is at the start of implementation: identifying and applying effective quantitative risk measuring techniques.

The second challenge is the implementation of supporting tools for the quantitative techniques. The selection of appropriate tooling remains an important challenge for those at the very beginning of the development of quantitative techniques as much as for those who already perform quantitative risk management techniques in different business areas. Respondents also mentioned other challenges with respect to quantitative risk analysis, including the identification of required data and the effectiveness of data capturing.

Exhibit 28: Risk assessments methods

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<thead>
<tr>
<th>Method</th>
<th>Currently in use</th>
<th>Plan to incorporate in next 12 months</th>
<th>Plan to use</th>
<th>No plans to incorporate</th>
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<td>Self-assessments</td>
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<td>Probabilistic analysis</td>
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<td>Scenario analyses</td>
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<td>Economic metrics</td>
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<td>Stress-test</td>
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<td>Failure mode effect analysis</td>
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<td>Third party assessments</td>
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Exhibit 29: Does your company use quantitative risk analysis methods?

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<th>Method</th>
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<td>ICT</td>
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Exhibit 30: In which domains are quantitative risk analyses used?

<table>
<thead>
<tr>
<th>Domain</th>
<th>Yes</th>
<th>No</th>
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</thead>
<tbody>
<tr>
<td>Finance and Tax</td>
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<tr>
<td>Commodity Trading/Sourcing</td>
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<tr>
<td>Other</td>
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<tr>
<td>Asset Management</td>
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<tr>
<td>EHS</td>
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<td>ICT</td>
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Exhibit 31: Main challenges of implementing quantitative risk analysis

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Yes</th>
<th>No</th>
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</thead>
<tbody>
<tr>
<td>Identifying and applying effective quantitative risk measuring techniques</td>
<td></td>
<td></td>
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<tr>
<td>Implementing supporting tools for quantitative risk measuring techniques</td>
<td></td>
<td></td>
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<tr>
<td>Effectiveness of data capturing</td>
<td></td>
<td></td>
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<tr>
<td>Identifying the required data for your quantitative risk analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timeliness and accuracy of data entry</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Identifying and applying effective quantitative risk measuring techniques: 33%
Implementing supporting tools for quantitative risk measuring techniques: 23%
Effectiveness of data capturing: 20%
Identifying the required data for your quantitative risk analysis: 17%
Timeliness and accuracy of data entry: 7%
Risk Intelligence in the Energy & Resources Industry

Commonly used risk monitoring practice. Implementation of KRIs does not seem to be a reporting aspect of the risk management process. Maturity levels were assigned to monitoring and risk management activities. The lowest process and documentation of risks have become mature. Generally, respondents assessed themselves rather lack maturity on monitoring aspects.

Organizations have a clear process for the identification, evaluation, and mitigation of risk but lack maturity on monitoring aspects. In regard to the technique used to capture quantitative data, respondents noted incident monitoring systems (69%) and paper format (66%) are the most frequently used tools. 60% of the respondents indicate using 2 to 3 techniques to capture quantitative data. However, unlike the risk assessments techniques, new methods for quantitative risk analyses are less likely to be implemented. Currently, most of these techniques are developed to capture historic data (e.g., incidents). Emerging techniques include condition monitoring systems (used by 45% of the respondents) which facilitate prediction of future incidents (e.g., within the domain of asset management).

Exhibit 32: Which quantitative data capturing methods are used? Incident monitoring systems, Paper format, Statistic sampling techniques, Condition monitoring systems, Mandatory fields (incident loggings), Automated logging systems, and Hand held devices (incident loggings).

Risk limits are monitored.

People

Few organizations train all employees in Enterprise Risk Management. Although training is recognized as an important contributor to the creation of a risk-aware culture, a significant part of respondents (31%) do not have a structured training plan in place. Approximately 69% of the respondents state that their organizations do have a structured training plan. Of those, the greatest number (42%) focus their efforts on the employees that are directly involved in risk management activities. 20% of respondents state their organizations train only those specialists who perform specific risk management functions. Few organizations extended RM training to all employees (7%). Training is strongly related to the operational status of the ERM program. Respondents who stated their organization did not have a structured training plan (100%) are in the development stage of their ERM program. Similarly, most respondents who stated their organization trains only specialists (78%) are also in development stage of their ERM program. Organizations that assess themselves as being better prepared in risk management involve more employees in an ERM training program and vice versa. Of those respondents stating that their organizations train all employees or all employees involved in risk management, a majority assesses their ERM maturity above the average. Among the organizations that only train risk specialists or that have no structured training plan are only a limited number of organizations who assessed their ERM maturity as above the average.

