

# PennEnergy®



## SURVEY REPORT

# Maximizing Operational Excellence

The Key Role of Intelligent Content

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# Introduction

**I**N A RECENT survey conducted by PennEnergy Research, 70% of surveyed energy industry professionals expect to receive higher productivity and reduced costs of operations from Operational Excellence initiatives. Further, more than 90% indicated either an Operational Excellence program was underway or the subject of increased focus.

This level of response suggests that the sector is taking Operational Excellence seriously and have great expectations from these programs. However, projects in the sector can underperform, leading to lost credibility from management.

Operational Excellence programs must be well defined, their value articulated and program risk mitigated. Enabling enterprise systems must be robust with high performance. The initiatives and performance metrics (KPIs) must address the trials the organization faces today with the resiliency to meet the unexpected.

## Challenges

The energy sector is faced with major challenges. While some of these are not directly within the control of management, e.g. commodity price points, many are. Strategies emanating from Operational Excellence provide the organization with the capabilities necessary to meet these challenges.

- **Upstream**—Unfavorable prices (35.6%), Global economic recession (16.9%), and Global oversupply & Big Crew Change/ Talent shortage (15.3%)
- **Midstream**—Global oversupply / Global economic recession / Increasing operating costs / Renewable energy sources (22.2%)
- **Downstream**—Increasing operating costs (35.0%), Global economic recession (30.0%), Increasing government regulations (25.0%)
- **Utilities; Power & Generation**—Environmental (25.0%), Increasing government regulation (21.4%), and Lower demand (17.9%)
- **Utilities; Transmission & Distribution**—Increasing operating costs (44.4%), Distributed power generation (33.3%) and Renewable energy sources (27.8%)
- **Industry Suppliers**—Global economic recession (33.3%), Renewable energy Sources (22.2%)
- **Engineering, Procurement, and Construction**—Lower demand (38.9%), Global economic recession (33.3%) and Unfavorable prices (22.2%)

## Introduction

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Attaining and Sustaining Operational Excellence enables the organization to tap into one major source of unrealized value: its financial Balance Sheet. Such an organization is agile and resilient when dealing with the difficult economic issues the companies responding to the survey reported above.

# Operational Excellence Criteria

**A** **S NOTED, THERE** is a lot of discussion about Operational Excellence (OE), how it is defined and how organizations can attain and sustain it. For example, one SPE paper defines it as, “Operational excellence is a methodology helping organizations grow and sustain operational standards in today’s environment of government regulation and consumers’, communities’, and NGOs’ expectation.”

According to the consulting company, Bain & Co. there are six major criteria required for firms to meet world-class Operational Excellence. Bain correctly states that to achieve and sustain Operational Excellence, organizations must meet all of the criteria simultaneously.



- **Top Quartile Asset Performance**—This is a function of capital deployed, also known as Return on Capital Employed (ROCE) which is a common financial metric for the sector. The challenge is to become and remain an organization that is best-of-breed compared with others in its segment.
- **Immaculate Reputation**—Best in class operations and sustained business practices and organizational image to the outside. Those organizations with stellar reputations offer stakeholders the highest valuation.

