IPA

Independent Project Analysis Newsletter

Independent Project Analysis, Inc. is the preeminent organization for quantitative analysis of capital project effectiveness worldwide. At IPA, we provide practices you can use to ensure your success.

VOLUME 6, ISSUE 4 DECEMBER 2014

Inside this issue:

Managing Editor: Kelli L. Ratliff
IPA-Newsletter@IPAGlobal.com

Defending the FEL 1 Gate

Paul Barshop, IPA Chief Operating Officer

In a recent study for IPA clients,[1] we asked people how frequently these statements about the opportunity assessment phase of the capital project development process, referred to as FEL 1 by most companies, were accurate:

- ***The projects in FEL 1 address a true business***
- ***The alternatives for meeting business goals were explored thoroughly***
- ***The economic analysis used to evaluate potential benefits was robust***

The most common response was "sometimes," meaning that for some projects the FEL 1 work was done thoroughly, but for others it was done haphazardly. This feedback is a true reflection of a pervasive problem for approximately 8 of 10 capital-intensive companies. That is, there is wide variability in the rigor and discipline applied to projects in the FEL 1 phase.

This inconsistency has serious consequences. Some projects will have weak business justification. Others will move too quickly thorough alternative selection. Still others will have cost and schedule estimates containing much more risk than anticipated. Ultimately, inconsistent FEL 1 leads to portfolio management mistakes, higher sunk costs, and excessive capital project spending, all of which reduce shareholder wealth. Consider the ways inconsistent FEL 1 work undermines portfolio management, which depends on evaluating competing capital investment opportunities on a level playing field. Projects that have not done a thorough market analysis may overstate expected revenue. Projects that have slapped together a capital cost estimate have probably underestimated the eventual investment required. These projects will appear more attractive than the projects whose cash flow estimates are rooted in more realistic assessments.

Sources of the Problem

Inconsistent FEL 1 has many sources. Time is often a culprit. Time pressure to meet a market window or to gain access to resources often leads to shortcuts in the first phase. For some of these companies, the problem can be traced back to poor integration between the business planning process and project development process. The business strategy process fails to move projects into the project development process early enough to allow for high-quality work to be performed by functional specialists on the project team.

1 Paul Barshop and Annalynn Jacob, *FEL 1: Setting the Foundation for Doing the Right Project*, IBC 2014, IPA, March 2014

Continued on page 2

Continued from page 1

For many companies, the lack of qualified project sponsors is also problematic. The project sponsor, the person delegated by a business to lead the development of the initial business case, has a crucial role. The project sponsor must guide the definition of business objectives, provide input on preferred alternatives, gain stakeholder alignment, and reconcile competing objectives, all of which are necessary for a reliable business case. Despite its importance, only 60 percent of IPA clients have formally documented the roles and responsibilities for their project sponsors.

While fixing process deficiencies or plugging resource gaps is necessary for improvement, in the end, the only way a company can ensure consistent, high-quality FEL 1 is with a strong gate at the end of the opportunity assessment phase that is capable of stopping projects that are not in compliance with company requirements for moving into the scope development phase of project development, or FEL 2.

Of course, it would be better if people always did the right thing and followed company guidelines, but for a variety of reasons they do not and will not if there is no mechanism to force compliance. In other words, what gets asked about tends to get done. ***Figure 1*** shows the relationship between the average FEL quality of a company's project development process and the level of assurance and endorsement that the company performs on key FEL 1 deliverables. Only companies that have a high level of assurance and endorsement have consistently high-quality FEL 1.

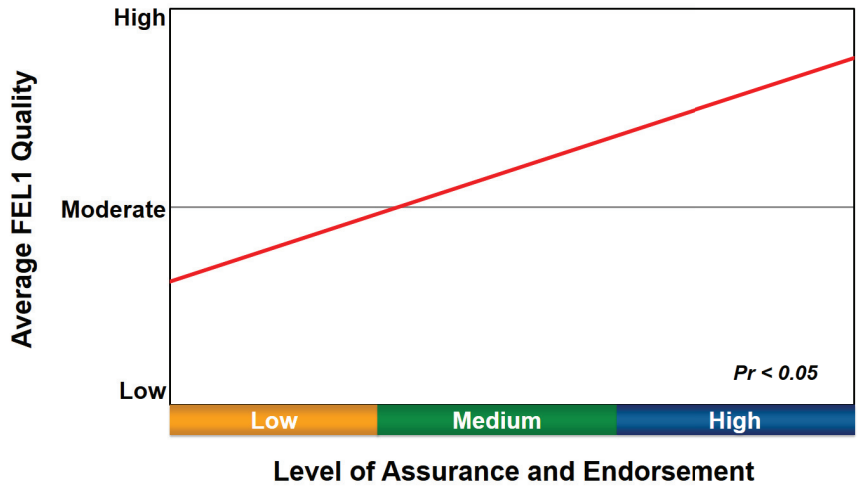


Figure 1. Assurance and Endorsement Drives FEL 1 Quality

The Weakest Gate

Forcing "compliance with requirements" smacks of rigidness and bureaucracy. But it is important to remember that the FEL 1 process is really just a structured, logical approach to answer a series of questions:

- What is the business opportunity?
- What the best way to take advantage of this opportunity?
- Does the potential benefit from this project justify further work?
- Is this project a higher priority than other opportunities competing for scarce resources?

The process is meant to foster creativity and to improve decision making through better definition of objectives, constraints, and potential options. At the end of FEL 1, there are still many unanswered questions about the exact shape of the project. Different scope options are being considered and the capital cost estimate still has a wide-range of uncertainty, +/-50 percent for some companies. A strong FEL 1 phase increases—rather than reduces—the chances a project will be a business success.

Continued on page 3

Continued from page 2

Implementing assurance and endorsement at the FEL 1 gate is generally harder than at the FEL 2 and FEL 3 gates. Although those phases are typically led by the projects organization, the FEL 1 phase is almost always in the business' domain. Businesses are tasked by corporations to find promising investment opportunities. The FEL 1 phase is when businesses identify, screen, and prioritize which capital projects will be pursued and which will be deferred. The resources needed to develop the initial business case also usually reside within the business unit. It is logical that the businesses run FEL 1, but there must be corporate oversight of the gate. It is almost impossible for a business unit within a corporation to effectively police the FEL 1 gate by itself. There are simply too many forces that undermine the discipline needed to kill or recycle projects at the FEL 1 gate when necessary.

Reinforcing the Gate

Companies can effectively implement corporate oversight through two functions: (1) the corporate finance department which either builds or reviews the project's economic model and (2) the central estimating function that either develops or reviews the FEL 1 conceptual estimate. For petroleum and mineral companies, a corporate group is tasked with reviewing and endorsing the resource estimation. These mechanisms should be sufficient to identify gaps in the FEL 1 deliverables.[2]

Stage-gate assurance and endorsement alone is of course not a fail-safe system. The gatekeeping process must also include the appropriate checks and balances so that the information from the reviews is actually used in the stage-gate decision. For some companies, the lack of endorsement from a functional leader is in effect veto authority and stops the project from advancing. More commonly, a cross-functional governance board will take the input from the reviews and judge whether the project is ready to proceed. This method is an effective way to stimulate debate and to garner support among key stakeholders provided the board members have similar levels of seniority. Governance boards can easily become rubber-stamp committees if one person has the authority to downplay or dismiss the concerns of the other members and push a project forward.

