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IPA Research Explores *the Right Stuff* for Complex Capital Project Leadership

By Sarah Sparks, *IPA Product Champion, Organizations & Teams*

There is general agreement throughout the industrial world that large complex projects have had a very rough go. In fact, megaprojects fail more than twice as often as their under \$1 billion counterparts using the same criteria for failure. However, it is easy to overlook the fact that about one complex project in three is highly successful. The successes are too numerous to dismiss as flukes. It has been previously shown that when large complex projects followed a particular set of practices, they were quite likely to generate not just good but genuinely excellent outcomes. This indicated that success and failure were not, in any sense, random. What we could not satisfactorily explain is why relatively so few megaprojects actually employed sound practices. The failure to do so could not be explained by ignorance because the practices are known throughout the modern projects world, especially over the past 15 years. *The missing piece of the puzzle is to be found in the nature of project leadership, how leaders are selected for complex projects, and how they must behave to achieve success.*

The need for actual project leadership, not just project management aptitude, is vital when project planning, development, and execution are complex. Complexity is not just defined by project size. Instead, complexity occurs in three dimensions. One dimension is scope complexity—often when scope is complex, it entails three or more distinct sub-projects. The second dimension is organizational complexity—for example, when a project requires a central support hub but manages work indirectly. The third complexity dimension is shaping—when projects have four or more stakeholders, either internal or external, this

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leads to shaping complexity. A project leader possesses the skills to understand and respond to all three complexity dimensions. Leaders are adept at articulating a clear vision for a project; getting all stakeholders to agree and cooperate in meeting objectives; and generating strong followership from teams, including other leaders.

So, if the leader is so important, how do you identify who should lead your most difficult and complex projects? Most companies have answered that question by appointing those who have done well or at least reasonably well on middle-sized and less complex projects. In a detailed study of over 100 directors of complex projects, Ed Merrow, Founder and CEO of Independent Project Analysis (IPA), Inc., and Neeraj Nandurdikar, IPA Oil and Gas Practice Director, have found that many have been doing this all wrong. Success on simpler projects is not a particularly good predictor of success on highly complex projects because the personalities, habits, behaviors, and preferred tasks of the most successful complex project leaders do not look much like traditional project management. Complex projects require leadership, not just management. Successful complex project leaders have many of the same characteristics as leaders in other walks of life but in a project context.

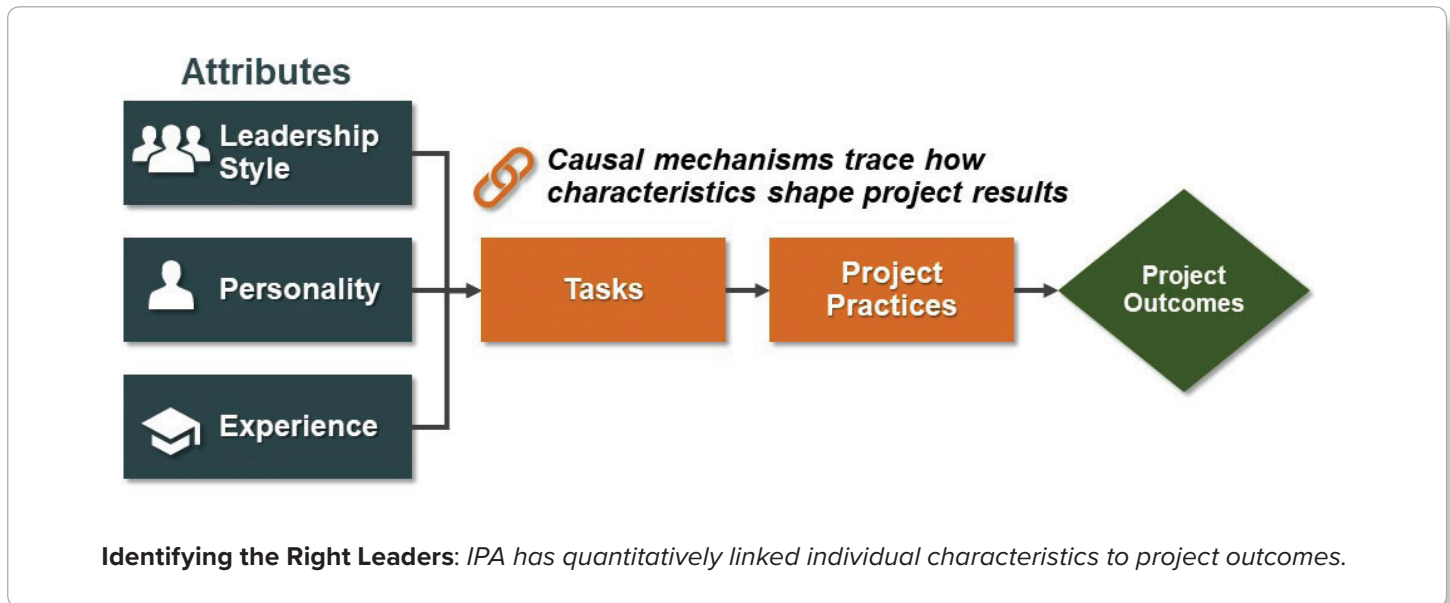
Using the model shown, Merrow and Nandurdikar have quantitatively linked individual characteristics to project outcomes. More specifically, they have demonstrated links between a more generalist orientation; certain personality traits, especially openness; high emotional intelligence; and certain types of experience and more successful project results. In addition, they have investigated the causal