## Operational Excellence Criteria

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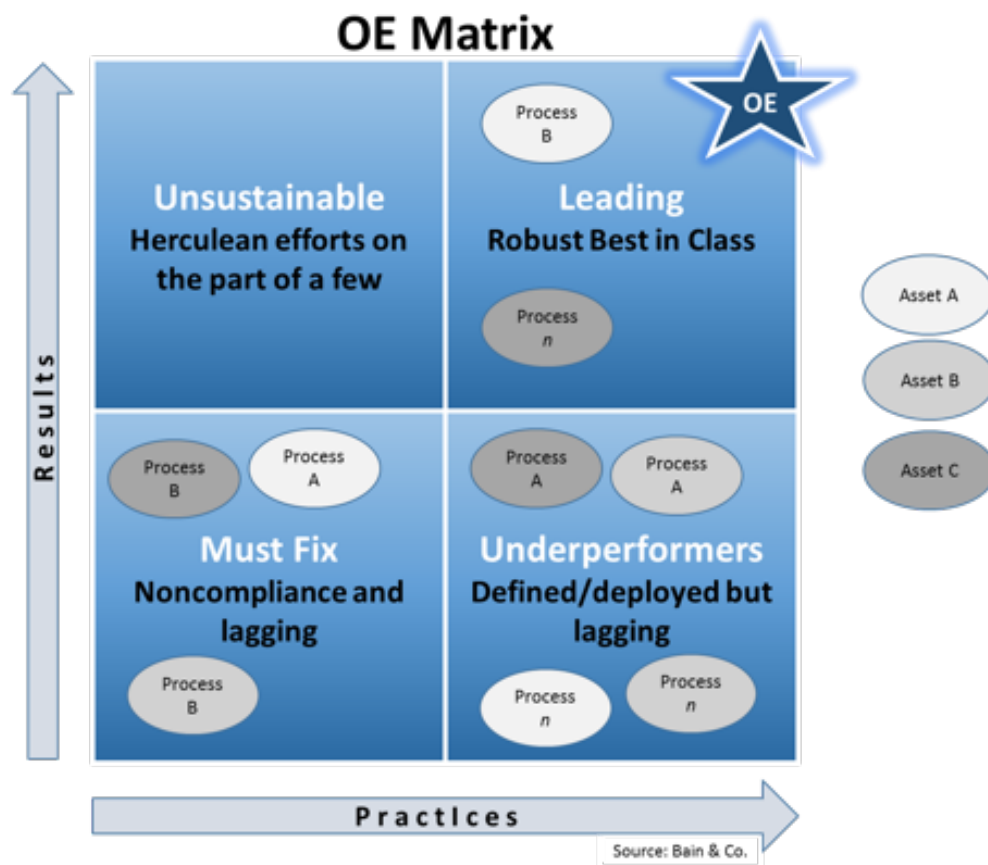
- **Distinctive Capabilities**—Workforce (including supply chain) Competency and Institutionalized Processes that are unique and add value to all stakeholders. In other words, the organization’s competitive advantage.
- **High Performance Culture**—The construct of a High Reliability Organization (HRO) is relatively new to the Oil & Gas sector, although the utility segment has been using its tenets for some time now. Its focus is on operations and building a resilient organization.
- **World-Class Health, Safety and Security for individuals and the Environment (HSSE)**—Meeting the Tenets of a Safety Culture as originally defined by the nuclear power sector post-Three Mile Island.
- **Best in Class Processes & Systems**—Standardized best in class including seamless integration of acquisitions and partnerships. These include not just the business and technical processes but the enabling IT systems as well, e.g., single sign on.

Attaining and sustaining these six criteria appears to be a daunting task and expensive. However, conversely one can argue that in today’s business climate Operational Excellence is no longer a luxury but mandatory to add stakeholder value. Bain predicts that it may take up to five years to reach a sustained Operational Excellence.

It is likely that in a large global organization, various business and/or technical processes from different organizational assets will not all attain and continuously improve at the highest level. It is possible that various processes from A, B ... n will fall in various parts of this matrix.

- **Leading**—Robust, Best in Class processes at meet all six criteria.
- **Underperformers**—These processes are well defined and deployed. However, they are lagging behind and require additional work to meet all of the criteria.

- **Must Fix**—These processes are not in compliance with the criteria and are far behind. However, if they are addressed they can be brought up to standards. If left unattended, they pose an enterprise risk, not simply a risk to a division or department.
- **Unsustainable**—Processes in this quartile are not in compliance with Operational Excellence objectives, but also, they are not codified and only supported by limited human and other resources. As the name indicated, processes left in the sector are not maintainable and their risk to the organization is high.



As indicated in the figure, each process and enabling technology suit is results driven and hence, measurable and their practice is at a level of compliance with operational policies and procedures. Moreover, a strong governance model assures consistency across the organization.

# Intelligent Content

**C**ONTENT HAS ALWAYS been important to decision-making processes. Timely and accurate information is a Critical Path item.

Years ago, the concept of information overload was identified as a problem. Now, in an era where many believe they can multi-task regarding major organizational problems, digesting voluminous data and information manually is impossible.