Organizations have a strong focus on ERM skills and knowledge. Respondents assessed the people-related aspects of ERM from medium to high maturity.

Exhibit 33: Process Maturity per Quartile

Exhibit 34: People Maturity per Quartile

Report risks/ control activities 75% 75%
Monitor risks/ control activities 68%
Assess risks/ control activities 61%
Document process flowcharts 39%
Other 29%
Integrated performance management 25%

Report risks/ control activities 7%
Monitor risks/ control activities 7%
Assess risks/ control activities 7%
Document process flowcharts 7%
Other 7%
Integrated performance management 7%

Risk limits are monitored.

Risk intelligent

Systematic

Top-Down

Specialist Silos

Tribal & Heroic

Risk culture is promoted.

Risk job descriptions exist

Risk awareness is promoted.

People understand their responsibilities.

People have skills & knowledge.

Communication is in place.

ERM is integrated in training.

Company knows ERM best practices.

ERM process is audited.

Identified risks are documented.

Efficiency & effectiveness is monitored.

People understand their responsibilities.

People have skills & knowledge.

Communication is in place.

ERM is integrated in training.

Company knows ERM best practices.

ERM process is audited.

Identified risks are documented.

Efficiency & effectiveness is monitored.

People understand their responsibilities.

People have skills & knowledge.

Communication is in place.

ERM is integrated in training.

Company knows ERM best practices.

ERM process is audited.

Identified risks are documented.

Efficiency & effectiveness is monitored.

People understand their responsibilities.

People have skills & knowledge.

Communication is in place.

ERM is integrated in training.

Company knows ERM best practices.

ERM process is audited.

Identified risks are documented.

Efficiency & effectiveness is monitored.

People understand their responsibilities.

People have skills & knowledge.

Communication is in place.

ERM is integrated in training.

Company knows ERM best practices.

ERM process is audited.

Identified risks are documented.

Efficiency & effectiveness is monitored.

People understand their responsibilities.

People have skills & knowledge.

Communication is in place.

ERM is integrated in training.

Company knows ERM best practices.

ERM process is audited.

Identified risks are documented.

Efficiency & effectiveness is monitored.

People understand their responsibilities.

People have skills & knowledge.

Communication is in place.

ERM is integrated in training.

Company knows ERM best practices.
‘Hard’ aspects of people maturity are assessed positively, whereas the ‘soft’ aspects of people maturity tend to be less positive.

The high scores of ERM knowledge and best practices indicate a high degree of specialization. These respondents feel comfortable with the understanding of roles and responsibilities and risk job descriptions. Respondents estimate that the ‘soft’ aspects of people maturity, such as communication and training, are less developed. One area that appears to be open for improvement is integration of risk management in the company’s training program. Only the 25% most mature organizations assess that this integration takes place systematically. This assessment might result from the earlier finding that most organizations opted to train only a limited number of people in risk management.

In a majority of the responding organizations, only the people who directly perform risk management activities are involved in an ERM training program.

Technology
A majority of respondents have ERM software or tools to support the ERM process. 63% of the respondents indicate that their organizations are using a risk management tool to support the ERM process. Of those using ERM tools, a small majority of 55% are using tools developed in-house instead of using purchased tools.

The use of a tool is related to operational status of the ERM program. 80% of the fully operational ERM program respondents use a tool compared to only 50% of the ERM programs in development. Moreover organizations that assessed themselves as being better prepared to manage risk also report making use of a supporting ERM tool. Organizations that assessed their risk maturity rather low did not use such tools.

In the early stages of the development of an ERM system, organizations focus on the development of a tailored ERM methodology. Once this methodology is fine-tuned, attention is paid to an appropriate supporting tool. The use of an ERM tool has many benefits. It contributes to a uniform application of risk management along business units and functions and it allows processing large amounts of data into company-wide risk monitoring tools and reports. It is mainly in these two domains that a performing but user-friendly risk management tool can prove its added value.

As observed earlier, risk monitoring and reporting are the least developed aspects of the ERM process. A supporting ERM tool can facilitate the implementation of these final stages of the ERM implementation process.