mechanisms that get us from personal traits to project results by understanding the actual tasks project leaders think are important and how their decisions to focus on some tasks lead to degraded practices that, in turn, directly shape project results.

This work has allowed us to develop detailed profiles that indicate the attributes of a person that are most likely to support them in successfully leading complex projects. By comparing individuals to this profile, companies can make smarter decisions around the hiring and assigning of individuals to lead their complex projects—improving their likelihood to successfully deliver these important projects. Further, the profiles can also be used to more strategically develop the most promising candidates in your organizations to be highly successful future leaders.

The results of this work form the basis of IPA's *Project Leader Profile Assessments* and have also been published in the book *Leading Complex Projects*, the third book in a series written by IPA's industry-recognized experts in the capital projects industry. Merrow authored the first book in the series, *Industrial Megaprojects: Concepts, Strategies, and Practices for Success* (John Wiley & Sons, 2011). IPA Capital Solutions Director Paul Barshop wrote the second, *Capital Projects: What Every Executive Needs to Know to Avoid Costly Mistakes and Make Major Investments Pay Off* (Wiley, 2016).

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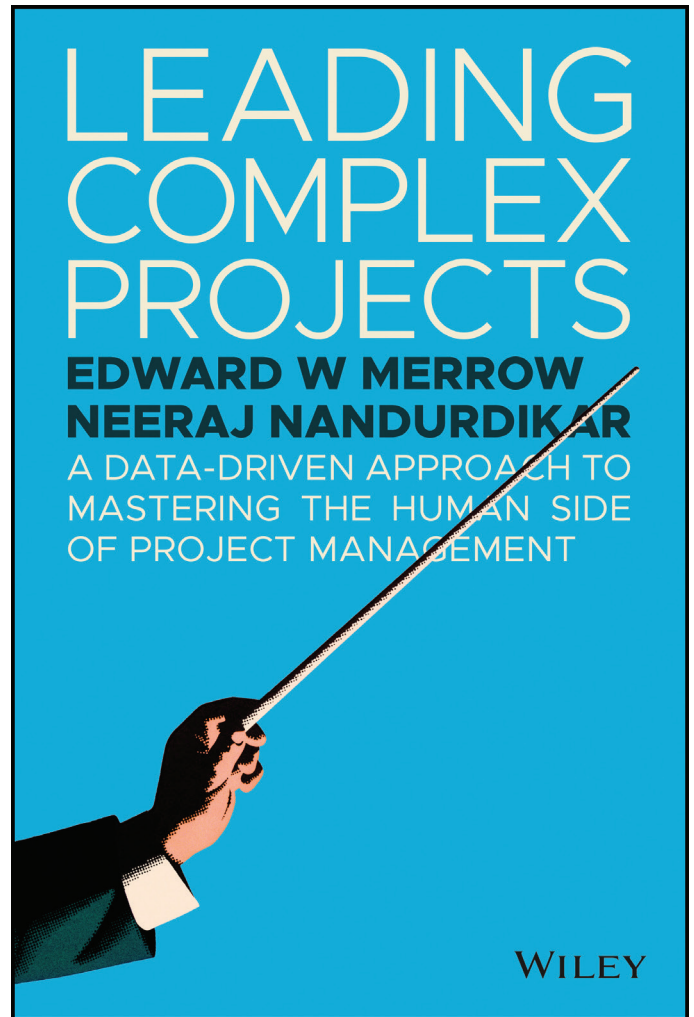