Strengthening the gate also provides the benefit of forcing improvement back through system as people realize it is easier to complete the work right the first time. Ideally the system will reach a balance where only occasionally projects must be stopped at the gate. Companies, however, must remain vigilant and monitor the functioning of the FEL 1 stage gate. The balance that produces sufficient rigor and discipline for effective decision making while avoiding wasteful bureaucracy is easily upset. There is a tendency in Industry to add layers to the review process in response to unique situations in which a project should have been stopped,

How We Measured Assurance and Endorsement

Our measure of the level of assurance and endorsement was generated by adding up the types of reviews each company that participated in our study performed on three main elements of the initial business case:

- **The project charter**
- **The capital cost estimate**
- **The economic model**

The intent of assurance and endorsement is to verify that the information underlying the FEL 1 stage-gate decision is reliable.

We distinguished between assurance and endorsement. Assurance is an independent review of the underlying work that is passed to a gatekeeper or decision review board as input to the stage-gate decision. Endorsement is the attestation by a functional manager that the work was done properly and that they take accountability for the quality of the work.

Deliverable	Independent Review *(Yes or No)*	Formal Endorsement *(Yes or No)*
Project charter		
Capital cost estimate		
Economic model and analysis		
Total Score *(Sum of "Yes" Answers)*		

Total scores were combined into an index to measure the overall level of assurance and endorsement.

2 Megaprojects or other company-changing projects likely require a broader set of reviews to ensure contextual issues are understood and that there is sufficient stakeholder support for the investment.

Continued on page 4

Continued from page 3

but was not. Eventually the reaction to excessive reviews is to cut them back so much that the gate no longer functions properly.

Like anything that is important to a company, the operation of the process development stage gates, including FEL 1, must be carefully managed to ensure its effective operation. Although there is probably little appetite for adding another management task, a strong FEL 1 gate pays significant dividends to shareholders.

Professional Profile:
Paul Barshop, IPA Chief Operating Officer

Paul is the Chief Operating Officer at IPA. From 2000 to 2004, he served as Director of IPA's Netherlands Office, interacting primarily with European and Middle Eastern clients. Over the past few years, Paul has taught most of the IPA Institute's course offerings, in particular Gatekeeping, Cost & Schedule, Contracting, and Megaprojects. Paul frequently delivers customized executive presentations for our clients.

In his early years at IPA, Paul worked as a Quality Manager and Project Analyst with a focus on evaluating downstream process projects, particularly in the petroleum and chemical areas.

Prior to joining IPA in June 1994, Paul served as a Control Systems Engineer for a major oil company.

Paul holds an M.S. degree in Business Administration from Boston University and received a B.S. in Chemical Engineering from New Mexico State University.

UIBC 2014: Getting the Foundation Right for Asset Development

For 3 days marked by unseasonably cold and windy weather in Northern Virginia, more than 200 exploration and production (E&P) industry company representatives gathered to reassess long-standing oil and gas asset development practices and processes.

Beginning with a research study examining the handover of information from oil and gas reservoir exploration teams to project development teams and ending with a separate study on improving project delivery to production from November 17 to 19, ***Upstream Industry Benchmarking Consortium (UIBC) 2014*** attendees reviewed a wide variety of current asset development work process issues, especially those that are driving project costs higher.

In the more comfortable setting at The Lansdowne Resort near Leesburg, Virginia, IPA Exploration & Production Business Area Manager, Neeraj Nandurdikar, asked UIBC participants to shift their thinking about the asset development process that their owner company uses. Business and project team members should recognize that decisions made early on in the process can have significant negative effects on production attainment or overall net present value, he said.

Continued on page 5

Continued from page 4

This 19th annual UIBC conference examined ways at "helping you get the foundation right" during the project appraise and select phases of the asset development process. The E&P industry should be adopting thought models that view *"asset development as a whole; not [individual] functional excellence"* at different development stages, Nandurdikar said.

In addition to the handover of projects to and from E&P project development organizations, IPA analysts and industry presenters at the conference spoke on the following topics:

- **Sustainability and social risk mitigation for the development of large projects**
- **Practices and trends in project risk management**
- **Strategies for dealing with project team staffing shortages**
- **Root causes of engineering schedule slip**
- **A new approach to assessing well construction readiness**
- **Operation readiness planning and obstacles**

Several workshops were also held during the conference that zeroed in on specific project diagnostic and action plan implementation issues. As is the case at each annual UIBC gathering, the research studies and topics addressed at the conference are selected in accord with the UIBC steering committee.

Also of note, several owner companies in the mining industry were present as this year's conference. The oil and gas and mining industries are both extractive industries and share a lot of commonalities in project development.

In the conference's keynote address, IPA President and Founder Edward Merrow reminded owner company business and project team professionals in attendance that oil prices, which have fallen in recent weeks, are uncontrollable. Project costs, on the other hand, can be controlled. *"Let's worry about what we can control,"* Merrow said.

Echoing comments he made at the conference last year about the explosive growth of owner's costs, Merrow cited IPA data that show owner's costs have increased 1,000 percent over the last 20 years. The drivers of these project cost increases range from larger owner teams to rising contractor expenses and vendor fees. "We can't sustain these increases," Merrow said. Adding later, "Dealing with our cost problem has to be looked at across the whole asset development process. There are a lot of little things we can do, but it has to start early."—*Geoff Emeigh, IPA Staff Writer*

Beyond the Organizational Chart: Leveraging PMOs to Improve Centralization

Katya Petrochenkov, Associate Research Analyst

IPA research has shown that truly centralized project organizations have more competitive and less variable project outcomes than their decentralized counterparts. Some project organizations claim to be centralized, but still show critical performance gaps. These performance gaps can be bridged with a properly structured and fully endorsed project management organization (PMO).

IPA has found that when a PMO maintains the project work process, project organizations are likely to realize better project outcomes and sustain those outcomes over time. Such work process maintenance tasks include gathering lessons learned

Continued on page 6

Continued from page 5

and Best Practices, instituting improvements, and ensuring those improvements are consistently used.

Put simply, the PMO is a component of the central project delivery organization whose primary role is to provide active project management support. To be clear, the PMO does not define and execute capital projects, provide all staff for projects, serve as a functional home for project professionals between projects, or provide cost estimates and schedules for projects.

A common difficultly with PMO design is getting the organization aligned and in sync with the corporate strategy, culture, and organization of the company it serves. Although no two PMOs are the same, IPA has found that successful PMOs tend to be structured in one of two ways: (1) as a separate PMO group or (2) as several groups that are part of an integrated project organization.

The Standalone PMO Structure

One effective structure is a distinct, standalone PMO ***(Figure 1)*** responsible for managing, supporting, and governing the project delivery system. Although separate from the project delivery group, the PMO is charged with all support activities, except it does not usurp project delivery management. The PMO maintains the work process by developing project management guidance and ensuring compliance with policies and procedures. The PMO provides work process assurance and trains project professionals in the work process. Personnel from the separate PMOs can even augment project staff when necessary. In such a group, the same PMO representative may take on all of the above responsibilities as part of that role.