Systems need to enable rapid response to problems. Information Technology has advanced to where databases of content are no longer relationship or object driven. Criteria for Intelligent Content include:

- Rich and semantically categorized, e.g., discoverable, reusable, reconfigurable and adaptable
- Focused on data type and not its location
- Content in the “context” of the decision making process

These data become “intelligent” since they are no longer passive awaiting to be *queried* but possess the “smart” ability to participate in the decision-making process and even provide *behavioral* machine learning.

Learning human decision-making processes and adding that knowledge to the content or knowledge base is the directional future. Intelligent Content is the framework enabling this next generational step in knowledge management.

**Accessibility (54.8%) and Security (52.7%) were the two most important drivers for Information Management**



## Intelligent Content

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Especially for highly regulated sectors such as the energy industry, information systems managing Intelligent Content must be robust. For these systems to be widely adopted, critical organizational data and information must be accessible 24/7 to decision makers.

Moreover, in an era of constant cyber exposure security is vital. Management must be assured that Intelligent Content is readily available and has not been tampered with when it is relied upon to manage operations and other critical infrastructure.

Operational Excellence is an enterprise process. As such, multi-dimensional information from throughout the enterprise must be available and actionable, e.g., best Operational Excellence practices from West Africa may be applicable East Asian operations.



# Current Business Landscape

**O****N JUNE 15,** 2016, West Texas Intermediate Crude Oil (WTI) closed at \$48.01 as it continues to flirt with the \$50 level. Some industry players believe that the current trading range will remain for some time into the future but is still below the price point needed for profitable drilling.

Moreover, others believe that crude oil prices may slide further. It would appear then that the sector will remain in challenging times for at least the near future and few believe that a significant increasing in crude oil prices is likely.

Post BREXIT, the energy industry may have an element of uncertainty much like other sectors. A strong US dollar has historically driven the price of the commodity downward. Since oil is traded in dollars it there may be downward pressure until the uncertainty is mitigated.

Risk mitigation strategies should take these issues into consideration. This is consistent with the survey respondents who expressed concern over the possibility of a global recession (more than 30%) and its accompanying lower demand and pressure on operating margins.

# Unlocking the Value

**O**VER THE PAST 20 MONTHS OR SO, the industry has addressed falling oil prices in the traditional manner. Reductions in Force (RIF), freezing discretionary spending, shuttering projects, etc. have been wide spread. The number of bankruptcies and asset sales continue and one can expect mergers and acquisitions to accelerate once asset value is stabilized.

Has management done all it can to survive in this market? Perhaps not. If the market has undergone a systemic change, traditional cost savings efforts are not enough.

In 2015, the consulting firm McKinsey put forth a methodology they claimed could reduce offshore drilling costs by 50%. Two major findings that are under the *control of management* include:

- Up to 80% of costs are project time issues, e.g., optimizing equipment, material and facilities, and delivery times.
- 50 and 75% are engineering productivity constraints, such as frequent and last minute project change orders, and “weak-performance cultures and broken leaning curves.”

These are significant cost savings that are measurable, which means they can be managed. Moreover, other components of the energy value chain suffer from the same issues including costs overruns.

If drilling costs can be reduced by 50%, operators, drilling companies and energy service providers among other participants in the value chain may be profitable in the current crude oil trading range. Employing technology is one enabler for realizing this value.

An earlier McKinsey paper stated that, “world-class operational execution can add up to 30% of value to the production asset base.” If these values than can be extracted from the financial Balance Sheet and Net Income Statement, the value to

shareholders are huge. Additionally, they are visible at all levels of the organization and actionable.

### 7 of 10 respondents expect to see higher productivity and/or reduced operational costs as a result of having an Operational Excellence Program

Seventy percent of the survey respondents echo the belief that significant value is available from Operational Excellence. Increased productivity and lower direct operational costs will unlock this value and can do so quickly.

# Operational Excellence Governance

**T**HE FIRST TENET of the Safety Culture and most organizations' Operations Management Systems (OMS) is **Leadership**. In these contexts, leadership is a firm, visible and sustained behavior by the top leaders of the organization: the CEO and Board of Directors.