New IPA Book—Leading Complex Projects

Independent Project Analysis (IPA) is pleased to announce the release of its third book on improving capital project outcomes. **Leading Complex Projects: A Data-Driven Approach to Mastering the Human Side of Project Management**, by Edward Merrow, IPA Founder and President, and Neeraj Nandurdikar, IPA Oil and Gas Practice Director, gives readers a first-of-its kind, in-depth look at the quantitative links between individual project manager characteristics and project results.

Many books have been written on project management, but it is rare to find books that specifically focus on project managers. Filling this void, **Leading Complex Projects** begins as a data-driven exercise in examining the backgrounds, education, and personality characteristics of the individuals responsible for leading projects. Merrow and Nandurdikar explain why complex projects require leadership, not just management, and highlight the characteristics successful complex project leaders share with other highly successful leaders in other walks of life. The second half of **Leading Complex Projects** reinforces these data with detailed profiles of seven successful project leaders, who candidly share valuable insight into their career development and practices that led to their success.

Leading Complex Projects lays the groundwork for improvement, not just for project managers, but also for project organizations as a whole. Those responsible for leading complex projects come away with a better understanding of personal strengths and areas of opportunity. For project organizations, the book serves as a blueprint for selecting the right person to lead a complex project and deliver the desired business results.



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How Long Is Too Long to Wait for a Site *Checkup*?

Less Frequent Measurement Is Associated With Degraded Site Performance Outcomes
Katherine Marusin, IPA Global Manager Site and Sustaining Capital

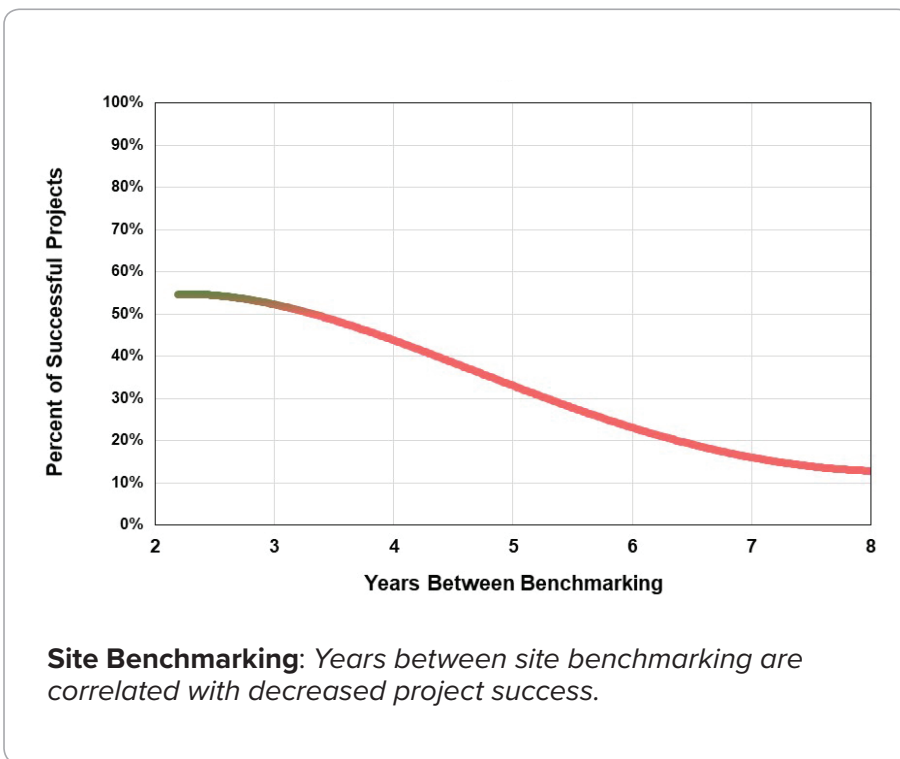
Medical doctors advise their patients to make a habit of having regular health checks. These routine examinations serve several purposes: they allow physicians to screen for common medical problems and diseases, assess the risk of future medical problems, and encourage a healthy lifestyle. When a patient is ill, having a relationship with a trusted physician or set of medical professionals is imperative. However, even for healthy patients, regular *benchmarks* ensure problems can be avoided or quickly addressed.