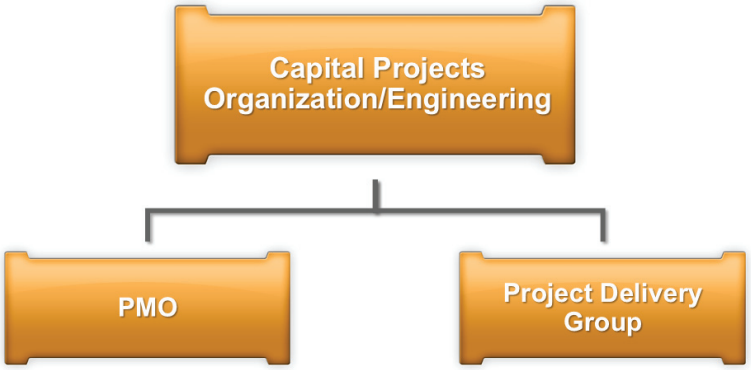


Figure 1. Separate PMO Group

The Integrated PMO Model

In contrast, the integrated PMO model ***(Figure 2)*** entails several groups responsible for traditional PMO tasks, but, as the model name suggests, these PMO responsibilities are integrated into the project delivery group itself. This structure is typically found in mature companies with high business buy-in and strong engineering organizations. For the integrated PMO, PMO responsibilities may be owned by the individual functional groups. Although the PMO and functional specialist are aligned, their roles and responsibilities are clearly divided into separate groups.

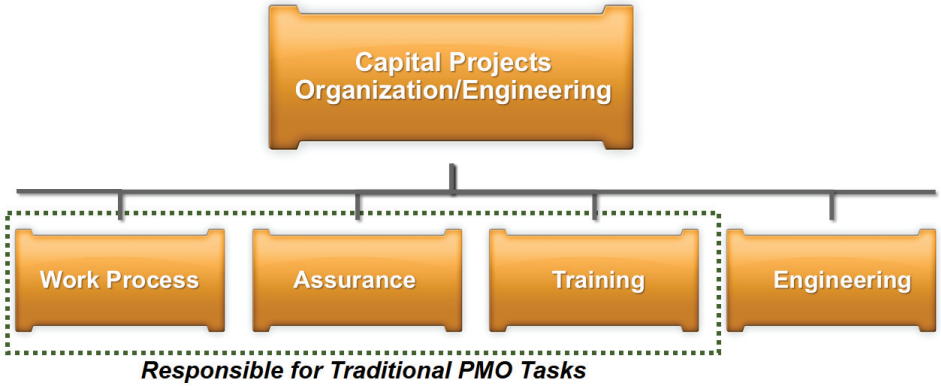


Figure 2. Integrated Projects Organization

Continued on page 7

Continued from page 6

The decision to choose one structure over the other is strategic. Companies should determine which services are most important for achieving corporate goals and decide whether those services are currently implemented effectively.

For example, an organization with a strong central engineering group may decide that functional training responsibilities should remain with the engineering group rather than being transferred to a PMO. On the other hand, a company with a highly decentralized engineering group may find that by centralizing training and development standards within the PMO, they are able to improve functional competency across the project organization.

All told, the optimal structure is the one that will best align with the overall organization's intended structure and workflow.

Characteristics and Benefits

Let's look at a few key characteristics of PMOs that successfully support capital project excellence and then examine a few common failings.

Developing and Maintaining a Common Work Process

Maintaining databases and tracking project performance allows the PMO to understand what is and is not working well at the project and portfolio levels, providing rich information to drive evidence-based portfolio decision making. This can range from understanding project interdependencies in the portfolio to gaining a better understanding of how resources need to be deployed across the system. These knowledge management activities can also provide further insight into work process improvements.

Project professionals have equal opportunities to receive work process training and gain exposure to associated work process tools. More uniform and consistent training is important because compliance with standards and norms is impossible when knowledge of the work process varies across the organization.

Training and Supporting Project Managers

When the PMO is responsible for project personnel development, the added benefit is being able to tailor training to address competency gaps in the workforce and having a better idea of the resource constraints that may emerge from certain portfolio scenarios.

Providing Work Process Assurance

Giving ownership of work process assurance to PMO staff, separate from or integrated with the delivery group, helps keep the assurance function independent and avoid conflicts of interest (e.g., feeling pressured to skip critical work process gates to meet aggressive schedule targets). Other common PMO responsibilities include maintaining assurance databases (e.g., cost, schedule), monitoring and reporting project performance, and training and professional development for project functions.

Developing Work Process Tools and Templates

PMOs are useful in developing tools and templates to assist work process management and documentation.

Endorsing and Halting Projects

PMOs can have a role in endorsing project readiness and stopping projects that are not ready to proceed to the next development phase.

Continued on page 8

Continued from page 7

So Why Do Some PMOs Fail?

The PMO is not a shortcut to project success. A weak or misaligned PMO can actually do more harm than good. Many PMO failures or shortcomings result from insufficient time and effort taken to fully integrate the PMO within the project organization and overall corporation. The following are some common pitfalls that undermine the degree to which PMOs can be an effective force for project delivery.

Lack of Full Support From Upper Management

The PMO must have clear and continuous support from upper management if it is to have consistent involvement with capital projects across the organization. The PMO's credibility is seriously undermined if its messages or goals are in direct contradiction with those of business. The PMO needs to engage corporate leaders early in its development and on an ongoing basis to gain alignment, incorporate feedback, and establish rapport.

Lack of Buy-In From Project Professionals

Open and frequent communication with project professionals is a must. The PMO must not only be able to communicate its purpose, role, and value proposition, but it should also solicit feedback from its primary user group. The individuals planning and executing projects are in the best position to identify process gaps and inefficiencies. Engaging project professionals not only fosters a culture of collaboration, but also promotes continuous improvement of the project delivery system. Without open and frequent communication, project professionals may see the PMO as a hurdle to project delivery, or even as a "police force" of the work process, which can create tension and promote "tick the box" behavior.

Low Visibility

The successful PMO must be visible to the rest of the organization. This means project professionals know when to engage the PMO, how to engage the PMO, what support is available, and where to find the tools and templates they need. Although this can be especially challenging for organizations with a geographically dispersed portfolio, many successful PMOs address this issue by instituting regional support hubs or representatives. This allows the PMO to have a global presence and helps more remote regions engage with the central organization.

Instituting a PMO can provide many project delivery and portfolio management benefits. Centralized work process assurance and maintenance promotes more consistent project results. A holistic view of project performance provides insights for more effective portfolio management. However, a PMO should never be viewed as a quick fix. Executing a PMO or PMO-like group takes careful planning and thorough alignment with multiple organizational stakeholders. If sufficient time will not be taken to fully integrate the PMO with the rest of the organization, a PMO can serve as a useful strategic tool that can help institutionalize successful practices.
—Geoff Emeigh, IPA Staff Writer, contributed to this article

If you are interested in learning more about your project organization's or PMO's effectiveness, please contact *Sarah Sparks, Product Champion for IPA's Organizations and Teams Business Area,* at *ssparks@ipaglobal.com.*

CEC 2014 Gets Down to Business, Estimating Efficiencies

Cost engineers found out how to enhance the cost and schedule estimating capabilities of their capital project teams at IPA's annual gathering of project estimators near Washington, D.C.

Presentations and workshops held during the 2-day Cost Engineering Committee (CEC) 2014 conference, held Sept. 16 to 17, in McLean, Va., honed in on two general themes: 1) the importance of effectively relaying project estimating knowledge to business professionals and 2) techniques that can help streamline estimating processes.