Leadership drives the Organizational Culture and the Behavioral Economics of all individual stakeholders of the firm. In addition to managing the daily transactions of the firm, transformational leadership requires a clear Vision. Employees and other stakeholders cannot effectively follow fuzzy, slogan centered statements.

One of the ways CEOs lead their firms is to establish Governance models. Post Macondo, Enron and other destruction of shareholder equity incidents, simply stating policies and procedures in a static manner is no longer acceptable.

A Governance Operating Model must be dynamic, actionable and focused. Management MUST engage on a full time and consistent basis. This model must form the basis of Operations Management Systems.

A Strong-Bond governance model is required to tie top leaders to operational strategies and daily activities. This tight coupling assures leadership engagement and visibility throughout the organization and its suppliers, vendors, customers, communities and government oversight agencies. Moreover, it is made possible by sophisticated, cost effective IT and Intelligent Content solutions.

## **The Operations Management System**

The Governance Operating Model is made actionable through the Operations Management System. Most major organizations in the sector have published an OMS similar to Chevron's featured below.

Chevron defines its operational excellence management system (OEMs) as, “comprehensive, proven means for systemic management of process safety, personal safety & health, the environment, reliability and efficiency. Through disciplined application of the OEMs, we integrate our processes, standards, procedures and behaviors into our daily operations.”

In response to the BP Deepwater Horizon incident in 2010, the U.S. Bureau of Safety and Environmental Enforcement (BSEE) requires the use of Safety and Environmental Management Systems (SEMS) for operators in US Federal waters. A typical OMS might include the following:

<b>1. Leadership</b> 1.1 Operating Leaders 1.2 Operating Strategy  1.3 Planning & Controls 1.4 Resources & Implementation 1.5 Accountability  1.6 Communication & Engagement 1.7 Culture	<b>2. Organization</b> 2.1 Organization Structure 2.2 People & Competence  2.3 Operating Discipline 2.4 Organizational Learning 2.5 Working with Contractors	<b>3. Risk</b> 3.1 Risk Assessment & Management 3.2 Personal Safety  3.3 Process Safety 3.4 Health & Industrial Hygiene 3.5 Security  3.6 Environment 3.7 Transportation	<b>4. Procedures</b> 4.1 Procedures & Practices 4.2 Management of Change 4.3 Information Management & Document Control 4.4 Incident Management 4.5 Control of Work 4.6 Crisis & Continuity Management and Emergency Response
<b>5. Assets</b> 5.1 Project Management  5.2 Design & Construction  5.3 Asset Operation 5.4 Inspection & Maintenance 5.5 Decommissioning & Remediation 5.6 Marine Operations	<b>6. Optimization</b> 6.1 Plant Optimization  6.2 Energy 6.3 Feedstock & Product Scheduling and Inventory 6.4 Quality Assurance  6.5 Technology 6.6 Procurement 6.7 Materials Management 6.8 Continuous Improvement	<b>7. Privilege to Operate</b> 7.1 Regulatory Compliance 7.2 Community & Stakeholder Relationships  7.3 Social Responsibility 7.4 Customer Focus  7.5 Product Stewardship	<b>8. Results</b> 8.1 Metrics & Reporting  8.2 Assessment & Audit  8.3 Performance Review 8.4 Budget Management

As might be expected from a large robust OMS, the amount of daily information that must be processed, categorized and stored is immense. This represents a major document management problem.

In many ways this management system is similar to the requirements of Section 404 of the Sarbanes-Oxley Act of 2002 that requires acceptable management systems to assure adequate financial reporting transparency following the Enron driven Crisis-in-Confidence. In response to the Section 404 requirements, public organizations and their Auditors developed new SOX reporting processes enabled by information technology. IT solutions can empower Operations Management Systems enabling Operational Excellence as well.

### Top three operational excellence priorities:

- 1) Continuous process improvement (54.3%)
- 2) Establishing corporate standards for all 1) Standard Operational Procedures (52.7%)
- 3) Reducing unplanned downtime and issues

Survey respondents expressed a belief that these top three OE priorities can be met using OMS. Continuous improvement can only be accomplished in a cost effective manner if systems are built around standards across the enterprise and the processes measured.

