



2017

Attaining & Sustaining Operational Excellence

A Best Practice Implementation
Model

THE RAPID RESPONSE INSTITUTE, LLC.

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Abstract

The following is taken from the BTOES Insights article associated with this White Paper; Assuring Operational Excellence from Contractors and Their Subcontractors II: A Best Practice Model Abstract. It is intended as an Executive Summary.

Before undertaking any organizational initiative, it is important to develop an understanding of the economic value that can not only be attained but sustained from said strategy. Value will be different among industry sectors and can be very diverse with individual organizations.

Benchmark data can vary; however, two studies suggest that for many, the value derived is not just significant but can be game changing. In one case, a Bain & Company study showed that for an upstream oil and gas operator, “actual operations and maintenance hours” were approximately 233% over planned hours.

That same study indicated that “poor planning” accounted for drilling rig inactivity for approximately two-thirds of an unconventional oil well development project. Conversely, another operator attained over 50% increase in efficiency over a 12-month period with better planning and greater accountability.

McKinsey also reported that over US\$ 4.2 billion is available to the global oil and gas sector from operating cost and production improvements. According to this firm, these “rollup” numbers were developed from detailed assessment and recommendation across the firms’ *portfolios at the asset level*.

These cases represent significant value that can be unlocked from operational excellence business models. It is important to note that, as the McKinsey study suggests, *value is attained in smaller increments at the individual asset level*. Details are important: well below the three bullet PowerPoint presentation to management!

Operational Excellence focuses on organizational leadership and how it deploys methodologies and enabling tools to sustain top quartile, measurable performance. This is a fairly broad, yet demanding requirement on management and the Board of Directors.

Additionally, there are several definitions for “Best Practices,” most of which are industry dependent. Generically, Wikipedia defines these practices along the lines of a set of processes that are generally accepted to be superior to others. Usually, they are based on appropriate industry/non-industry standards such as AMA, API, ISO, IEEE or others.

To meet the criteria necessary to create the significant value available from OE, firms must use a Best Practice model that has a major focus at the individual asset and its role/function within its portfolio. Such a model is depicted in the following graphic.

The focal point of this model is Strong Bond Governance and its risk governance component. This archetypal recognizes that to attain and sustain Operational Excellence, the role of the firm’s ecosystem is key to its systemic success.

All industries have a significant risk exposure from operations. Case studies of failure and stakeholder exposures are readily available. Sadly, incidents continue despite years of effort and major expenditures to try to limit these incidents.

Normal Incident Theory (NAT) purports that highly complex systems such as those found in sectors with Critical Infrastructures are subject to levels of uncertainty that makes occasional failure likely. Another perspective, High Reliability Organizing (HRO) suggests that uncertainties can be managed more aggressively and incidents are not foretold.

The Strong Bond Governance approach to Operational Excellence incorporates the HRO risk governance approach.

Overview

Operational Excellence is the subject of a number of articles, blogs and interest for almost all organizations. A Google search on the term will generate over six million hits. However, while there is plenty of materials on the subject, most do not appear to attain OE.

Some may believe that OE is not relevant, too hard to achieve and sustain or too expensive. None of these reasons stand up to scrutiny. This White Paper develops an Action Plan for achieving and sustaining OE in a cost-effective manner. Our goal is to help all readers accomplish this game changing position in their sector.

The consulting firm, Bain & Company has laid out six criteria of Operational Excellence as shown in the following figure. These are useful guide posts for those seeking OE.



Bain & Co. Operational Excellence Criteria

These criteria are briefly defined as follows:

- **Top Quartile Asset Performance**—Best in class performance from the organization's assets. Assets defined as Balance Sheet items.
- **Immaculate Reputation**—An organization known for its transparency, ethics etc. For example, individuals inside and possibly outside know and speak well of the firm.

- **Distinctive Capabilities**—More than just competitive advantage, this structural in nature. These organizations capitalize on the Structural Dynamics of their environment
- **High Performance Culture**—World class culture with a focus on performance such as a High Reliability Organization with a strong Safety Culture
- **World Class Health, Safety, Security and the Environment Stewardship**—Top management priority and part of the organization's culture
- **Best in Class Processes & Systems**—Business processes as well as enabling tools such as software.

