Proven Method for Assessing the Value of a Digital Oilfield Investment - Part 1

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By PennEnergy Editorial Staff
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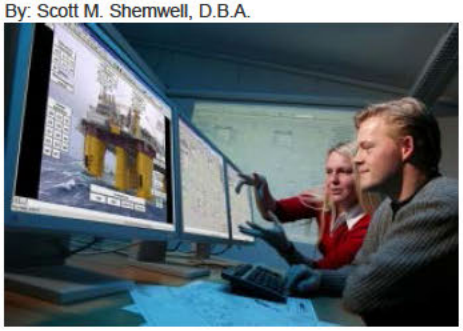

The Challenge
Since the advent of the modern digital computing era, with the arrival of the ENIAC (electronic numerical integrator and computer), understanding and articulating the Return on Investment (ROI) of information systems has often be equated to hocus pocus. Although not fully functioning until the fall of 1945, he economic justification of this first machine was World War II.

For over 60 years, a number of different financial and economic rationales have been applied to capital expenditures in the information technology sector. By the early 1980s, IBM's System/360 machines were touted as providing users with more rapid response times for the user because of faster system response time. The resul ing increase in produc ivity was deemed a func ion of the user not having to wait on he machine as well a lower cost per computing cycle. These transaction cost reductions were difficult to accurately measure and would like vary greatly by organiza ion.

Readers, particularly those in the IT procurement process would not be surprised to learn that not much has changed in the sales value proposition "pitch." In fact, the stereotypical sales presentation is so ingrained into Western culture that a Google search for "funny sales pitches" generates almost two million hits including videos and even poems.

Economic Value
Economists have developed a set of tools to help identify components of value for economic solutions such as Marginal Utility Theory—the value of one more unit of change in a variable. Moreover, the petroleum industry measures Return on Invested Capital (ROIC), effectively the return on capital employed as one of its Key Performance Indicators (KPIs). From these two constructs, the following model was developed by the author previously and is reprinted as follows:

One measure of the dollars of economic value, economic profit is a function of return on capital (monetary measurement) over a single period (fiscal year) and can be expresses as,

EP = IC x (ROIC - WACC) Where,

EP = Economic Profit,
IC = Invested Capital (operating working capital + net fixed assets + other assets),
ROIC = Return on Invested Capital (Net Operating Profit Less Adjusted Taxes divided by Invested Capital or, NOPLAT / IC),
& WACC = Weighted Average Cost of Capital (equity and debt).

ROIC is a better analytical tool for understanding performance than he traditional industry metric, Return on Assets (ROA), because it focuses on the true operating performance of the firm. The other variables in the EP equa ion are robust as well

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Tips for specifying new technology

There has been little improvement to power grid technology over the past one hundred years, but power needs have changed significantly since hen. So how do utilities and manufacturers specify equipment and ensure it's the right technology? Teresa Hansen, editor-in-chief of PowerGRID International and Electric Light & Power magazines interviews a technology expert on tips for specifying new technology and modernizing the power grid. This video outlines tips for specifying new technology and overcoming the discomfort factor when modernizing the power grid. For more informa ion, download the free white paper: Overcoming urban power distribution challenges with technology

and take into consideration a number of micro and macro-economic factors hat are bo h under control of management and outside the control of management.

From marginal utility theory, we can deduce a new concept, the expected value of marginal information, EVMI. Readers should note that we are using the economic definition of marginal utility; the amount of satisfaction obtained from consumption of the last unit of a good or service.

Thus, when added to the firm's estimate of the probabilities associated with he uncertain outcome of a decision can be expressed as follows:

$$\text{EVMI} = \left(\begin{array}{l}\text{Expected value of the best}\\ \text{decision } \textit{with} \text{ new}\\ \text{information (obtained at no}\\ \text{cost)}\end{array}\right) \text{ minus } \left(\begin{array}{l}\text{Expected value of the}\\ \text{best decision } \textit{without}\\ \text{new information}\end{array}\right)$$

EVMI represents the probabilis ic maximum cost of new information to the decision process. As long as he real cost of new information does not exceed EVMI then the information is adding economic value to the firm. In other words, it is the threshold value proposition or NPV (net present value) =0 for new information.

An NPV in excess of the marginal utility of information represents economic value to the firm.

Taken together, this enables the assessment of investments in information technology in terms management is familiar with and is consistent with the CAPEX process used for other capital investments in plants, equipment and assets. This has the additional benefit of quantifying the returns and extends earlier metrics into the 21st century.

The final component of the model is the comparative value of asymmetric information. The author previously defined:

"Comparative advantage is structural by nature. It is developed as part of a firm's core competency and are the actions taken based on asymmetric information the organization possesses about its customers, processes, assets (capital and labor), and markets.

Asymmetric information has value and is acquired at a cost. However, in and of itself it has no economic value. Only when acted upon can the organiza ion realize the value. Asymmetric informa ion is not confined to one process or even one set of interrelated processes, it often manifests itself throughout he firm's value chain. Likewise, information obtained in various segments of the value chain may be of interest to those whose value creation took place earlier in the process."