Unplanned downtime costs can be significant, not just because of the incident costs itself but the loss of production. Regardless of commodity price, lost production can never be made up.

# Enabling Operations Excellence

**T**HE SO-CALLED **DIGITAL OILFIELD** has permeated field operations over the past two decades—improving Net Present Value up to approximately 25%. In fact, there are a robust set of solutions available for real-time, structured, unstructured and other including new database management solutions designed to truly manage Big Data of all types.

Moreover, these field processes are well understood and low cost solutions readily available. One of the challenges is to manage the sheer volume of documentation required by digital oilfield implementations. Furthermore, many of these document management systems are based on older schema

## **Risk Management**

Today, the data and information necessary for Operational Excellence are incomplete, disparate, and fragmented. Spreadsheets are used extensively and the likelihood of errors is very high. Documents are scattered and their taxonomy are antiquated and often incomplete.

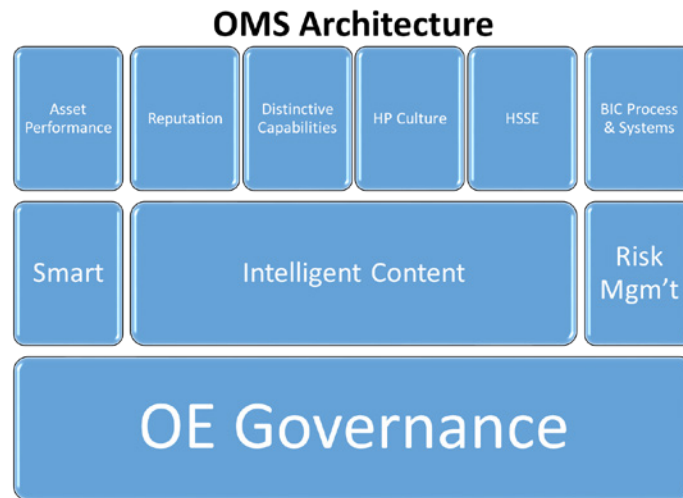
When data is fragmented and supported by an array of software tools, the decision-making processes are fragmented as well. By extension, poor decision making processes can often result in poor decisions.

OMS by definition are integrated *information rich* systems. Management has developed these systems to increase operations performance in a safer, environmentally friendly and socially responsible manner; globally.

Transforming the organization into one with an Operational Excellence Culture is enabled by a full range of digital oilfield solutions. In addition to “Smart” telemetry from equipment, document management systems must be reassessed, updated and automated—**Intelligent Content**.



The delivery of Operational Excellence is enabled by the following Operations Management System Architecture. With Operational Excellence Governance as the foundation, Intelligent Content and real-time data are the linchpins enabling Risk Management across all six Operational Excellence Criteria.



Examples of **Intelligent Content** in the Operational Excellence Criteria include:

**Top Quartile Asset Performance**—All of the information available regarding revenue producing assets. In the case of an operator, it would be the reservoir engineering and G&G. In the case of service providers, it would be equipment and other resources necessary to complete the “job tasks” safely with environmental stewardship with high performance in a timely manner.

**Immaculate Reputation**—Organizational reputations are difficult to obtain and easy to lose. During times of crises, firm’s must demonstrate that they are “on top” of the incident, making good and timely decisions and be seen as looking out for the best interest of the locale and society in general. Having access to the correct information in a timely manner is critical to “Resiliency” of the firm as it responds to events in real time under the public eye.

One example from the health care sector was the Ebola scare in Dallas, Texas during 2014. The continued availability of “good” information helped soothed public concerns. As a High Reliability Organization, it was resilient and successfully contained the contagion.

**Distinctive Capabilities**—Demonstrated workforce competency, both internal and with supply chain partners requires training and access to materials and information to accomplish the tasks in a timely manner.

**High Performance Culture**—Sometimes referred to as a High Reliability Organization, the focus of this culture is on operations and its successful processes. More than Zero Defects type slogans, this culture is built on “resiliency” and the process in place to rapidly respond to incidents requires access to documents not just during the incident but beforehand to build prevention barriers, i.e., Bowtie model.