The goal for the CEC, a subcommittee of IPA's Industry Benchmarking Consortium (IBC), is for "companies to work together in sharing knowledge that can result in capital effectiveness and business result improvements," said Luke Wallace, IPA Deputy Director, Cost Engineering Group, and the committee coordinator. The committee's specific objectives are to develop industry cost and schedule metrics, to assist member cost engineering organizations in identifying and sharing Best Practices, and to benchmark the function of cost engineering and scheduling for owners.

Research studies presented during the 2014 conference covered the following topics:

Communicating effectively with business—Project group estimators have a difficult time explaining how project estimates are prepared and what they mean. Business also must recognize that the project team estimating function is also essential to corporate capital investment governance.

Engineering progression—Based on interviews with CEC member company representatives, companies are fearful of what they perceive as a recent decline in engineering performance. Poor engineering quality and late project scope additions are resulting in costly late changes to projects. Business and owner firms could be more supportive of delivering sufficient resources for engineering and controls.

Cost and schedule integration—Based on CEC member representative interviews, IPA reported that companies have found success in integrating their cost account structure with work breakdown structure designs. A single source integration system can offer better cost and schedule predictability.

Labor hour growth research—Field labor work predictability is influenced by what precedes construction and aggressive schedules can erode productivity, the study found. Front-End Loading (FEL) practices for the design, planning, estimating, and control of capital projects can offer a more systematic way of managing labor hour growth.

Major project cost overruns—Aside from truly unforeseeable events like natural disasters, disciplined adherence to FEL Best Practices can stem the occurrence of wildly off-target cost estimates.

Another benefit CEC member companies receive is access to updated summary cost and schedule metrics using data IPA collected from member companies in the last 10 years. Cost engineers can use the data to perform high-level summary cost evaluations and conceptual schedule evaluations and to quantify regional differences in project costs. Civil, pipeline, and minerals metrics were made available to member companies for the first time in 2014.

Approximately 90 people representing 28 companies attended the annual gathering.—*Geoff Emeigh, IPA Staff Writer*

For more information about the CEC, please contact *Luke Wallace, Associate Director, PRD Cost Analysis,* at *lwallace@ipaglobal.com.*

Challenges to Large Fertilizer Projects in North America

Lara Keefer, Ph.D., Senior Project Analyst, and
Natalia Zwart, Business Manager, Chemicals, Life Sciences and Nutrition

The North American fertilizer industry is experiencing a revival. Declining natural gas pricing is fueling increased production of ammonia, an energy-intensive building block of nitrogen fertilizers. More than 50 major fertilizer capital projects have been announced over the last 2 years in North America, with overall investment of more than $30 billion.[1] Publically announced fertilizer-related investments are estimated to cost in the upward of $500 million or even $1 billion and can be categorized as megaprojects. These large, complex investments embody many of the complexities a capital venture can have. Megaprojects tend to have high numbers of stakeholders and partners, multiple distinct scope elements, large numbers of interfaces, extensive infrastructure requirements, difficult regulatory environments, inadequate local labor supply, difficulties in adequately staffing the project, and other dimensions of complexity.

The majority of fertilizer owner companies have limited experience developing and executing projects of this size and complexity, especially in North America. The most recent world-scale natural gas-based fertilizer plant in the United States was built almost 25 years ago. These projects are the largest for their companies in recent or even overall history. Limited owner experience in developing and executing these projects, combined with a challenging project environment due to the increased number of capital projects in the United States, will make capital project excellence more difficult.

IPA data on the performance of more than 300 industrial megaprojects show that these large, complex projects fail too often for comfort. Large cost overruns, major delays, poor operability, and far too many safety incidents characterize well over half of the industrial projects around the world. Upon examining the reasons behind the failures, IPA discovered that the damage is largely self-inflicted. IPA found that the path to megaproject failure is usually laid out early in the development of the basic business strategy and timetable for the project. Failure to align stakeholders effectively early in the project and develop the basic technical data package sufficiently leads to major disappointment. The standard project development process—Front-End Loading[2] —must be augmented with an effective shaping process to yield successful results. Even seemingly small mistakes during project planning prior to full-funds authorization often spur a cascade of failures all the way through execution.

Few Fertilizer Projects Achieve Capital Excellence

IPA data further show that fertilizer large project and megaproject performance is not different from Industry overall. IPA's database contains over two dozen global large capital fertilizer projects with an average investment of more than $630 million. ***Figure 1*** shows that fertilizer projects struggled with a number of project shaping issues, including community relations, permitting, and financial and commercial agreements.

Currently ongoing fertilizer projects are not faring better. It appears that a number of owner companies proceeded into project execution prior to bringing all stakeholders on board with the proposed investment. Several announced projects are facing continuing local opposition to proposed plant locations and challenges to permits for water usage, discharge of used water, and rights-of-way. Much of the local opposition stems from

1 This is from the publicly announced values. Some of the projects have not announced a capital spend, so the number in reality is higher.
2 Front-End Loading (FEL) is a process by which a company translates its marketing and technology into capital projects. The objective of FEL is to gain a detailed understanding of the project to minimize the number of changes during later phases of execution.

Continued on page 11

Continued from page 10

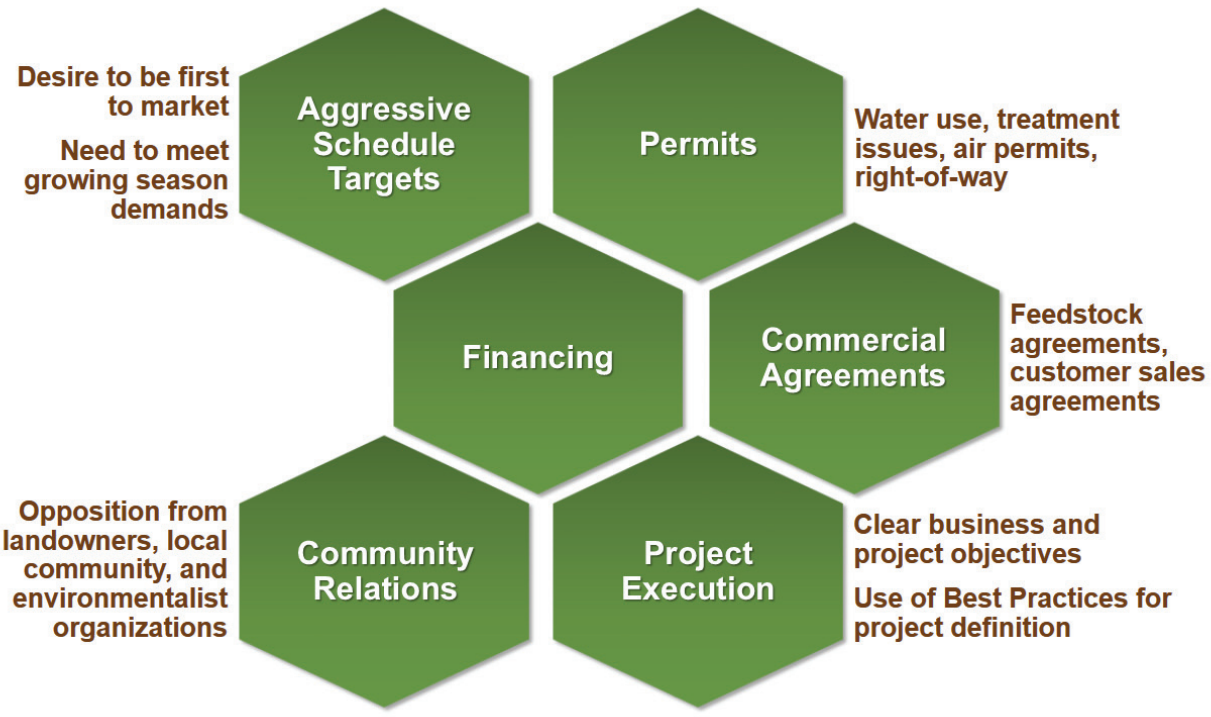


Figure 1. Larger fertilizer projects face multiple challenges

concerns about undesirable air emissions, increase in wastewater, water quality issues, and even emergency preparedness. Local communities are worried about the effect that these facilities could have on local housing values or that the increased truck traffic might have on smaller rural communities. These issues stem from a "not in my backyard" fear, fueled by recent safety accidents that have been widely publicized. Without adequate community alignment, these projects are likely to continue to experience schedule delays and cost growth.