This theoretical construct, based on established economics provides the basis for assessing the economic value of investments in the digital oilfield. The Economic Value Proposition Matrix model (EVPM) has been extensively vetted by both operators and suppliers of digital oilfield solutions. It speaks the language of management and addresses both hard and software variables.

Parts 2 and 3 of Scott Shemwell's "Proven Method for Assessing the Value of a Digital Oilfield Investment" will be available on PennEnergy.com later this week. Shemwell will also act as moderator for an informative PennEnergy Research Webinar: Take Your Company's Value Proposition to the Next Level. The live webinar is scheduled for November 15th. More information is available here.

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Proven Method for Assessing the Value of a Digital Oilfield Investment - Part 2

November 14, 2012
By PennEnergy Editorial Staff
By: Scott M. Shemwell, D.B.A.

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*Part one of **Proven Method for Assessing the Value of a Digital Oilfield Investment** is available here.*

Overview of the EVPM

The EVPM model has been developed with he upstream petroleum industry and as a direct result of the need to understand the value of IT initiatives with heavy industry such as the digital oilfield. It is the result of over a decade of development of a useful solution that meets the needs of the sector.

EVPM is a multi-dimensional model composed of five Components of Value:

- **Cost Takeout** defined as he COMPLETE elimination of a specific activity or process. For example, the consolidation of disparate data centers into a Cloud based data solution.
- **Cost Avoidance** by identifying and correcting an error that was not budgeted for correction but would have caused an expense had it not been corrected, we are avoiding a cost. For example, the correction of an engineering design flaw before the product goes into produc ion.
- **Productivity & Efficiency Gains** hrough increased productivity hat improve existing resource utilization. For example, removing a bot leneck that is restraining manufacturing capability, or correcting a process by reducing or eliminates "wait time" during the produc ion process.
- **One-time Cash Flow Impact** defined as the impact from decreasing and/or eliminating one-time cash flow. One example is the elimination of redundant information/data storage.
- **Intangible** benefits are those that improve business operations and are therefore necessary to control, protect and/or enhance company assets. However, they do not lend themselves to quantification and are subjective by nature. Examples include implementing a knowledge management solution that improves communications between departments or reducing inventory shrinkage using web cams in a warehouse.

Moreover, each of these components have subgroups of bo h Capital Expenditures (CAPEX) and Operating Expenditures (OPEX). This recognizes that over the life cycle of a digital oilfield project, OPEX will be required as well to assure continued safe and optimal asset performance.

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Five Components of Value

Category	Definition	Example
Cost Takeout	Completely eliminating a specific activity or process	■ Redeploying a resource from a non value-added activity to a value-added activity
Cost Avoidance	Identifying and correcting an error that was not budgeted for correction but would have caused an expense had it not been corrected	■ Correcting an engineering design flaw before the flaw goes into production.
Productivity & Efficiency Gains	Increase in productivity that improves existing resource utilization.	■ Removal of a bottleneck that is causing capacity restraint ■ Correcting a process to allow more productive time by shifting from wait time to production time
One-time Cash Flow Impact	Decreasing and or eliminating one-time cash flow impact	■ Elimination of redundant information/data stores ■ Monetize Capital
Intangible	Benefits that improve operations of the business and /or are necessary to control, protect and enhance company assets, but are not quantifiable due to the nature of the area being improved	■ Improvement of communications between different operational units/supply chain ■ Reduced small equipment shrinkage

Additionally and often not specifically recognized, value is not necessarily attained across all functions of the organizations evenly. For example, field operations is the logical recipient of value but perhaps not as clear are back office administrative functions. Moreover, as will be shown in the following case studies, the model enables management to address intangibles such as HSE cost/benefit.

The model enables organiza ions to develop the subjective components and ultimate place a value or range of values that then be subject to "what if" scenarios to better illuminate various variables and their impact on the value of a digital oilfield initiative. Finally, he costs and economic values are assessed using Net Present Value (NPV) metrics or other financial determinates as required.

The formal EVPM has been in use over the last decade and has been used frequently to assess the value of digital oilfield initiatives. In the following section, we will address three different initiatives by an Independent, an industrial supplier to the upstream sector and an unconventional oil production company.

Case Studies
This section addresses three different engagements utilizing EVPM for digital oilfield ini iatives. These have been selected as they provide a broad perspective about how EVPM is used by a number of parties to develop digital oilfield value propositions.

Real-time Control
An independent operator used this process to assess the value proposition for the installa ion and operating of a real time control system in an oil brownfield. A team was assembled representing the different departments hat would be impacted by this project. The group identified 37 different line items of Components of Value among 12 process owners.

In addition to factoring in the cost of the control system and its depreciation over a ten-year period, the company assessed payback as a function production in terms of days and number of BOE (barrel of oil equivalent). Relatively modest improvements in production projections effectively made the valuation conservative.