**World-Class HSSE**—The transformation to a Safety Culture is not just a training and change management process. Each of the Nine Tenets is information intensive and requires the timely availability of Intelligent Content. As an example, the SEMS regulations are mapped into the OMS and become part of the Operational Excellence process.

**Best in Class Processes & Systems**—The industry is rapidly driving towards a higher level of standardization harmonized across the globe. Moreover, “best/good” practices from other sectors are integrated where applicable. New robust business models are emerging, all of which are information intensive.

These are just a few examples where Intelligent Content adds value to the firm and helps it attain and sustain Operational Excellence. The level of complexity is high and getting higher. For example, the industry is just beginning to collect “Behavioral” Big Data—task performance!

### **Role of Big Data**

Operation Management Systems are large robust systems that capture a lot of data on a daily basis. Data can include real-time telemetry from “Smart” equipment and facilities as well as documentation, drawings and other structured and unstructured data.

According to Bain, companies using data analytics to improve their performance are:

- “Twice as likely to be in the top quartile of financial performance within their industries,
- Three times more likely to execute decisions as intended, and
- Five times more likely to make decisions faster”

This is very similar to the Operational Excellence criteria previously set forth. This suggests that Big Data will play a role in Operational Excellence going forward and that world-class organizations must have a Big Data Analytics strategy.

Over time, one might expect that robust OMS will be learning enabled, much like Machine Learning today. This process, at least in theory today will enable even more effective Operational Excellence.

# Economic Value from Intelligent Content

**I** **T IS IMPORTANT** to make any economic value proposition Believable, Demonstrable and Defendable. This is even more critical when the stakes are as high for the firm as attaining and sustaining Operational Excellence. Becoming a top quartile firm and remaining there, while challenging as we have shown is the only way to deliver high shareholder value in the current economy.

## Components of Value

One economic value model has identified five categories where value can be derived from technology enabled process transformations. These include:

### Directly Measureable

- **Cost Takeout**—complete elimination of an activity or process
- **Cost Avoidance**—eliminating errors or costs incurred from them, i.e., regulatory fines
- **One-Time Cash Flow Impact**—such as the sale of an asset

### Not Directly Measureable

- **Productivity & Efficiency Gain**—increase in productivity that improves existing resource utilization
- **Intangible**—benefits that are not directly measureable such as the firm's reputation

These Components of Value are useful when assessing the value proposition for a transformational process such as attaining Operational Excellence or assessing the capital expenditure for information technology. Organizational transformation to Operational Excellence can be enabled through the deployment of **Best in Class IT enabled Processes & Systems**.

If we map the Operational Excellence criteria to these Components of Value, we can develop an Operational Excellence implementation model. The mapping process can be many-to-many in lieu of these simple illustrations.

### Actionable Value

As stated, it is important that value from Intelligent Content enabled Operational Excellence program are understood by management and speak in the terms of finance. The following economic value propositions are provided for each of the six Operational Excellence criteria. These are available to all organizations regardless of size and role in the energy value chain.

In these five business cases, better decision making enabled by Intelligent Content can have a dramatic impact on the financial health of an organization—Operational Excellence is all about better and more timely decisions.

### Cost Avoidance

Achieving **Top Quartile Asset Performance** will have significant value that will impact on the firm's Earnings per Share (EPS). In other words, Economic Profit (EP) is equal to Invested Capital (IC) multiplied by the difference between Return on Invested Capital (ROIC) and the Weighted Average Cost of Capital (WACC).

The construct of the Economic Value of Marginal Information (EVMI) was first posited in 1997. Similar to economic Utility Theory, if the expected value from an investment in information exceed the cost of that information, value is added to the firm.

Therefore, investments in information technology can directly impact the bottom line (Economic Profit) of the organization. EVMI assessment is applicable to the remaining four examples.

For example, from the survey “Over three-fifths of respondents manage information on work orders (65.4%), regulatory compliance data (61.2%) and asset data (60.1%).” If these costs are avoided, the impact is direct to the bottom line.

### One-Time Cash Flow Impact

When drilling an oil well, every hour that “first oil” can be advanced increases the production value of that asset. Those organizations with **Best in Class Processes & Systems** may safely increase their production. For example, if an offshore drilling rig day rate is \$250,000, reducing the time to first oil by just four days is \$1 million.