The remainder of this document develop the plan management can use to implement and measure their level of OE. Additionally, readers should note the alignment of the implementation model with the Bain construct.

It is important to understand that to meet these six criteria requires the full cooperation with the organization's ecosystems. The old saying, "A chain is only as strong as its weakest link" is very appicate to sustaining OE. Management must put in place best in class processes and enabling systems to assure a top level of performance every day.

Note: Certain support materials are available in the October 20, 2017 edition of BTOES Insights, [Assuring Operational Excellence from Contractors and Their Subcontractors](#) and the accompanying free First Chapter of the book, Implementing a Culture of Safety and the [full book](#). For purposes of brevity, these points are not elaborated in this White Paper. Interested readers are invited to review these materials.

Strong Bond Governance

The construct of Strong Bond Governance was first put forth in 2014 book, Implementing a Culture of Safety. In an environment enabled by the Industrial Internet of Things (IIoT) and Cloud based Mobility, it is now possible for management to effective manage a global High Reliability Organization based ecosystem.

As with most management theories and models this approach to governance evolved from earlier requirements as result of "bet your company" risk exposures created by field operations and its assets such as oil wells, pipelines and nuclear power plants. Given that many CEOs and Board members do not have a technical or even operations background, then current governance models were no longer satisfactory.

This approach to governance is not simply the centralization of decision making. For many global organizations that approach is not practical or desirable. There are several dimensions to governance including, Asset/Equipment Integrity, Risk Management, Information Technology, and others.

Asset/Equipment Integrity

Prior to 2011, many governance models focused primarily on financial transparency in the post Sarbanes-Oxley world. To fill the gap created by industrial incident during the 2010-2011 period, the Asset/Equipment Integrity Governance (AEIG) model was first published in 2011.

In addition to traditional financial and IT governance, AEIG extended the model to specifically include field operations with a greater focus on systemic safety, work process standardization and workforce competency (including the organizational ecosystem).

From the Executive Summary of that seminal work:

- *The importance of strong governance with its implication of strong shareholder rights cannot be overstated.*
- *Sarbanes-Oxley drove a new level of shareholder rights in the aftermath of the debacles at the beginning of the century. As we enter the next decade, operational concerns are now taken to the same level.*

While historical context is always helpful, a detailed discussion is beyond the scope of this document. Interested readers can access the [2011 AEIG Pre-Publication Draft](#) themselves.

It is interesting to note that several of traditional finance driven governance frameworks now include field operations and associated equipment and contractors as a governance item.