A parallel can be made with the performance of sites IPA benchmarks. Although many of our clients have engaged in regular benchmarkings of their site-based project performance within defined intervals, others have adopted a more haphazard approach to site health and performance measurement.

In 2015, IPA found that sites went an average of 4.5 years between *baseline* benchmarkings and their *follow up appointment*. That year, IPA observed an alarming decline in performance—in fact, the year marked an all-time low for performance outcomes of IPA-benchmarked sites. The use of key Best Practices for site-based project performance declined as well as the project performance outcomes. Site-based projects were more expensive, took longer, and were less predictable. Alarmingly, just 17 percent of sites benchmarked by IPA that year delivered project portfolios in which more than 40 percent of their site-based capital projects could be considered successful.

In a follow-on study conducted the next year, IPA first investigated the relationship between less frequent measurements of site *health* through regular benchmarking. Site health questions were asked: Did sites improve performance, maintain already good performance, or did their performance worsen? On average, sites that improved or maintained their health were benchmarked every 3.2 years. When we looked at sites whose performance suggested declines in their overall health, we found that the average duration between benchmarkings was 4.5 years.

For those sites with degraded performance, the projects were, on average, 16 percent less cost effective (or more expensive) than at the previous benchmarking, with all but one of the unhealthy sites showing a degradation in cost effectiveness of 10 percent or more. Projects at sites with worsened performance were also less cost *predictable*, with significant variability in outcomes.





Conversely, sites that took their health seriously by embarking in more frequent measurement were more likely to have improved or maintained their performance. Like patients adhering to a regiment of frequent exercise and a proper diet, these sites that are regularly benchmarking tend to focus on improvement efforts in key areas, most commonly improving teams and Front-End Loading practices and enhancing project controls. The result was more predictable cost and schedule outcomes as well as improvements in cost competitiveness. There were also additional benefits: 15 percent more competitive cost targets; a reduction in the frequency of late changes; and, most significantly, increases in the percent of successful projects delivered across the portfolio.

IPA has continued to investigate the relationship between the frequency of health status checks through benchmarking and performance outcomes. Frequent measurement continues to correlate with improved or maintained performance. IPA has been encouraged by how many sites have embraced more frequent

measurement. In fact, some of IPA's top performing sites and companies have increased the frequency of their site *health checks*. Benchmarking in and of itself is not a panacea. But site personnel are empowered with knowledge gained from more frequent benchmarking, enabling them to focus their energies on site improvement efforts.

Regular measurement works because it allows observation and monitoring of capital expenditure. The root causes of results that fall outside expected ranges (both good and bad) can be investigated and traced back to their origins. Further, regular measurement allows incremental changes to be identified and appropriate adjustments to practices made. However, perhaps most importantly, regular measurement forces accountability for site health.

For more information, contact Katherine Marusin at kmarusin@ipaglobal.com.

Portfolio Management Instability Drives Less Predictable E&P Sustaining Capital Project Outcomes

Industry Must Address Site Portfolio Performance Instability

By Ifunanya Onwumere, IPA Associate Project Analyst

This article is based on Upstream Industry Benchmarking Consortium (UIBC) research titled, Effective Management of Site & Sustaining Capital Project Portfolios, (November 2017) by IPA Associate Project Analyst Ifunanya Onwumere and IPA E&P Research Team Leader Jonathan Walker.

E&P owner companies today allocate significant capital to fund short-cycle and sustaining projects, such as tie-back installations, facilities refurbishment, and debottlenecking activities. These brownfield capital projects usually entail maintaining or replacing aging assets that threaten to erode production expectations. These projects often are attractive capital investments because they promise short payout times. However, the E&P Industry has not been diligent about improving the capital effectiveness of these small to midsized capital projects, and the end result is performance volatility.