### Cost Takeout

Reducing the number of project change orders as a function of a better trained workforce may increase the **Distinctive Capabilities** of the organization as well as reduce the headcount required to perform these activities. According to the survey, “100% of industry supplier respondents and 77.8% of EPC respondents manage work orders, a much higher percentage than other industries.” This is likely a design issue as well as field execution.

According to one source, five to 10% of project contingencies can be consumed by change orders. Given that even small projects can run into the tens of millions of dollars, improved efficiencies and less “rework” will dramatically eliminate project costs.

### Productivity & Efficiency Gain

As noted in the McKinsey study, engineering productivity constraints are a major contributor to the drilling cost model. Transforming to a **High Performance Culture** can dramatically increase reliability thus positively impacting “weak performance.”

One of the problems measuring productivity and efficiency is the latent aspect of their measurement. Sometimes referred to as Not Directly Measureable, their only trace is from other KPIs.

The 2014 Ebola scare was contained by a resilient (HRO) public health care system. What would be the costs if it had not been contained until after 100, 1,000 or even more patients had been infected?

Medical treatment costs would be high, but societal costs of fear and perhaps restrained economic growth could soar, e.g., concerns about travel to Brazil for the 2016 Summer Olympics because of the Zika virus.

### **Intangible**

A firm's Reputation and perhaps its "Brand" are valuable. Moreover, accidents and major incidents that *did not happen* have value as well. Organizations with an **Immaculate Reputation** and **World-Class Health, Safety and Security for Individuals and the Environment** benefit with its market constituents.

The 2010 Deepwater Horizon incident is the most recent well known catastrophic impact on industry safety as well as significant financial impacts on the major companies involved. Over six years later, issues of this nature continue. Not only is the image of the firms involved impacted but the costs (in dollars) of response as well as the regulatory and legal fines are not insignificant.

Would you entrust your 401K manager to invest your future retirement in these companies? Tied to the EPS above, one would expect the Cost of Capital to be higher for a company in this situation.

In reality, this Operational Excellence economic model is more complex. For example, most offshore service providers will not even be considered for a contract regardless of their bid if they can demonstrate Workforce Competency and a track record of Safe Operations with competent management process.

We can model this process in more detail, but readers will get the jest of this process. Larger models have incorporated almost 50 variables demonstrating substantial value.



# Concluding Thoughts

**M**OST SENIOR EXECUTIVES and industry leaders expect the trading range for the price of oil to remain in the current trading range. Any pricing pressure will most likely be downward in the near future.

Throughout the energy value chain, management understands that a major key to unlocking shareholder value is to attain and sustain Operational Excellence. Most large firms have Operational Excellence initiatives in place and require their suppliers and vendors to adhere to their tenets.

In other words, Operational Excellence is a version of top down economics and those whose customers use this approach by definitions must practice Operational Excellence as well. However, the transformation to an Operational Excellence culture is often seen as expensive, time consuming and likely to fail and something only the largest firms can undertake.

- Less than a quarter of organizations (24.5%) have a corporate standard or solution for Operational Excellence, although 34.6% have project or divisional standard
- Even fewer Upstream Oil & Gas organizations (20.3%) have a corporate standard or solution for Oil & Gas

It is clear from the survey response that the energy industry has work to do to capture the value from Operational Excellence. Over the past few decades, organizations have deployed standardized Enterprise Resource Planning (ERP) solutions solving similar organizational challenges such as SOX. It is time to do the same for Operational Excellence.

A great deal of industry knowledge and best practices are available. However, unless they are codified and captured in an enterprise level Operational Excellence platform, Operational Excellence implementations will continue to be fragmented

## Concluding Thoughts

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and suboptimal. As discussed herein, this will leave economic value on the table and weaken the competitive posture of the firm.

Moreover, Intelligent Content is the game changer not just for the largest but for all members of the energy value chain. Processes and technologies are available and have documented success adding value to Operational Excellence initiatives.

Finally, the economic value from Intelligent Content is documented and that value is available to all firms. Operational Excellence is the only major near-term business model available to management and their equity owners and other stakeholders.



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