IPA data also show that, historically, many large fertilizer projects suffer from more than poor shaping issues. Over 75 percent of these projects did not follow industry Best Practices for project definition and proceeded into execution without integrated and adequately representative teams, with inadequate understanding of the site conditions, and poorly defined scopes of work and execution plans. It is not surprising that most had disappointing results. As shown in ***Figure 2***, fertilizer projects without adequate representation from all needed functions (team integration)[3], on average, experienced 36 percent cost growth and 33 percent schedule slip.

This means that a $630 million project—an average project size in IPA's fertilizer database—spent an additional $220 million and took 10 months longer to execute than similar projects with integrated teams.

Heated Markets Pose Additional Challenges to Achieving Capital Excellence

To add additional pressures to fertilizer projects, the current market for capital projects is challenging in North America and is expected to become even more difficult in the coming years. Large fertilizer projects have been planned at the same time that a significant number of chemical and refining companies have also announced and are executing large infrastructure improvements or greenfield projects to also take advantage of the cheap gas.

3 Team integration measures whether all functions that can influence the project's outcomes are represented on the project team and whether the team is adequately staffed. In addition, the functional representatives must be active participants on the team and have the authority to make decisions for the functions they represent.

Continued on page 12

Continued from page 11

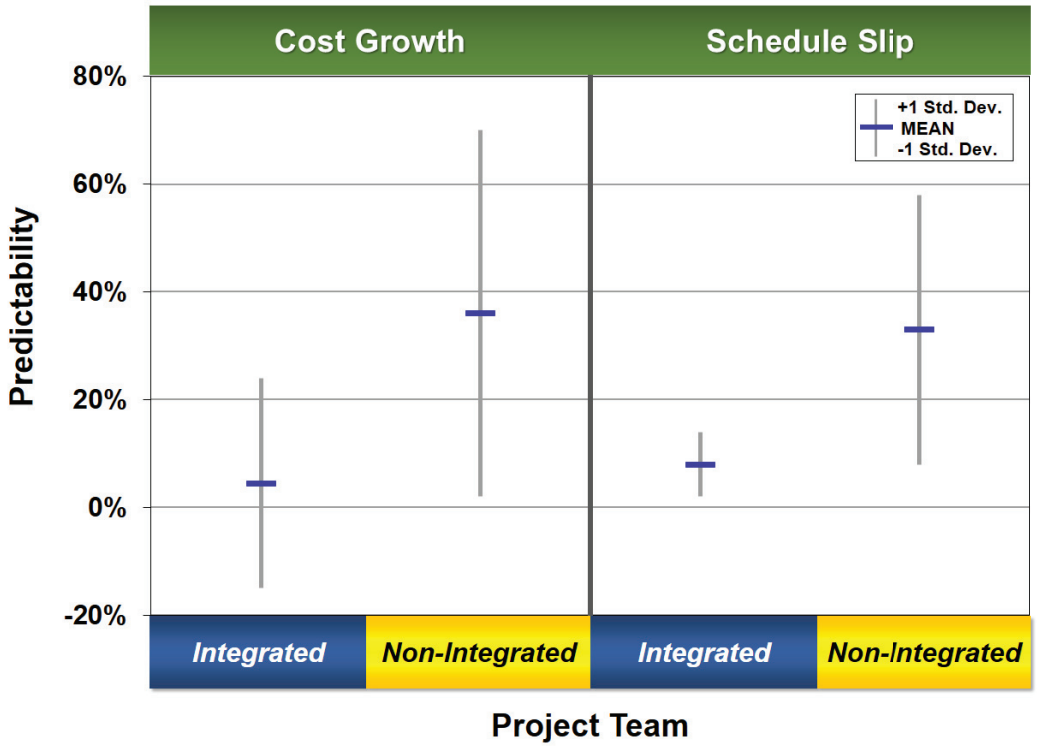


Figure 2. Team integration minimizes variability for fertilizer projects

It is this flood of capital spending in the United States that threatens to once again strain project supply chains, forcing companies to find and procure engineering services, materials, and equipment for their large projects earlier. The level of overall capital project activity in North America is expected to surpass the levels of the previous hot market in the United States from 2004 to 2007. IPA data show that the failure rate for capital projects—projects that experienced more than 25 percent real cost growth or execution schedule slip or incurred a fatality—doubled during the last heated market.

Failure modes were directly related to project supply chain issues. In particular, stretched supply chains forced companies to compete for limited engineering contractor resources. The number of engineering changes increased and engineering quality declined. In addition, projects that maintained the planned start date of construction after engineering had slipped had poor field productivity. These factors contributed to the 60 percent failure rate of large projects between 2004 and 2007 compared with the pre-hot market failure rate of approximately 30 percent.

What Can Fertilizer Companies Do?

It would be easy to say that given these macro, trends it is unrealistic to expect good outcomes in the current market. However, this is a mistake. IPA routinely collects data on capital projects with excellent outcomes that are executed under the most trying conditions. ***Figure 3*** shows that what separates them from less successful projects is their steadfast dedication to using Best Practices, including project shaping approaches and stakeholder alignment; adequate, appropriate, and timely resource deployment; proper project definition; and discipline during execution.

Continued on page 13

Follow IPA on LinkedIn at *www.linkedin.com/company/independent-project-analysis*