A 2016 IPA analysis¹ of more than 300 sustaining capital projects identified reasons why sustaining capital projects experience wide variances in cost, schedule, and functionality outcomes. In many cases, weak project organizations, inadequate staffing, and streamlined work processes were found to have contributed to portfolio management inefficiencies. IPA recently took a closer look at these issues. In surveying more than 50 E&P portfolio management leaders from 16 owner companies, IPA found that portfolio instability and disruptions are underlying factors contributing to the industry's troubles in delivering predictable and consistent sustainment project outcomes. Asset and business unit leaders mutually agreed that sustaining capital project portfolios are subject to frequent changes in business priorities. Compared to major project portfolios—traditionally developed with a long-term perspective—sustaining capital projects are contingent on production and uptime requirements and operational needs. Portfolio managers for sustaining capital projects are, therefore, tied up in a constant balancing act, balancing operational needs and the need to execute projects simultaneously.

Today's Reactive Portfolio Management

It almost goes without saying that portfolio management is a well-known subject. Nevertheless, applying Best Practices for managing sustaining capital project portfolios often poses challenges for business leaders. Resources are limited and projects have multiple potential sources of risks, failures, and opportunities, particularly as an asset ages. Typically, projects do not have the funds, capacity, or time/manpower to pursue all ideas. This reality makes it difficult to implement defined portfolio management practices in a consistent and structured manner. *Unfortunately, Industry has taken a reactive approach to sustaining capital project portfolio management.* Inconsistent outcomes are not wholly surprising.

In conducting its latest research, IPA matched its portfolio manager survey responses with actual project performance data from more than 200 projects in IPA's databases in its latest work on the subject. In doing so, IPA found inconsistencies in portfolio management practices across seemingly similar business units in Industry—and even across business units within the same company.

IPA looked at two categories of portfolio metrics—**Delivery** metrics, including cost and schedule data, and **Stability** metrics, such as recycle and rejection rates, frequency of break-in/unplanned projects, etc. These two categories of metrics were linked to known portfolio management Best Practices. As a result, IPA successfully developed a portfolio management framework for E&P sustaining capital projects based on six elements statically correlated with better project outcomes. A portfolio management approach that falls within the framework can aid in ensuring continuous alignment between business plans and asset sustainment priorities. One element of the framework, for instance, involves opportunity initiation practices.

Most companies have an *initiation request* process, often referred to as a Project Initiation Request (PIR), which initially defines the capital project. However, the

¹ Vincent Mourai and Ray Rui, The Neglected State of SSC Projects, UIBC 2016, IPA, November 2016.



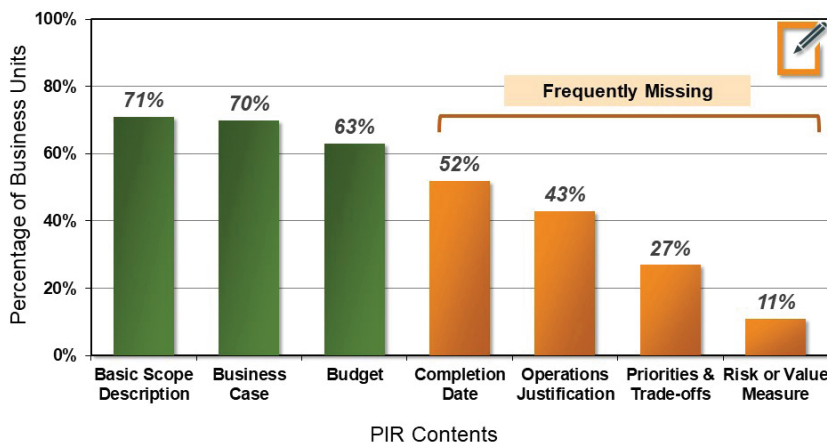
content and rigor involved in PIR development is often inconsistent from company to company and even from business unit to business unit. PIRs are important to decision makers because the information they contain forms the basis for assessing value, complexity, and early cost or schedule commitments. They also guide

subsequent selection or deselection decisions. The study found that more rigorous identification supports consistent delivery to committed end dates.

As an Industry, we have been inconsistent in managing sustaining capital project portfolios. Our reactive approach to project prioritization and resource management has led to volatile short-cycle sustaining capital project outcomes.

Industry also needs to establish methods to track capital availability in real time and to update forecasts based on integrated knowledge of progress, resource availability, and funds. Successful and consistent sustaining capital portfolio outcomes can be achieved through integrated portfolio management and adequately informed decision making. Gaining control of sustaining capital portfolio practices will go a long way toward delivering more predictable and repeatable project outcomes.

For more information, contact Katherine Marusin at kmarusin@ipaglobal.com.



Project Initiation Requests: PIRs are important to decision makers because the information they contain forms the basis for assessing value, complexity, and early cost or schedule commitments.