Intangible items included a better response to HSE events and the system as a showpiece within the organiza ion. In both cases, these line items were given an initial value of zero. In other words, the value proposition would stand on the merits of "hard" data and not hard to measure or unmeasureable metrics. This is another strength of the model routinely used as it allows management to identify certain areas of "perceived" value that may not be known initially. Experience can factor into later assessments of value and/or subsequent digital oilfield projects.

Finally, as previously noted both CAPEX and expected OPEX were taken into consideration over the ten-year period. This resulted in an NPV @ 10 percent of almost $9 million that jus ified the project.

KEY LEARNING

- A team of constituents was tasked with the assessment
- The team provided "their" numbers for the model
- The valuation was detailed with expectations that almost 40 Components of Value would each provide a small percentage of value on one or two large positive impacts
- EVPM is used by the operator to assess and document value from Digital Oilfield investments

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Equipment Integrity Management

A provider of engineered products to the drilling sector was determining the value proposition for a new service in support of their existing product line. The service involved monitoring fluid management systems using RFID based asset management. Using the company's extensive knowledge of its products life cycle performance on drilling rigs, the company sought to provide a new maintenance management service designed to dramatically reduce drilling rig downtime.

The company proposed to charge a one- ime fee for the service as well as an ongoing monthly charge. Moreover, there were varying levels of service, similar to the Pla inum, Gold and Silver airline frequent flyer models. The challenge this supplier had was to convince its drilling contractor customers of the value of this service.

The cost of downtime was reflected as a function of loss production and offshore drilling rig idle time. The values assigned to rig idle time are straightforward and a function of the current day rates for a class of vessel multiplied by possible time offline as a result of failure. Loss of production was calculated as a function of the number of days lost because of equipment failure that delayed hydrocarbon production multiplied by the spot price for that class of petroleum

Intangible costs included fines for non-compliance, i.e., EPA etc. This project was completed prior to he Deepwater Horizon incident in 2010; however, it did reflect "what if" scenario capability in the event of a catastrophic failure incident.

The company identified three areas of hard value in field operations as well as four categories of soft value (initially zero value) that resulted in a five year NPV @10 percent for its customers of over $3.5 million. The model developed became the way he supplier demonstrated to its customers he value from its new solution.

KEY LEARNING

- For suppliers, the model enables them to put themselves in the customer's shoes and document "real" value not just a sales pitch
- The number of Components of Value can be small in some cases
- EVPM is used by the vendor as a sales tool for its Digital Oilfield solutions

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Unconventional Oil
A Canadian unconventional oil exploration and development company had a significant need to manage remote operations and coordinate a complex supply chain. KPIs included lowering costs and decreasing process cycle times. Moreover, key areas of concern included:

- Scheduling and logistics
- A new Steam Injection process
- There are large number of wells and significant data from the drilling program
- Health, Environment, Safety are paramount
- There is a need to track equipment and material to and from its central staging area on site including better project cost management
- It is important to know the exact location a fleet of pickup trucks as part of its safety program
- Plans to establish a data room

The project involved the development of an integrated informa ion management system composed of data and information such as interpreted well logs, drilling permits and daily reports, equipment integrity as well as other information of interest to assure safe operation in a very remote area.

Thirty-one Components of Value in five Categories were identified. Working with the operator, the Digital Oilfield solution provider developed a detailed description of each component that assisted the internal "sales" process. The model include items such as the cost of capital, cost of downtime, as well as process debottlenecking.

In this case, the operator decided not to build a full NPV mul i-period model but believed hat the preliminary model was sa isfactory. In other words, his robust model allows users to either build very complex enterprise wide valuation assessment or fit for purpose simple models. You can either strike a valuation assessment nail with a claw hammer or a spike with a sledgehammer.

KEY LEARNING

- Sometimes simple is the best
- Operator commented that he was not sure he could sell the asset for more but he felt he could sell it quicker
- EVPM is used by the operator to assess and document value from Digital Oilfield investments

Concluding Comments
By some accounts, the digital oilfield is entering the next generation. Capitalizing on the knowledge of the last decade of digital oilfield transformation, one might expect a more rapid take up from industry as the construct matures. Moreover, issues around asset and equipment integrity continue to grow post-Macondo.

If one accepts the hypothesis that digital oilfield projects are becoming mainstream and subject to he same capital budgeting processes of other investments, an economic value proposition assessment process must be put in place. Such as process must take into consideration the unique aspects of information technology investments as well as frame the value proposition in the "financial language" of the organiza ion.

Nowhere is this more important that the IT vendor community, which must demonstrate a believable and defendable economic value propositions to their customers. Tools exist that can meet the needs of operators and their suppliers. Such tools increase the successful take-up of digital oilfield initiatives and EVPM has been accepted by the industry and used for multiple digital oilfield value assessments.

Parts 1 and 2 of Scott Shemwell's "Proven Method for Assessing the Value of a Digital Oilfield Investment" are still available on PennEnergy.com. Shemwell is also the author of "Governing Energy," a bi-weekly blog covering contemporary issues in organizational governance and its new role in operations.

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