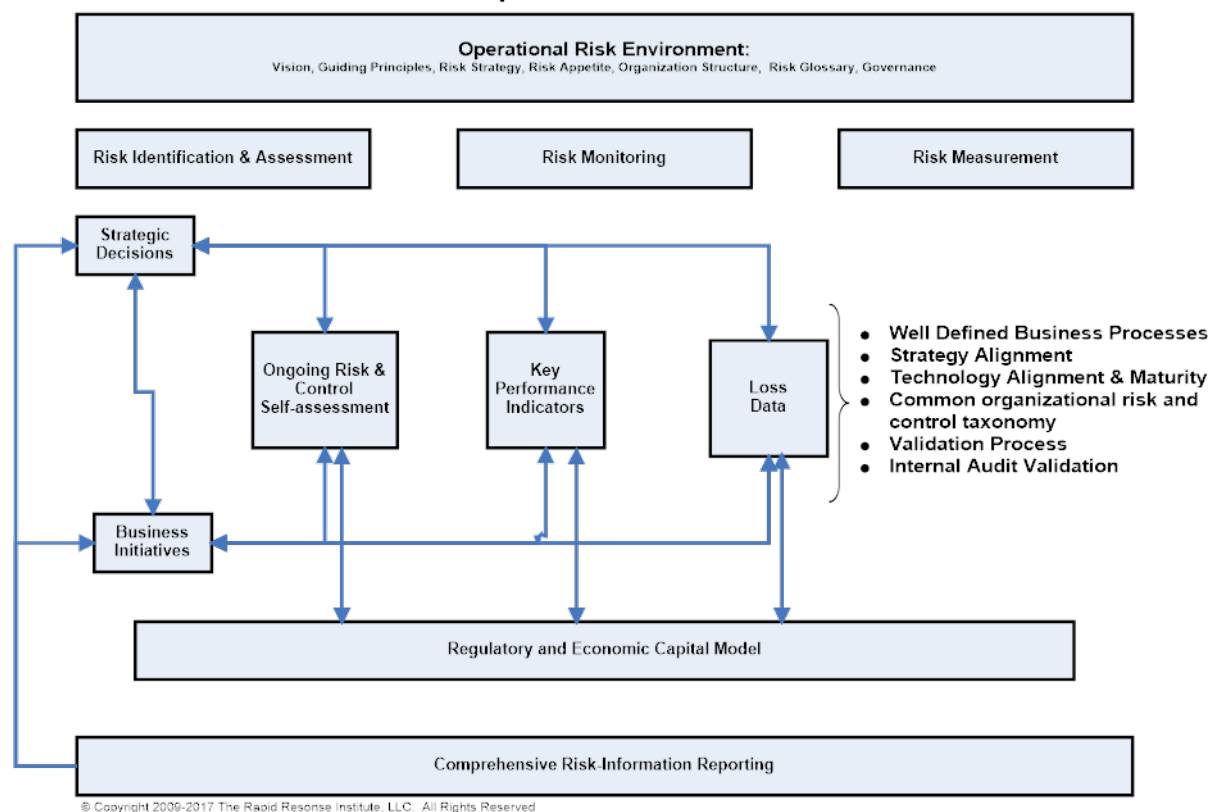
Systemic Risk Mitigation

A major component and consideration for any organizational activity is risk management. Historically, field operations risk management focused on HSSE. After the incidents of 2010 and 2011, that model has been reevaluated to include field operations as well as the ecosystem that enables these operational activities and tasks.

For example, several years ago we extended the traditional risk management business model to more fully embrace operations. See the following figure for details. This recognizes that in some ways the organization is at greater risk from operations than from other activities such as finance, procurement, cyber security etc.

Enterprise Risk Management must include all aspects of the enterprise. Moreover, it must be systemic by nature as it must extend well beyond the walls of the organization to include all aspects of the ecosystem. Moreover, it must be more robust than simply part of vendor selection and supply chain management.

Risk Governance Model Operational Focus



Risk Governance Model: Operational Focus

Neither the Bain construct or the OE model described herein specifically name risk as a separate item. Risk Management is not just implied, it is part of the very fabric of OE.

Attaining and Sustaining Operational Excellence

To attain and sustain an OE strategy, organizations need an **ACTION PLAN**. One of the key differentiators of this Best Practices and other approaches is the *focus at the individual ASSET level* and ‘then’ the roll up to the enterprise.

This is an important point to consider when developing and implementing OE initiatives. Therefore, when reviewing an OE initiative, one must consider all the variables depicted in the following graphic at a much lower level than most strategic consultants and process consider. This is key to ‘changing one’s competitive game.’

As depicted in the following figure, there is a specific process organizations should follow to arrive at a sustained OE. Most if not all of the methods and tools are readily available or can be obtained at a reasonable cost.

The key to success for this Best Practice is Strong Bond Governance. This should be developed before an OE initiative is undertaken.



Attaining and Sustaining Operational Excellence

There are two major groupings as shown in the graphic. Business Processes & Methods or those activities a firm engages with. The other group is composed of the Enabling Tools necessary to attain and sustain OE. Components within each align with the two aspects of Operational Excellence as defined, “Operational Excellence focuses on organizational leadership and how it deploys **Methodologies** and **Enabling Tools** to sustain top quartile, measurable performance.”

It is not the intent of this overview to be all inclusive, but to provide readers with a high-level understanding of the overall environment in which organizations exist. Each of the following paragraphs are necessarily brief; however, interested readers can contact the author for additional details.

In some cases, the discussion is brief where the term is deemed to be generally understood, i.e., Marketing. In others, such as Process Simulation the discussion is in more detail to help the reader develop a better understanding of less topical subjects.

A video, [Attaining and Sustaining Operational Excellence: A Business Case](#) is available.