IPA Announces Regional Management Changes

Paul Barshop Named Asia-Pacific Regional Director, Rolando Gächter to Lead EMEA Business Development

Ashburn, Virginia - Independent Project Analysis (IPA), Inc., is announcing two leadership changes. **Paul Barshop** will become Regional Director of IPA operations in the Asia-Pacific region. Barshop will oversee client engagements across the region and supervise capital project analysts, researchers, and support staff working from offices located in Singapore and Melbourne, Australia. **Rolando Gächter**, who has completed his 3-year contract in the Asia-Pacific region, will serve in a new role under IPA's EMEA (Europe, Middle East, Africa) regional directorate. In this new role, Gächter will concentrate on client engagement in the Middle East. Both management assignments take effect July 1, 2018.

In an email to global staff, IPA Chief Operating Officer Elizabeth Sanborn said that Barshop will continue to expand IPA's relationships with industrial processing and oil and gas companies in the Asia-Pacific region. "Paul will focus on transforming IPA's role in the region to be the globally recognized source of capital project intelligence



Paul Barshop



Rolando Gächter

for companies planning and executing capital investment across AsiaPac," Sanborn said.

Barshop previously served as a Director of IPA's Capital Solutions, an IPA business providing direct support to clients implementing capital project improvement efforts. Barshop was IPA's COO from 2004 to 2015 and he served as the Director of IPA's EMEA regional business activities office from 2000 to 2004. He joined IPA in 1994. Barshop is the author of *Capital Projects: How Executives Can Avoid Costly Mistakes and Make Their Major Investments Pay Off* (Wiley, September 2016), a playbook for business executives responsible for delivering capital projects.

In taking on this new role, Gächter will focus on the development of stronger relationships with our clients in the Middle East. His E&P knowledge and experience will also be an asset to all oil and gas clients in EMEA.

Gächter has been IPA's Asia-Pacific Director since 2015. He previously led several IPA E&P business area client engagements, including project evaluations and research for a supermajor, a large national oil company, and many smaller independent operators. He also led client engagements with several industry leaders in the mining, metals, and minerals sector. Gächter has 20 years of capital project benchmarking experience. He joined IPA in 1998.



The Value of IPA's Cost Engineering Committees

The capital-intensive industrial companies IPA regularly partners with are either members of or familiar with the Industry Benchmarking Consortium (IBC). The IBC and the Upstream IBC (UIBC)—for the oil and gas sector—are forums where companies can pursue the continuous improvement of capital processes. Less known are IPA's Cost Engineering Committees (CECs).

The CEC and Upstream CEC (UCEC)—both IBC subcommittees—are designed to improve business results by strengthen the cost engineering function supporting owners' capital project organizations. Using detailed capital project data contributed by IBC member companies, IPA develops industry cost and schedule metrics that CEC member companies can use in developing early project cost estimates and validating estimates. Tools for using the metrics, also developed by IPA, aid cost engineers in performing their work. New sets of metrics and updates to the metrics tools are released to member companies at annual meetings held in Northern Virginia (CEC) and the Houston area (UCEC).

Committee members also benefit from research IPA conducts in areas of interest to cost engineers, as recommended by CEC steering committees. Research findings and Best Practices are shared and discussed at the annual meetings.

Summary Cost Metrics—Summary Cost Metrics provide cost engineers with quick and easy metrics that are useful for high-level cost evaluations. The metrics themselves are based on IPA's Level 1 (e.g., total construction labor cost) cost database and include only completed costs. The metrics are most commonly used for proportional checks (e.g., Engineering Cost to Total Cost or to validate equipment factored estimates). Equipment, office, and total field cost ratios are included. The **Summary Cost Metrics Tool** allows cost engineers to easily select summary metric sets (e.g., ratio to total) and subcategories (e.g., project size and location) to determine general project cost estimate figures.

Detailed and Unit Cost Metrics—Like the summary cost metrics, Detailed and Unit Cost Metrics support estimate development and review. However, these metrics provide

many more levels of detail in the metrics, from discipline-level cost ratios (e.g., Piping Engineering Cost / Piping Construction Cost) to labor rates to unit hours (e.g., Piping Labor Hours / Piping Feet). These metrics are used in early estimate development to provide factors for material and labor disciplines and for bottoms-up estimate validation for more defined estimates (e.g., Class 3). The **Detailed Cost Metric Tool** is able to highlight the differences between the cost and schedule metrics for a particular project against corresponding CEC cost and schedule metrics.