Continued from page 12

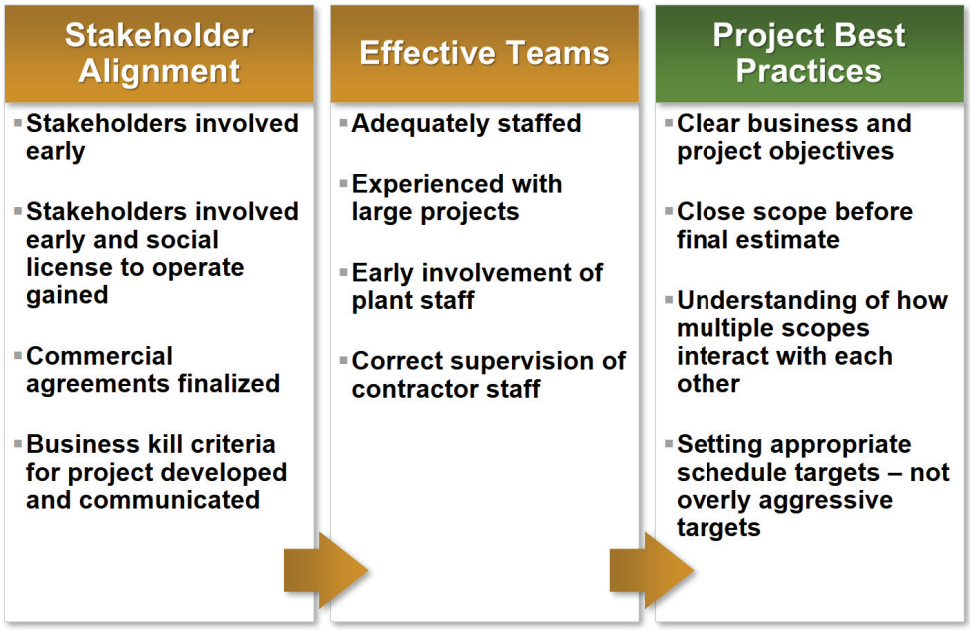


Figure 3. Planning for success—Strategies to set up large agrochemical projects for success

IPA has volumes of data to show that the use of these Best Practices will help tilt the odds of success in a company's favor.

For more information on IPA's knowledge about fertilizer projects or how to effectively execute large projects, contact *Lara Keefer, Ph.D., Senior Project Analyst,* at *lkeefer@ipaglobal.com.*

The goal of the IPA Newsleter is to provide you with research-based articles on current capital project issues, announce upcoming IPA events and IPA Institute course offerings, and introduce new and future IPA products that can improve your project management systems.

To subscribe to the IPA Newsletter and to view an archive of all past issues, please visit our website at www.ipaglobal.com/Newsletter.

To be kept informed regarding upcoming IPA Institute programs and courses being developed for capital project improvement, please join our mailing list at www.IPAInstitute.com.

Research Corner: Updates for IPA's Current Research Initiatives

Achieving Better Project Outcomes in West Africa

The group of coastal countries stretching from Guinea to Angola is home to vast mineral wealth and 35 percent (>350 million) of Africa's total population. It is also very possibly the single most difficult region in the world in which to develop and execute successful industrial capital projects. The motivation for this study is to find ways to reduce project risks in this uncertain region. The goal is to find the commonalities in the successful projects from this region and catalog the practices to minimize risks. Study scoping is complete and formal proposals have been issued. The study kick-off is in December 2014 with completion targeted for August 2015. The study is open to owners and contractors.

Nekkhil Mishra, Senior Project Analyst: nmishra@ipaglobal.com

Tunde Oguntimein, Associate Research Analyst: toguntimein@ipaglobal.com

Understanding Drivers of Rising Owner's Cost in the Oil & Gas Industry

Today's landscape in which oil and gas projects are executed is a difficult one. Projects are complex, much larger, being executed in frontier regions, and being done against a backdrop of demographic and supply chain constraints. Yet, the number of projects continues to increase, leading to significant sector inflation, including owner's costs. At the request of several clients, IPA completed a study to investigate and provide solutions in response to the rapid increases in E&P owner's costs. Participants in this joint industry project received a unique set of benchmarks and insights into why owner's costs are rising so much; how their owner's cost compare with competitors; and how owner's cost should change with project size, complexity, or geography. This study is now complete, but its insights as well as the system diagnostic are available to new participants.

Jonathan Walker, Study Principal Investigator: jewalker@ipaglobal.com

Project Authorization Processes and Durations

"It seems like it's taking longer and longer to get my projects authorized, and the hurdles keep getting higher..." is a theme IPA has heard from several clients this year. Although a hasty authorization phase can lead to an ill-prepared project facing trouble in the field, a process that is too onerous means the project may risk team member turnover or market changes while waiting on approval. So what is the "right" level of approval for a given project's authorization and how long "should" it take, considering the project's size, the company's portfolio size, the project type, and other key factors? IPA will answer these questions in a multi-client study that is open to all companies. The study will kick-off during the first quarter in 2015 and several companies have already committed to the study.

Natalia Zwart, Business Manager, Chemicals, Life Sciences, and Nutrition: nzwart@ipaglobal.com

Phyllis Kulkarni, Business Manager, Plant-Based Systems: pkulkarni@ipaglobal.com

Oil Sands Tailings Management

As regulatory requirements for tailings management continue to tighten, the major players in the Canadian oil sands industry face significant challenges in reducing the amount of tailings they generate during bitumen extraction and in reclaiming the large volumes of tailings that already exist on their sites. Tailings management projects are increasingly capital intensive with no direct return on investment. At the request of several clients, IPA launched a study to determine a benchmarking methodology for these unique projects and to investigate the drivers of cost and schedule in tailings management capital investments. Since July, IPA has collected data on

Continued on page 15

Continued from page 14

a sample of tailings management projects from three key oil sands operators. We are currently processing the analysis and will finalize the study early in the new year.

Jennifer Nicolaisen, Study Principal Investigator: jnicolaisen@ipaglobal.com

Global Equipment Procurement for Capital Projects

IPA is conducting a study that aims to advance Industry's understanding of the current trends and practices in equipment procurement for capital projects. A key focus is to evaluate the total cost of procurement in various global regions, taking into account equipment prices, the costs associated with transportation and setting up and maintaining regional procurement organizations, and other costs tied to addressing potential quality problems. IPA will also assess how companies' organizational structures, procurement approaches, contracting strategies, and other purchasing practices and strategies affect procurement effectiveness. The study is expected to be completed in December 2014.

Josh McClellan, Study Principal Investigator: jmcclellan@ipaglobal.com

Natalia Zwart, Business Manager, Chemicals, Life Sciences and Nutrition: nzwart@ipaglobal.com

Operated by Others

Companies are good stewards of capital when they consistently identify and develop the most promising investments and execute them well. Many organizations, however, understand what drives good capital projects performance, but do not understand how to drive the performance of non-operated projects. This study aims to study governance Best Practices for non-operated ventures (NOVs). IPA will accomplish these goals by analyzing a sample of NOV projects using elements of IPA's Upstream Project Evaluation System (PES®), interviewing non-operating partner companies, and surveying operating companies. A core group of companies has agreed to proceed with the proposed study. The study is expected to be complete in December 2015.

Rolando Gächter, Business Manager, Exploration and Production: rgachter@ipaglobal.com

Tackling Offshore EOR Developments

The number of offshore enhanced oil recovery (EOR) projects in the planning stages is increasing. However, no detailed knowledge on offshore EOR project success/failure is available and little is known about the Best Practices that enable success. Several IPA clients expressed their interest in researching this subject and answering what EOR performance looks like; determine if they deliver on their promises; describe the barriers, risk, and constraints that affect their performance; identify the project practices that should be used to improve success; and more. Study framing is currently underway.

Tom Mead, Deputy Director of Research: tmead@ipaglobal.com

Offshore Revamp Performance

Brownfield projects routinely suffer from large cost increases during execution. This problem stems from the fact that we lack reliable assessments of the realism of revamp scope and cost estimates. This effort will establish quantity-based tools (i.e., handled weights and man-hours) to assess revamp project performance. The goals of this study are to provide a detailed analysis of the participants' system performance on revamp projects, a summary of key drivers, and revamp trends over time and across regions. The study framing is currently underway and will conclude once the data availability is established.