Business Processes & Methods

As the name implies, this group is the business process itself. These components are focused on the organization’s mission and the delivery to its stakeholders. This is true whether the organization is for profit, non-profit or governmental agency.

Business Process Management

These are the core business processes necessary to deliver on the mission. It includes the ecosystem which is composed of all third parties contracted with, i.e., supply chain, legal, accounting etc. In some cases, it may include customers as well.

Business processes must have a set of metrics or KPIs so that management has a view into their effectiveness and efficiency. Moreover, most processes are governed by regulations and standards. For example, FASB, auditing or engineering standards.

Marketing

As typically, defined marketing is the organization's brand. How it presents itself to the marketplace, including regulatory agencies as appropriate.

Economic Development

Organizations do not exist in a vacuum. Whether supporting local youth activities or developing infrastructure to facilitate global oil and gas operations, organizations are involved in their local communities.

Training

Workforce competency is critical to successful and excellent operations. Training needs to be provided at all levels and that includes the ecosystem as appropriate. Training can be instructor led and more recently student driven e-learning.

Sales

For profit firms must generate revenue to survive and thrive. Non profits and others may apply for grants or donations. In all cases, aligned with the marketing effort, organizations must search and obtain funding. Government agencies also go through the annual budgetary review and must lobby for funding as well.

The video, [Making the Complex Sale: Selling to Industrial/Enterprise Customer](#) features an approach to a successful sales process with industrial organizations. The techniques can be used by sales representatives as well as those challenged with the internal CAPEX process.

Safety Culture

Developing and sustaining a Safety Culture has become one of the critical requirements for all organizations, but it is beyond essential for those economic actors in critical infrastructure sectors. If the organization has a strong safety culture as defined in this series and supporting materials/book, it will have a High Performing (see Bain) Culture.

A video, [Implementing a Systemic Culture of Safety: Risk Mitigation in Field Operations](#) is available.

Enabling Tools

Most are familiar with the term ‘enabling’ when referring to Information Technology investments. The term is used similarly herein. The tools discussed herein are very robust and in some cases, do require some facilitation. However, in all cases they are readily available and at a reasonable cost.

Serious Games

The term gamification is used a great deal today and it speaks to using reward systems used in video games for business purposes and training. Serious Games are typically training tools.

According to Wikipedia, “The “serious” adjective is generally prepended to refer to video games used by industries like defense, education, scientific exploration, health care, emergency management, city planning, engineering, and politics. The idea shares aspects with simulation generally, including flight simulation and medical simulation, but explicitly emphasizes the added pedagogical value of fun and competition.”

Cross Cultural Engagement

One specific serious game that is an important part of any training for OE ecosystems is the Cross-Cultural Negotiation based on Dr. Scott Shemwell’s doctoral research.

In 1996, he published his doctoral dissertation, *Cross Cultural Negotiations between Japanese and American Businessmen: A Systems Analysis, (Exploratory Study)*. This two-person game between Japanese and American business executive was conducted at the University of Houston’s Behavioral Science Lab.

Since this cross-cultural interaction model was originally developed for geographic and ethnic cultural differences, it has been extended (qualitatively) to include the cultural differences that exist within an industry segment and even within organizational boundaries. It is believed that the quantitative component of the model does not change regardless of the scenario. This makes the game a very powerful learning tool.

This Serious Game was first envisioned after the Deepwater Horizon incident in 2010. The first scenario should help with the issue of a Culture of Safety at sector is addressing. For example, a major oil company has a difference culture than its major service/engineering companies. Manufacturers have different cultures than professional service providers and so forth and so on.

This is a powerful tool to help align individuals who are part of the OE ecosystem as described herein. Per the callout below, there is no one Culture of Safety, nor is there one OE ecosystem. The requirement for people to understand these differences cannot be overstated if alignment is to be successful.

Currently, the oil and gas industry is undergoing a “desired” transformation to a Culture of Safety as well as High Reliability Management. This suggests that over 3,500 companies will need to transform their cultures. This also suggests that the upstream sector will have 3,500 Cultures of Safety, not the singular that is often touted.

Operations Management System

The following is taken from a paper Dr. Shemwell presented at the 2016 PNEC 20th International Conference on Petroleum Data Integration, Information and Data Management.