ERM tools focus on documentation, assessment, monitoring, and reporting of the risk management process. The connection with other key management activities has not yet been made.

Respondents having an ERM tool indicate that their organizations use the tool to document (68%), assess (61%), monitor (75%), and report (75%) risk and control activities. Tooling can especially help make risk monitoring and risk reporting more efficient and effective and hence drive the development of these final stages in the ERM process (which respondents indicated as the least developed aspect of the risk management process).

The connection with other key management activities has not yet been made, as only 25% of respondent indicate using their ERM tool to integrate risk management with performance management (KPIs, balanced scorecards, risk adjusted performance management). This may mean that ERM is disconnected from value creation, and thus from future growth, making it difficult to convince management of the value of improved ERM since there is no linkage to value, only to loss. Only few organizations leverage their risk management tool to integrate risk management with performance management.

Exhibit 30: Which activities are performed using the risk management tool?

- Report risks/control activities: 75%
- Monitor risks/control activities: 75%
- Doc risks/control activities: 68%
- Assess risks/control activities: 51%
- Document process flows/narratives: 39%
- Other: 29%
- Integrated performance management: 25%

Exhibit 37: Does your company have a risk management software or tool?

- Yes: 63%
- No: 37%

Exhibit 39: Technology Maturity per Quartile

- Q1: Integrated IT system are used to manage risks
- Q2: RM tool is integrated with other systems
- Q3: IT applications are used to assess & monitor risks
- Q4: Risk intelligent
- Q5: Systematic
- Q6: Top-Down
- Q7: Specialist Silos
- Q8: Tribal & shores

Exhibit 36: Is your risk management tool built in-house or was it acquired?

- In house: 45%
- Acquired: 55%
Technology is the least developed dimension of Enterprise Risk Management.

In general, respondents assess their technology maturity rather low. They indicate that in their organizations the use of ERM tools is often ‘silo driven’. ERM tools are being used, but not yet on an integrated and company-wide basis.

Among the four sub-domains of technology maturity, a similar maturity level exists in three of the four technology sub-domains: 50% of respondents indicate an ad hoc or silo based approach with regard to the use of an integrated ERM system, the use of the IT system to assess and monitor risk quantitatively, and the extent to which the system enables the bundling of related risks across functional areas. The integration of the ERM tool with other IT systems appears to be even less mature. 75% of respondents state that the integration with other IT system only happens on an ad hoc basis. This is consistent with the earlier finding that only a minority of respondents have their ERM tool integrated with performance management systems, such as balanced scorecards and ERP systems.

This leads to the conclusion that technology is the least developed dimension of Enterprise Risk Management.

The integration of an ERM tool with other management systems remains a major weakness in the overall ERM performance. Despite a proliferation of vendors competing in the ERM marketplace, no single package solution has emerged to provide the necessary functionality to support the entire ERM capability. Some more established vendors offer risk analysis solutions that enable users to make better informed decisions using specified risk parameters and robust data input. However, functionality to allow users to perform a full range of ERM analyses such as modeling detailed event-trees and scenarios, calculating aggregate risk measures, facilitating capital investment and allocation, and generating risk management reports remains elusive.

Respondents indicated the top 10 risks faced by their companies. Results are broken out by industry sub-segment: Electric Power & Utility (power generation and supply); System Operators (transportation and distribution of electricity, gas and water); and Oil & Gas companies (upstream and downstream). Insufficient responses were received from Metallurgy & Mining companies (extraction, production and treatment of metals and minerals) to analyze separately.

Commodity trading risk topped the list for Electric Power & Utility companies. Second came performance risk related to generation assets, followed by operation efficiency risk and regulatory risk. Increasing importance is product development risk, related among other things to the rise of decentralized energy production with households producing their own energy. Many Electric Power & Utility companies are looking for new services to compensate for this loss of revenues.

The "other” risks mentioned are: strategic investment and project development.

When looking at the top 10 risks of companies with system operator activities, regulatory risk is at the top. Most of these companies are working in a heavily regulated environment, with the regulator setting prices for the services they provide. The second ranked risk is asset performance risk, directly linked to their core business operating the transportation or distribution grid (e.g. black-outs, grid losses, etc.).

The “other” risks mentioned are: water quality risk; project finance risk; project management risk; environmental, health and safety risk; IT infrastructure risk and financial performance risk.