Tom Mead, Deputy Director of Research: tmead@ipaglobal.com

Upcoming IPA Events & Presentations for 2015

January 19	***IPA President to Present at PMI-AGC 15th International Conference*** ***IPA's President and CEO, Ed Merrow***, will give a keynote speech at the PMI-Arabian Gulf Chapter 15th International Conference. The conference will be held at the Gulf Hotel, Manama, Kingdom of Bahrain. The theme for the conference is *Delivering GCC 2030 Vision Through Excellent Project Management*. For more information, please visit ***www.pmiagcconference.com/2015/***.
February 9 - 11	***IPA President to Present at 2015 CURT National Conference*** ***IPA's President and CEO, Ed Merrow***, will give a keynote speech at the 2015 Construction Users Roundtable (CURT) National Conference. The conference will be held at the Sheraton Wild Horse Pass Resort in Chandler, Arizona. The title of Mr. Merrow's keynote is *The Owner's Role: It's Much More Than "Just" Front-End Loading*. For more information, please visit ***www.curt.org/CURT-National-Conference-2015.aspx***.
March 23 - 26	***IBC 2015 Annual Meeting in Leesburg, Virginia*** The annual meeting of the ***Industry Benchmarking Consortium (IBC)*** provides an independent forum for each participating company to view its performance against other companies' performance. The consortium meeting highlights Best Practices used and reinforces their use to improve capital effectiveness. During the consortium meetings, attendees learn ways to improve specific elements of capital project execution through presentations and face-to-face discussions. For more information, please contact ***Andras Marton*** at ***amarton@ipaglobal.com***.
June 25 - 25	***UCEC 2015 Annual Meeting in Houston, Texas*** The ***Upstream Cost Engineering Committee (UCEC)***, formally organized in 1999, is an approved subcommittee of the Upstream Industry Benchmarking Consortium (UIBC). The purpose of the UCEC is to improve upstream project and business results by providing metrics for better cost engineering. The UCEC metrics provide asset evaluation and concept development professionals with a better understanding of costs and schedules. For more information, contact ***Carlton Karlik*** at ***ckarlik@ipaglobal.com***.
September 28 - 30	***CEC 2015 Annual Meeting in Tysons Corner, Virginia*** The ***Cost Engineering Committee (CEC)***, an approved subcommittee of the Industry Benchmarking Consortium (IBC), 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 capability of the owner cost engineer. For more information, contact ***Luke Wallace*** at ***lwallace@ipaglobal.com***.
November 16 - 18	***UIBC 2015 Annual Meeting in Leesburg, Virginia*** The annual meeting of the ***Upstream Industry Benchmarking Consortium (UIBC)*** provides an independent forum for each participating company to view its performance against the performance of other companies. The consortium meeting highlights Best Practices, reinforcing their importance in driving improvements in asset development and capital effectiveness. For more information, contact ***Neeraj Nandurdikar*** at ***nnandurdikar@ipaglobal.com***.

New Contractor Research Consortium to Help Contracting Companies Improve Capital Project Performance

Independent Project Analysis (IPA) has formed a Contractor Research Consortium (CRC) that will provide, for the first time, our research capability directly to the contractor community. Over our 25+-year history, we have established the largest and most comprehensive capital projects database in the world and have developed an extensive research capability with approximately 50 research professionals.

The purpose of the CRC is to help participating contracting companies improve their capital project performance in combination with their owner clients. The inaugural CRC Steering Committee Meeting was held on September 24, 2014, and included representatives from Fluor, Jacobs, and Kiewit. A full research agenda for 2015 was defined (outlined below) along with the data collection and deliverables planned over the coming year. The group is seeking to develop into an elite and influential organization of 8 to 10 contracting companies.

Planned 2015 Research Agenda

- ***What Is Industry Average Schedule Performance?***

  Contractors often accept the owner's schedule and the downsides that go with it without fully understanding the risk that they are taking on. The purpose of this research study is to help contractors be calibrated to what an average schedule really is for projects of different sizes in different industries.

- ***Avoiding and Coping With Surprises***

  The goal of this study is to help project teams anticipate and cope with unexpected events. The ability to adapt is key to improving the success rate of projects, and the CRC will produce a tool for helping project teams improve in this area.

- ***Enabling Early and Effective Involvement With Owners to Improve Project Performance***

  A formal meeting among business, engineering, and other subject matter experts to discuss and define the project's boundary conditions and trade-offs is a statistically proven practice that improves capital project performance. IPA research has recognized substantial variance in the application methods for this practice. This study's primary goal is to explore more effective methods of implementing this practice as owners too often lack these capabilities.

The CRC Steering Committee will guide the research agenda and will control the distribution of the research results. The goal is for the research to provide participating contractors a competitive advantage in developing successful projects for their owner clients.

For more information please contact *Dean Findley, Director, Subscription Services,* at *dfindley@ipaglobal.com* or *Michael McFadden, Director, Project Research Division,* at *mmcfadden@ipaglobal.com.*

THE IPA INSTITUTE
ADVANCING PROJECT KNOWLEDGE

2015 Public Course Schedule

The IPA Institute, a division of Independent Project Analysis (IPA), develops and delivers educational seminars to further IPA's mission to improve capital effectiveness. IPA Institute courses are derived from IPA's extensive research and quantitative analysis of capital projects, linking statistically proven Best Practices to business value. In addition to public courses, the IPA Institute can deliver courses privately at a company's preferred location. Choose from existing off-the-shelf courses or highly customized courses designed to help improve a company's internal training program. To view full course descriptions, pricing, up-to-date registration details, and special discounts, please visit our website at www.IPAInstitute.com.

Webinars Also Available

Project Management Best Practices (22 PDUs)

- February 23 - 25: London, UK[1]
- March 8 - 10: Abu Dhabi, UAE[1]
- April 13 - 15: Pittsburgh, Pennsylvania[1]
- April 21 - 23: Shanghai, China
- May 4 - 6: Johannesburg, South Africa[1]
- June 1 - 3: Calgary, Canada[1]
- June 16 - 18: Curitiba, Brazil

Establishing Effective Cost & Schedule Processes (14 PDUs)

- February 26 - 27: London, UK[1]
- March 11 - 12: Abu Dhabi, UAE[1]
- April 16 - 17: Pittsburgh, Pennsylvania[1]
- May 7 - 8: Johannesburg, South Africa[1]
- May 12 - 13: Santiago, Chile
- June 4 - 5: Calgary , Canada[1]

Gatekeeping for Capital Project Governance (16 PDUs)

- March 3 - 4: Calgary, Canada
- April 30 - 31: Houston, Texas[2]

Exploration and Production Project Best Practices (22 PDUs)

- March 10 - 12: Jakarta, Indonesia
- April 21 - 23: London, UK

Best Practices for Small Projects (22 PDUs)

- March 10 - 12: Las Vegas, Nevada
- April 7 - 9: Curitiba, Brazil
- April 14 - 16: Perth, Australia

Megaprojects - Concepts, Strategies, and Practices for Success (22 PDUs)

- April 27 - 29: Houston, Texas[2]

Practices for Shorter, More Cost Effective Turnarounds (14 PDUs)

- June 17 - 18: The Hague, The Netherlands

New Bundled Courses

[1] ***Project Management Best Practices*** and ***Establishing Effective Cost & Schedule Processes*** are bundled together for select locations.