Conceptual Cost Metrics—IPA develops conceptual cost metrics for cost groups. These high-level metrics are used to support estimate development during the early stages of project definition. The metrics are also useful in supporting internal estimating database and tool development. This includes various summary-level metrics in subsets such as percentages of total project costs; percentages of total office costs (or soft costs); and, especially critical for projects using unit rates, percentages of total construction costs (construction labor, bulk materials, and lump-sum contracts).

For more information, please contact IBC Director Andrew Griffith at agriffith@ipaglobal.com.



IPA Events and Presentations

Deepwater Conference Latin America

July 12-13,
Mexico City, Mexico

IPA Regional Director of Latin America Astor Luft will deliver a presentation, *Developing and Improving the Effectiveness of Capital Project Management Systems*, addressing topics including optimizing performance efficiency through the right workflow and capital project management systems. IPA Principal Deputy Director of Research Jason Walker will lead representatives from Halliburton, Baker Hughes, and McDermott in a panel discussion titled, *A Look into the Future of Deepwater Engineering*. The panel will deliberate over a range of topics, including supply chain challenges of Latin America, partnership with local oil and gas companies, and deepwater engineering's future. For more information, visit <http://deepwaterlatin.com/>.

Airport Project Benchmarking and Research Consortium

September 13-14,
Leesburg, Virginia

With the encouragement of several of our airport clients, IPA is assembling a consortium of airport project organizations to address the unique project challenges and pursue the following goals of creating a quantitative airport projects benchmarking methodology that comprehends all key outcomes of airport projects; exploring the drivers of project excellence that may be specific to airport projects; and helping airport project systems demonstrate the value project excellence brings to airport economics and operations. Contact Melissa Matthews for more information at mmatthews@ipaglobal.com.

Cost Engineering Committee 2018

September 18-19,
McLean, Virginia

The Cost Engineering Committee (CEC) is a working subcommittee under the Industry Benchmarking Consortium (IBC) that assists cost engineers by providing metrics and tools that offer an unbiased snapshot of industry cost and schedule estimates and trends. The CEC focuses on all aspects of cost (or investment) engineering, including cost estimating, scheduling, and project control practices and metrics, with the goal of expanding the owner's cost engineering capabilities. The primary vehicles for accomplishing these objectives are validation metrics, Best Practices research, and practice sharing. Contact IBC Director Andrew Griffith at agriffith@ipaglobal.com for more information.

Upstream Industry Benchmarking Consortium

November 12-14,
Leesburg, Virginia

The Upstream Industry Benchmarking Consortium (UIBC) is solely dedicated to the exploration and production (E&P) industry. It provides an independent forum for each participating company to view key metrics of its project system performance such as for cost and schedule, Front-End Loading (FEL), and many others against the performance of other companies and share pointed and detailed information about their practices. The consortium highlights Best Practices, reinforcing their importance in driving improvements in asset development and capital effectiveness. Consortium attendees learn how to improve specific elements of capital project execution through presentations and other more interactive discussions. For more information, contact IBC Director Andrew Griffith at agriffith@ipaglobal.com.

IPA Research Analyst Shubham Galav Published in *Offshore Magazine*

IPA Advanced Associate Project Research Analyst Shubham Galav had his article, *Understanding Long-term Production Shortfalls Vital to Lowering Costs*, published in the May 2018 issue of *Offshore* magazine.

In the article Galav writes: “*The extent of the E&P industry’s production attainment problem is actually much worse than many realize. The reality is that early year production shortfalls usually portend long-term performance disappointments. IPA’s recent research shows that projects, on average, do not deliver their production plans for as long as 10 years after startup, throwing cold water on any notion that cumulative production totals eventually offset early year losses, or that early year losses are overcome in later years.*”

The article is based on research presented at the Upstream Industry Benchmarking Consortium (UIBC) 2017, titled *Long-Term Production Performance* by Galav and IPA’s David Roberts.