Exhibit 40: Top Energy & Resources risks

<table>
<thead>
<tr>
<th>Electric Power &amp; Utility</th>
<th>System Operators</th>
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<tbody>
<tr>
<td>Commodity trading</td>
<td>Regulatory</td>
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<td>Asset performance</td>
<td>Asset performance</td>
</tr>
<tr>
<td>Operation efficiency</td>
<td>Business continuity</td>
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<td>Regulatory</td>
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<tr>
<td>Data quality and integrity</td>
<td>Compliance</td>
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<td>Compliance</td>
<td>People and talent</td>
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<tr>
<td>Business continuity</td>
<td>Data quality and integrity</td>
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<td>People and talent</td>
<td>Fraud</td>
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<tr>
<td>Credit</td>
<td>Brand and reputation</td>
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<tr>
<td>Competition</td>
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<td>Product development</td>
<td>Competition</td>
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<td>Fraud</td>
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<td>9%</td>
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</tbody>
</table>

Exhibit 41: Top Energy & Resources risks

<table>
<thead>
<tr>
<th>System Operators</th>
<th>Top 10 Energy &amp; Resources Risks</th>
</tr>
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<tbody>
<tr>
<td>Regulatory</td>
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Top Energy & Resources Risks
For Oil & Gas companies, the rankings shown in the chart do not represent the whole picture given the high number of “other” risks falling outside the ranked categories. Analysis of the risks listed as “other” reveal same patterns. Given that Oil & Gas companies, both upstream and downstream, are capital intensive, risks related to strategy and putting capital to good use come to the fore. Most respondents had risks such as strategic risk, cost of capital, asset performance (including subsurface and resource risk), and asset development in their top 5. Other mentioned risks reflect a continuing emphasis on geopolitical risk due to either assets or transportation routes being located in or near politically unstable countries. Those Oil & Gas respondents that engage in commodity trading list it as one of their top 5 risks and those that do not trade list market or price risk in their top 5. People and talent risk still makes the top 10 for all but 1 respondent, but is no longer in the top 3-5 as it commonly was prior to the economic downturn in many surveys conducted.

The “other” risks mentioned are: adequate raw materials; alignment with key stakeholders; asset integrity; capital cost/capital cost estimation; carbon; environmental, health and safety risk; environment risk; managing development projects; market/commodity market price; political/geopolitical; strategic; and subsurface/resources.

For many Electric Power & Utility and Oil & Gas companies, risk management programs started in their commodity trading and health, safety, and environment activities and then extended to other domains to cover all functions and business units. As enterprise wide coverage was achieved, the focus shifted from controlling non-rewarded risks (loss prevention) to evaluating rewarded risks (value creation) such as strategic and product development risks. For many System Operators, ERM programs have a shorter history, are less mature, and have a more operational and compliance focus, although strategic risks are just as relevant for them (e.g. product development risks with respect to decentralized production, smart metering, smart grid, use of gasses from sewerage system to generate power, injection of biogases into the grids, etc.). Though System Operators are quickly catching up and may even be more advanced in some areas.
Conclusion

Building the Risk Intelligent Energy & Resources Enterprise

While the Energy & Resources industry may be leading the way in implementing ERM, there is still considerable room for improvement. Many Energy & Resources companies are asking the question: What will it take to move beyond our current stage of ERM?

This report should help Energy & Resources companies identify opportunities to move toward becoming a Risk Intelligent Energy & Resources Enterprise.

Some of the remaining challenges faced by Energy & Resources companies and suggestions for moving toward the Risk Intelligent Enterprise are discussed below.

Moving beyond the initial stage

Many Energy & Resources companies have moved forward by performing enterprise risk assessments, implementing risk registers, developing risk treatment plans, and monitoring the status of certain high-priority risk exposures. Although some Energy & Resources companies have considered implementing most or all components of an ERM capability at once, many have instead chosen an incremental approach for the implementation of their ERM program. Starting with a few risk types or business units can provide opportunities to establish credibility and bolster support through early wins while gradually changing the enterprise’s culture and learning valuable lessons along the way.

The challenge is to turn this one-off exercise, most often top-down driven, into a continuous process. Key to overcoming this hurdle is the critical connection of the “top-down” managed risk set with the operational risks people encounter in their day-to-day activities.