In recent years the sector has moved towards the construct of an Operations Management System ([OMS](#)). Most major operators and energy services providers have adopted this operational model. An OMS is a systemic business model with top down leadership commitment and bottom up leadership enabled. An OMS addresses the enterprise risk exposure inherent to operations.

According to Chevron, “The OEMS (Operations Excellence Management System) is a comprehensive, proven means for systematic management of process safety, personal safety & health, the environment, reliability and efficiency. Through disciplined application of the OEMS, we integrate OE (Operational Excellence) processes, standards, procedures and behaviors into our daily operations.”

OMS Architecture

Consistent with other Information Technology process enablement models, OMS must have an architecture and governance model. The figure below depicts this and consists of two major components:

- Core Foundation
 - Policy—Organizational Governance requirements
 - Standards—Industry Standard such as API and non-Industry such as ISO
 - Competency—Knowledge, Skills, and Abilities (KSA) of the combined workforce as well as its state of Training
 - Tools—Whatever is required to perform job functions including hand tools, software and sensors, et al.
- Operations
 - Process—High Level Business Process that maybe across functions, departments and even firms
 - Procedure—Subset of the overall process that is a series of steps to accomplish good practices
 - Relationship—As stated herein, 3rd parties perform most of the work in the field. There is a relationship between the operator and contractor as well between contractor and subcontractors.
 - Task—is the Job to be performed at the worksite such as repair a pump, drill a well or SEMS Audit
 - Sub Task—those major components of a Task

In the real operational environment, this is a significant list with a number of different possible scenarios. Solutions must be robust enough to provide the Agility and Resilience to meet unexpected situations.

Often referred to as Situational Awareness, systems must assist the engineer or technician, not become an additional burden. The information provided must be timely and accurate.

OMS Governance Architecture

Operations



OMS Governance Architecture

Volumes have been published on this subject. While new, OMS are becoming in vogue for many sectors.

Process Simulation

Complex processes and their interdependence with other complex processes are often difficult to understand. Latent or unknown variables can negatively impact even straight forward and seemingly simple work flows.

Note: Challenges about unforeseen forces on a business or sector are addressed in the Changing the Dialogue monograph, [Structural Dynamics: Foundation of Next Generation Management Science](#). Interesting read to help organizations from being “blindsided.”

Most business process transformation efforts recognize that one or more or other of the following can negatively impact on the process in question. However, it can be very difficult to understand how one or more (often several simultaneously) impact on operations.

One approach is to address simultaneous issues using process modeling simulation based on MIT Systems Dynamics. This enables us to address all and more of these issues to find the best way to optimize work process performance in a safe and environmentally sensitive way.

- Re-work
- Waiting on xxx
- Workforce Competencies
- Parts/Equipment Availability
- 3rd Party Delays/Issues
- Bottlenecks et al.
- Customers Changes or Delays
- Are there Best Practices or Knowledge of what Competitors are doing?