IPA’s Edward Merrow Speaks at Engineers Australia, NERA Event

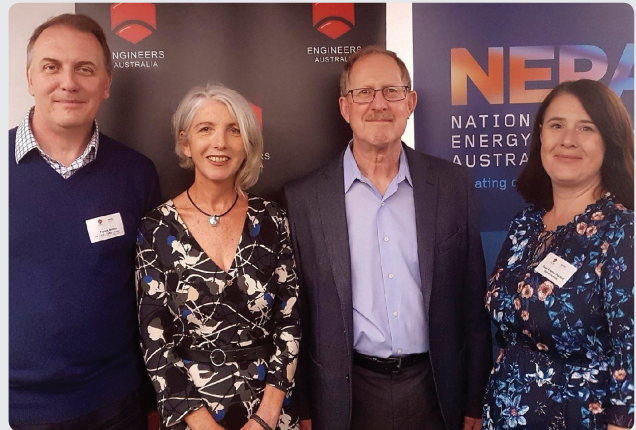


Photo Credit: NERA

On May 1, 2018, Edward Merrow, IPA Founder and President, spoke on the topic of leading complex projects at an event co-hosted by Engineers Australia and National Energy Resources Australia (NERA). Pictured from left to right, Francis Norman, NERA General Manager-Innovation and Strategy; Miranda Taylor, NERA CEO; Ed Merrow, IPA President; and Susan Kreemer Pickford, General Manager-WA Engineers Australia.



2018 Public Course Schedule

Visit www.ipaglobal.com/public-courses to view full course details and to register.

Project Management Best Practices (16 PDUs)

July 10-11 Bengaluru, India
 August 7-8 São Paulo, Brazil
 September 25-26 Houston, Texas
 October 9-10 Bangkok, Thailand

Best Practices for Mining Projects (16 PDUs)

August 7-8 Brisbane, Australia
Updated with new course modules, research, and data!

Best Practices for Site-Based Projects (16 PDUs)

September 18-19 The Hague, Netherlands
 October 9-10 Rio de Janeiro, Brazil
 October 16-17 Manama, Bahrain
 October 23-24 Orlando, Florida

Establishing Effective Capital Cost & Schedule Processes (16 PDUs)

October 23-24 Langkawi, Malaysia

New IPA Committee to Highlight Procurement's Value to Capital Projects

Independent Project Analysis (IPA), Inc. is standing up a new Industry Benchmarking Consortium (IBC) committee to discover the unquantified value of the procurement function in capital project systems.

Guided by its IBC member company procurement representatives, the Procurement Committee (PCOM) will create metrics to quantify relationships between industry procurement practices and capital project performance. According to IPA Project Research Division (PRD) Director Michael McFadden, procurement professionals belonging to the PCOM will learn about Best Practices that drive improved capital project effectiveness, including cost and schedule outcomes. In addition, the PCOM will establish a Procurement Effectiveness Index to assess the competitiveness of capital project procurement process performance among PCOM member companies.

"We want to demonstrate the capital procurement group's value to capital projects," McFadden said in a recent interview. The capital procurement group is small but influential, he said, noting that some procurement groups fall under a company's finance division rather than belonging to a projects organization. "We're going to help the procurement function demonstrate and quantify its value over the entire project work life cycle."

Negotiating and securing lower unit costs for project equipment, materials, and services is important, but the work processes procurement professionals follow affect cost and schedule performance beyond just unit costs. The procurement function's value is seen as being many times larger, McFadden explained. "It is not a trade-off. Procurement can negotiate lower unit costs and drive cost effectiveness throughout the entire delivery process."

Procurement slip disrupts the management of services and materials which degrades capital project effectiveness, McFadden said. "Decisions that undermine timeliness in the field can deteriorate capital effectiveness at the end of the day."

Like members of IBC's cost engineering committees—the Cost Engineering Committee (CEC) and Upstream CEC (UCEC)—PCOM member companies will benefit from

metrics developed from IPA's proprietary database of more than 18,000 capital projects. The PCOM will gather for an annual conference to review new procurement research data and trends and share ideas for improving project outcomes.

For more information, please contact IPA PRD Director Michael McFadden at mmcfadden@ipaglobal.com.



Membership Benefits

- ☑ Research on Best Practices that can be incorporated into your contracts, procurement and overall continuous improvement efforts
- ☑ Metrics and tools that you can apply as Key Performance Indicators to manage your vendors, suppliers, and other elements of the supply chain
- ☑ Access to IPA's procurement and contracting expertise and data throughout the year
- ☑ Network with other procurement and contracting professionals