Once this is accomplished, risk management can be truly embedded into the organization, making it part of daily processes and operations. Structures need to be designed where operational risk information can feed up to the higher enterprise-level risks required for informed “top-down” management of the organization’s risks. In contrast, enterprise-level risk information needs to be fed down, being translated into concrete activities on the work floor required for effective “bottom-up” management of specific exposures. The ability to measure and manage risk exposures from both the top-down and bottom-up is critical to becoming a fully Risk Intelligent enterprise — to build informed risk-taking and information into relevant decision-making throughout the organization in a continuous process.

Achieving enterprise wide coverage

Many Energy & Resources companies have developed fairly robust approaches to manage a few risk types in isolation, including insurable hazard risks and readily quantifiable market (or price) risk and credit risk. Some also rely on relatively haphazard or unsophisticated quantitative and qualitative risk analysis techniques to address other risk types on an individual basis.

Many Energy & Resources companies also focus their risk management activities on business units that are assumed to include the most significant risk exposures such as commodity trading.

Moving beyond a fragmented ERM capability involves expanding the coverage of risk management activities to encompass all material risk types and business units. Such an approach does not mean that all risk exposures are given equal consideration or are managed in the same way; rather, it means that the organization is able to make a more informed and conscious decision on which risks it should actively manage and how it should manage these exposures. For example, the organization may elect to self-insure certain nonmaterial exposures depending on its overall risk profile and risk appetite.

Achieving greater coverage requires developing and applying different approaches to analyze and manage the readily quantitative risk types described above and the more qualitative strategic, political, legal, and regulatory risk types. For example, commodity trading business units may decide that individual transactions and risk exposures should be directly modeled, measured, reported, and monitored. In contrast, techniques such as scenario analysis may be appropriate for more qualitative risk types.

Incorporating Risk into Strategy

Before risk can be aggregated into strategy, risk across risk types and business units need to be integrated and aggregated to provide a truly enterprise-wide perspective.

Once the board of directors and senior management better understand how individual risk exposures — arising from each risk type and business unit — contribute to the enterprise’s aggregate risk exposure, they are positioned to use risk in a more strategic way. Relying on the aggregate risk measures, Energy & Resources companies can incorporate risk into related management areas such as strategic planning, capital investment and allocation, and performance measurement. With a clear risk appetite and risk tolerance, the organization is guided to pursue new opportunities that create value for stakeholders.

Incorporating risk into capital and performance activities through advanced measurement techniques can provide the board of directors and senior management with the necessary confidence to start deploying capital with the overarching objective of creating value rather than simply preserving value.

A way forward

Building the Risk Intelligent Energy & Resources Enterprise has proven to be a daunting task, even for Energy & Resources companies with the most advanced and sophisticated ERM capabilities. Given the scope and complexity of implementing the ERM capability and the diversity of starting points among most Energy & Resources companies, a flexible approach is probably most appropriate. Below is an approach for building/ enhancing and sustaining the ERM capabilities that can be effective for many organizations along the ERM journey.

Build/enhance the ERM Capability

To build/enhance the ERM capability, the ERM program should start its planning with the assessment of the organization’s ERM capability, relative to capability components that correspond to each stage in the capability maturity model, in order to establish a baseline. The outcome of this diagnostic should provide sufficient information to evaluate the nature and extent of gaps between the current and desired ERM capability maturity stages. It should also provide the relevant data to perform a cost/benefit analysis for the ERM capability and prepare a business case. Milestones should be based on key attributes in the ERM capability maturity model so that the program team can effectively monitor and report on progress.

Sustain the ERM Capability

As with most of today’s critical management capabilities, sustaining the ERM capability at most Energy & Resources companies will require a process of continuous improvement. Changes in prevailing conditions in the operating environment, the organization’s composition and objectives, or the expectations of key stakeholders may require additional effort to maintain the desired stage of ERM capability maturity. Moving to more advanced stages will likely involve an iterative process. Developing an ERM capability can require substantial effort as well as scarce resources and senior management attention.

The benefits and costs of moving from less-advanced to more-advanced stages of the ERM capability maturity model should be carefully considered before launching the program.

The Energy & Resources industry, alongside the financial services industry, keeps on fulfilling its role of early adaptor and pioneer in the ongoing evolution of the ERM capability towards becoming a truly Risk Intelligent Enterprise™.
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