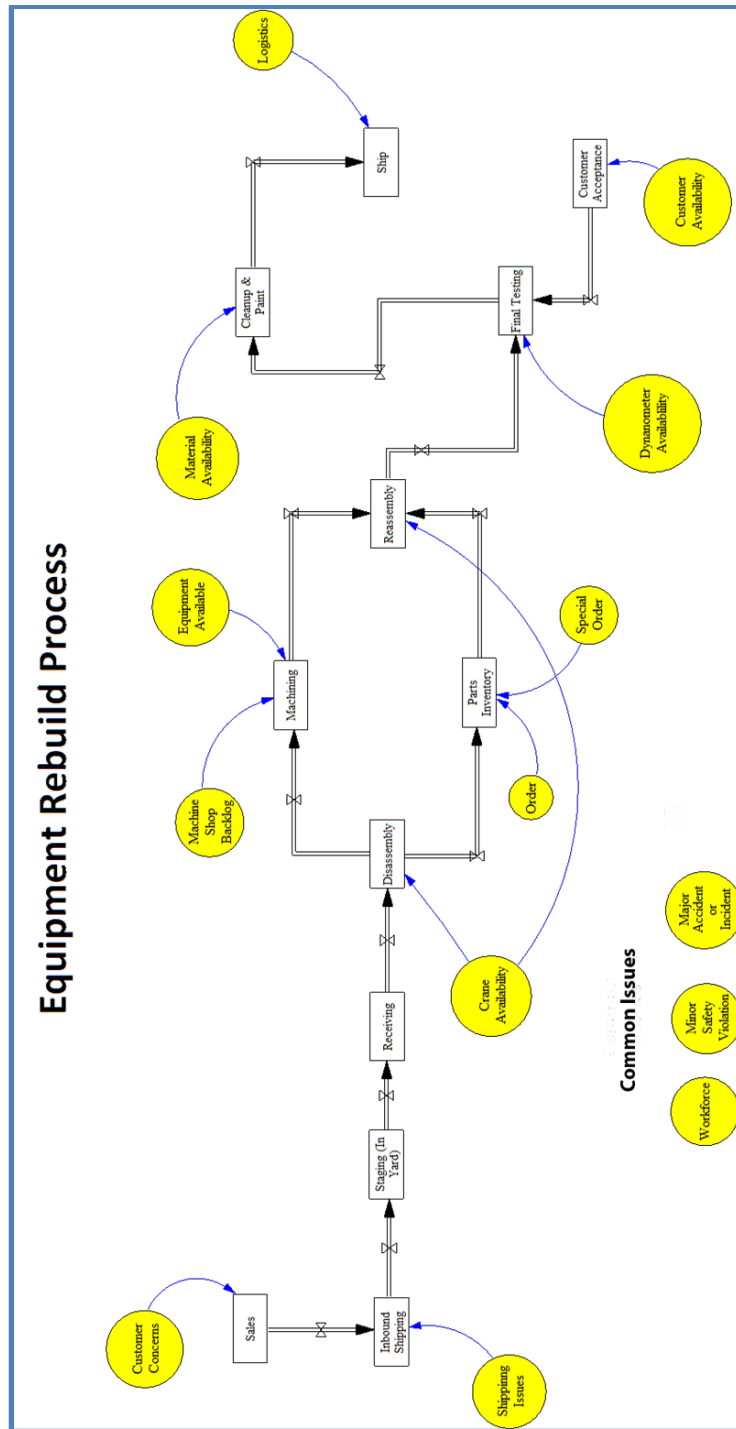
A video, [Drilling Risk Assessment: Simulation Scenario Modeling](#) is available. This is an actual model developed with the oil and gas drilling sector to mitigate operational risks.

As shown in the following figure, once a process is understood even at a high level, simulation can illuminate unknown process such as Information Flow. This allows management to make relevant changes base on knowledge and not speculation.

The diagram illustrates a complex supply chain for a steel mill. It features several key components and flows:

- Suppliers:** Michigan Steel Co. and State Street Assembly.
- Central Hub:** PRODUCTION CONTROL, which manages the flow between suppliers and internal processes.
- Forecasting and Ordering:**
 - Michigan Steel Co. provides a 6-week forecast and receives a daily order.
 - State Street Assembly provides an 80/60/30 day forecast and receives a daily order.
- Internal Processes and Inventory:**
 - Stamping:** Receives coils from Michigan Steel Co. and includes a "Changeover" step.
 - WELD + ASBY:** Receives coils from the stamping process and includes a "bin" inventory buffer.
 - Shipping:** Receives coils from the welding process and includes a "staging" area.
- Inventory Buffers:** Various "coil" and "bin" buffers are shown at different stages of the production process.
- Logistics:** A truck icon labeled "Daily (Milk Run)" is shown near the Michigan Steel Co. and a "Daily" truck icon is shown near the Shipping process.
- Timeline and Lead Times:**
 - "(at the press)" is noted near the initial coil input.
 - "1 day" and "2 days" lead times are indicated for different parts of the process.

The following figure is a (sanitized) actual example of process simulation for an equipment maintenance and rebuild process. It was built quickly and at low cost. The simulation software is available off the shelf at low costs. However, it does require two types of Subject Matter Experts (SME). One who understands the process and the other that know how to build the simulation model.