[2] ***Megaprojects - Concepts, Strategies, and Practices for Success*** and ***Gatekeeping for Capital Project Governance*** are bundled together for select locations.

PMI Registered Education Provider

The IPA Institute is a Registered Education Provider (REP) of the Project Management Institute (PMI). All IPA Institute seminars align with current PMBOK standards, enabling PMI credential holders (PMP, PgMP, PMI-SP, PfMP, etc.) to claim Professional Development Units (PDUs) upon completion of each IPA Institute course.

PMI Registered Education Provider® Project Management Institute

IPA's 2014 Community Service Program

Kelly Mitchell, Global Outreach Coordinator and Deputy Manager for Corporate Administration

One of IPA's main Principles of Operation is: social and ethical responsibility to our customers and our community. IPA recognizes and accepts that we have a responsibility to our community and to those in our community who are less fortunate. In an effort to put these principles into action, IPA conducts a number of efforts throughout the year, both locally and globally. The following are some of the organizations IPA has contributed to over the year either through funding, service, or donations:

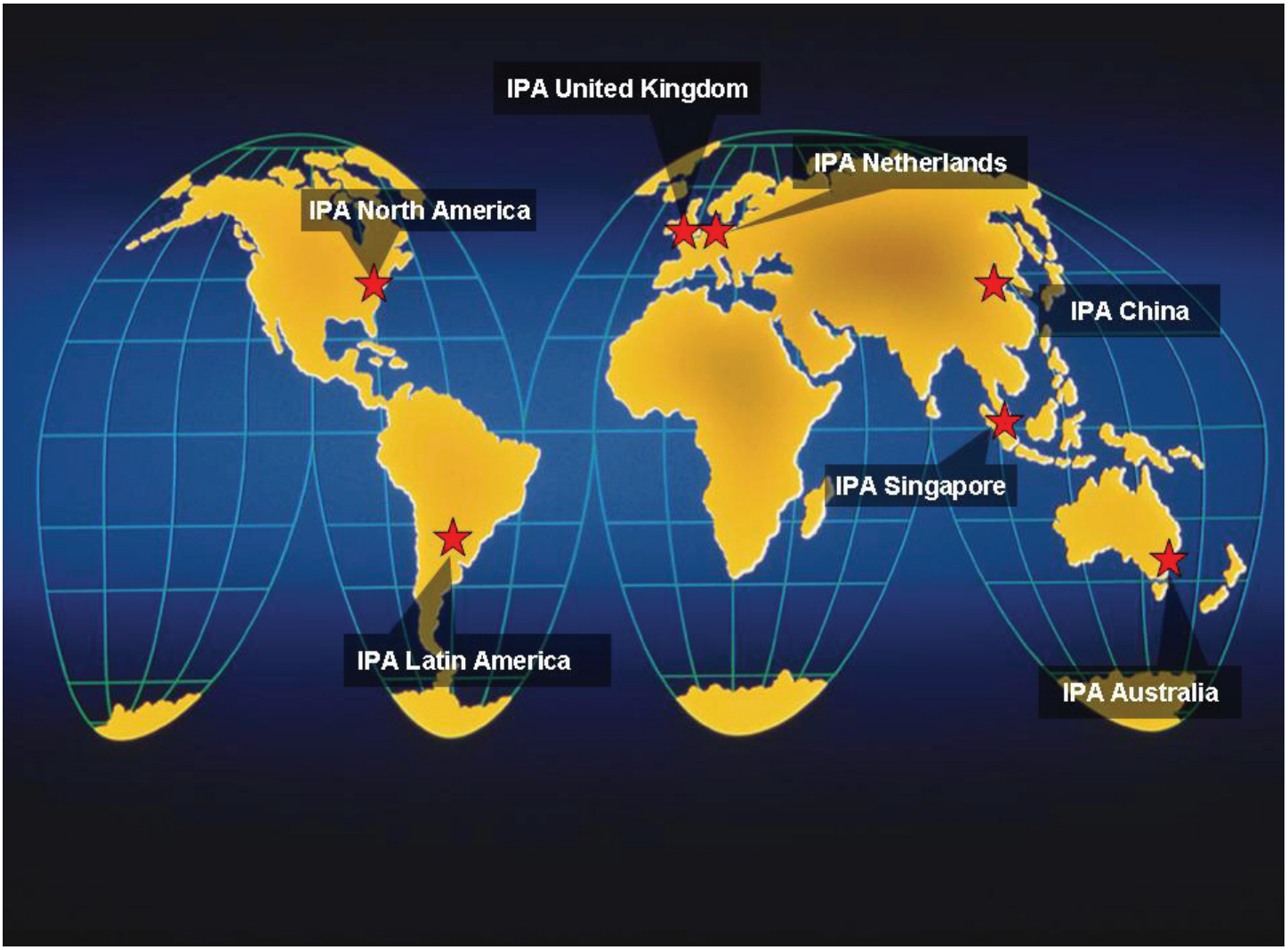
- Samaritan Ministry of Greater Washington
- Generosity Feeds
- Chantilly High School Science Fair
- Cystic Fibrosis Trust
- Nursing Home Lar Esperança
- APACN— Paraná Association of Child Support Neoplasia
- Good Shepherd Alliance
- CLIC (Cancer and Leukaemia in Childhood) Sargent
- American Red Cross
- Loudoun Interfaith Relief
- Casa Lar das Meninas
- Loudoun Library Foundation
- Rachel's Women's Center in DC
- Loudoun Area Agency on Aging—Home Delivered Meal Program
- Curitiba City Hall Social Action Foundation

IPA
www.IPAGlobal.com

IPA improves the competitiveness of our customers through enabling more effective use of capital in their businesses. It is our mission and unique competence to conduct research into the functioning of capital projects and project systems and to apply the results of that research to help our customers create and use capital assets more efficiently.

THE IPA INSTITUTE
ADVANCING PROJECT KNOWLEDGE
www.IPAInstitute.com

The IPA Institute's mission is aligned with the overall IPA mission to improve the capital productivity of its clients. The programs offered provide a forum for in-depth understanding of key elements of the capital project process and how to apply these learnings to effect positive changes and improvements, resulting in the more effective use of capital.



IPA North America
The IPA Institute

44426 Atwater Drive
Ashburn, Virginia 20147
PH: +1 (703) 729-8300
Fax: +1 (703) 729-8301

IPA Latin America

Rua Pasteur, 463-salas 1201/1202
Curitiba, Paraná 80250-080, Brazil
PH: +55 (41) 3028-9028
Fax: +55 (41) 3028-9024

IPA United Kingdom

Wellington House,
First Floor, Worton Dr.
Reading, RG2 0TG
PH: +44 (118) 920-7800

IPA Netherlands

WTC The Hague Business
Center, Prinses
Margrietplantsoen 33
2595 AM The Hague,
The Netherlands
PH: +31 (070) 335-0707

IPA Singapore

1 International Business Park
#10-02 The Synergy
Singapore 609917
PH: +65 6567-2201
Fax: +65 6567-2231

IPA China

#36 Chuangye Middle Road #502
Haidian District, Beijing 100081
China
PH: +86 (10) 5880-1970
Fax: +86 (10) 5880-1957

IPA Australia

Level 1, 56 Burgundy Street
Heidelberg, Victoria, 3084
PH: +61 (39) 458-7300
Fax: +61 (39) 458-7399