Process Simulation Model

While the construct of simulation using Systems Dynamics is decades old, it is only recently that it is becoming more mainstream. This is largely a function of the falling cost of the technology and the availability of simulation modelers (often college professors).

This makes the area exciting. One can expect organizations to use this tool more frequently and more aggressively.

Business Analytics

This is a subject of intensive discussions today. Big Data (including rapidly advancing IIoT) and associated tools. One challenge that is often overlooked is the reliability and validity of the data.

“Garbage in garbage out,” is another old saying. We see this issue every day, i.e., social media. Business decisions made on poorly defined analytics can be expensive. Not just in monetary terms but destroyed careers.

This is a case where not just a Data Scientist, but a Statistician is probably the best SME to do the assessment. There is high value in understanding the results of analytics but management should be skeptical of seemingly overly biased assessments.

Assessment of Processes

Academics and consultants have developed a long list of Key Performance Indicators (KPIs) and Critical Success Factor (CSF) and a host of other metrics. It is important that management have good visibility into processes that are actionable.

In many cases assessment leads to “mushy” conclusions. We need to increase productivity, for example. Question, why haven’t we done that already if it is so obvious?

Assessments need to be robust with a level of detail, discussion and vetting that supports the final recommendations. The risk profile and economic value are often poorly assessed. Sometimes because the teams doing the assessment do not have the expertise to address these concerns.

A callous assessment of the state of an organizations processes can be difficult. Biases and ‘turf’ often come into play. However, there is a way to mitigate these and other issues—EVPM.

EVPM

As mentioned previously in this document as well as the BTOES Insights *Assuring Operational Excellence from Contractors and Their Subcontractors II: A Best Practice Model Abstract*, “value is attained in smaller increments at the individual asset level.”

For many organizations in the industrial segments identifying and quantifying an economic value proposition has long been a challenge. It is relatively easy to calculate the Return on Capital Employed for tangible or hard KPIs. ROCE is a common metric for capital expenditures in sectors with decade long horizons such as infrastructure projects, i.e., electric power generation and distribution.

However, tools such as the Economic Value Proposition Matrix® model have evolved and are now off the shelf software solutions that enable all levels of management to understand the specific impact (and cost) that an OE initiative will have on their particular “bottom line.”

Over 15 years ago, the Economic Value Proposition Matrix® (EVPM) model was developed to assess the value of technology investment in the heavy industrial sector. This is a very useful tool for assessing the costs of an OE initiative as well as assessing its ongoing economic value.

There are two major outputs of the EVPM model that directly address the needs of an OE initiative:

- A detailed level of assessment by individual asset if appropriate
- Converts statements of value to the language of business--finance

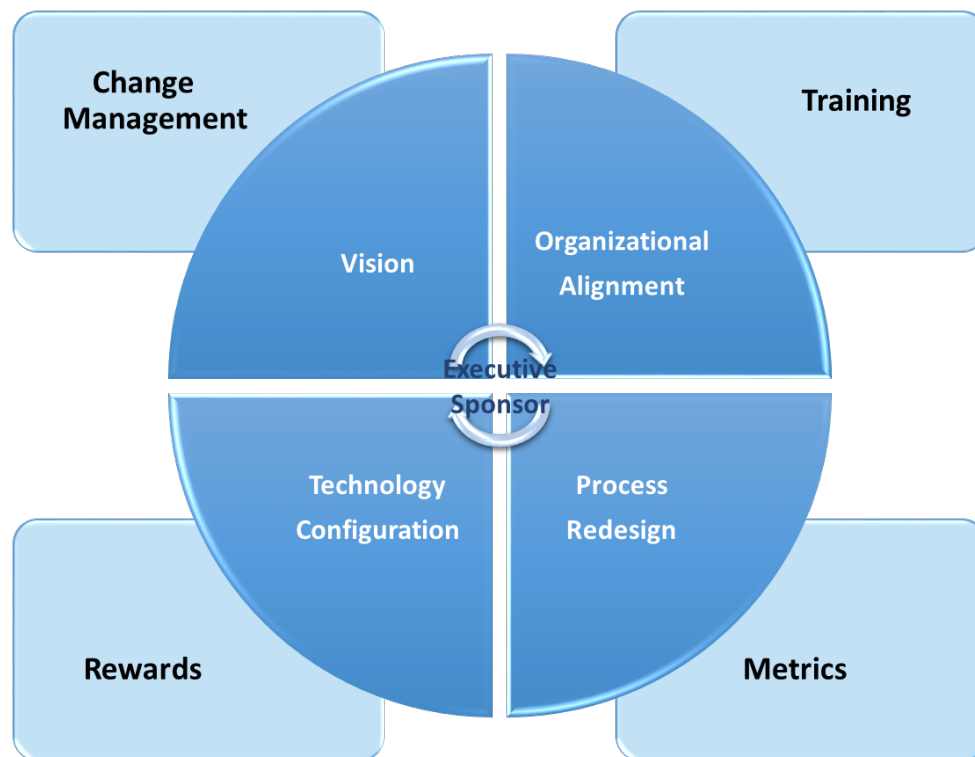
A [free version of EVPM](#) is available along with its [QuickStart Guide](#) which describes its use in greater detail. As stated several times in this two-part series, OE implementation tools are readily available at a reasonable cost. Assess the economic value for your organization at no cost!

A video, [Making the Complex Sale: Selling to Industrial/Enterprise Customer](#) is available and it features a short demonstration of EVPM.

Implementation Process

As with most business transformation processes, the implementation of an OE initiative should be staged. Phase I is typically a Proof of Concept or Pilot followed by 'roll out' to the global enterprise in stages.

An overview of Phase I follows and additional information on subsequent stages is documented in the book, [Implementing a Culture of Safety](#).



Phase I Process Details

The four outer blocks in the process model will be addressed as part of Phase I. For example:

- **Change Management**—actions required to move individuals to the desired end state (includes the continuous improvement processes)
- **Training**—necessary to realize the end state
- **Metrics**—management gets the performance it measures
- **Rewards**—intangibles individuals (employees, third parties and customers) benefit from working at the company

Change Management

Individuals involved in a business process change must understand why the changes are being made and what is expected from them and how do they benefit. As part of Phase I, organizations should develop the necessary materials and conduct workshops as necessary to build support for the resulting process change.

Focus will be on the “What’s in it for me” model from personnel at all levels.

Training


Any necessary training required as part of the change processes will be developed provided. Organizations will probably want to provide ongoing training internally and RRI will provide any training material as well as “train the trainers.”. RRI has expertise in business process change; however, any non-IT or engineering change is out of scope and the organization will be responsible for those action items.

Metrics

RRI will work with management to develop a set of Key Performance Indicators (KPI) and Critical Success Factors (CSF) for the new facility. This will enable management to incorporate these metrics into ongoing Performance Management processes.

Rewards

It is expected that one of the outcomes of the overall project will be intangible benefits for employees at all levels of the organization. As part of the Change Management process, RRI will work with management to identify and publicize high value results to individuals.



BUSINESS PROCESS MODELING (BPM) IN SYSTEMS ENGINEERING IS THE ACTIVITY OF REPRESENTING PROCESSES OF AN ENTERPRISE, SO THAT THE CURRENT PROCESS MAY BE ANALYZED OR IMPROVED

[Wikipedia](#)

Summary

This White Paper has addressed an Operational Excellence Initiative Best Practice at a high level. It is necessarily brief but hopefully provided enough detail and insight into this approach for further investigation by those interested in attaining and sustaining Operational Excellence.

Some may see the task as difficult, time consuming and even expensive. Hopefully, this White Paper has alleviated those concerns. The question is not if an organization will seek OE but how soon?

Additional material is available from The Rapid Response Institute and interested parties should contact the firm directly.

Videos Available

Several videos were featured in parts of this White Paper. The links are provided again for convenience.

Attaining and Sustaining Operational Excellence

[Attaining and Sustaining Operational Excellence: A Business Case](#)

Implementing a Culture of Safety

[Implementing a Systemic Culture of Safety: Risk Mitigation in Field Operations](#)

Economic Value Proposition Matrix®

[Making the Complex Sale: Selling to Industrial/Enterprise Customer](#) features a short demonstration of EVPM.

Process Simulation

[Drilling Risk Assessment: Simulation Scenario Modeling](#)

For more information

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