

IPANewsletter



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The Path to Better Site and Sustaining Capital Projects

By Andras Marton, Director, Integrated Energy Practice

Capital spent to sustain the operation of existing industrial assets is a critical element of a company’s long-term success. These site and sustaining capital projects range from simply maintaining existing operations, to improving the economics of existing operations, responding to regulations, and responding to market needs. Because existing assets in most industrial sectors are aging, their upkeep and replacement makes up a significant portion of a company’s capital spend. It is no surprise then that IPA is seeing increasing interest from clients in understanding and improving project performance at existing assets.

Where Do Site and Sustaining Capital Projects Go Wrong?

Whether the focus is growth or simply maintaining the status quo, effectively deploying site-based projects requires a significant effort. Investing in improved capital delivery at existing assets is a sound decision—companies can directly influence and control how effectively they deploy capital, which is in direct contrast with their ability to influence or predict future markets. IPA’s recent look at the capital deployment effectiveness of over 4,500 projects in several industrial sectors executed at multiple manufacturing sites highlighted a significant decline and identified the associated root causes.¹ Addressing these root causes is probably the most sound and future proof investment a company can make.

¹ All root causes and practices described in this article have a statistical significance of Pr < 0.05 or better.

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Independent Project Analysis, Inc. is the preeminent organization for quantitative analysis of capital project effectiveness worldwide. At IPA, we identify Best Practices to drive successful project outcomes. www.ipaglobal.com

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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 most concerning area of decline is in the quality and completeness of Front-End Loading (FEL), the process by which project teams translate the business case into a scope of work and then into a project that is ready to execute. IPA's measure of project definition, the FEL Index,² has worsened in the last 5 years. Moreover, although the average index was between *Fair* and *Poor* over the last 4 years, this year's average FEL Index is well within the *Poor* range (**Figure 1**).

This decline is concerning, because a project's level of definition at the start of execution affects all of the economically important performance measures—including cost, schedule, and operational performance. In fact, we find that only projects that achieve *Good* or *Best Practical* FEL have a positive internal rate of return (IRR); for every category below *Good*, projects lose 2 percent IRR (**Figure 2**).

In essence, the less FEL work completed, the more risks the project carries into execution, when resolving issues is costly and time consuming.

Project definition is a good investment because it translates into projects that are more cost effective. Based on projects in the last 5 years, projects that reach *Good* or *Best Practical* FEL are 15 percent more cost effective than those that had *Poor* FEL. For an average portfolio of \$200 million, this is \$30 million in savings, which is significant.

Project Definition Has Declined Over the Past 5 Years

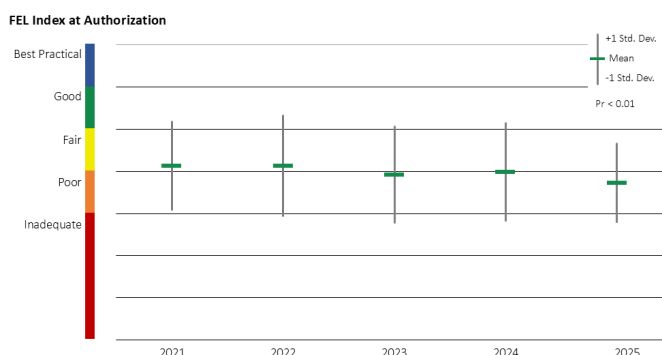


Figure 1

Only Projects With Good or Best Practical FEL Have a Positive IRR

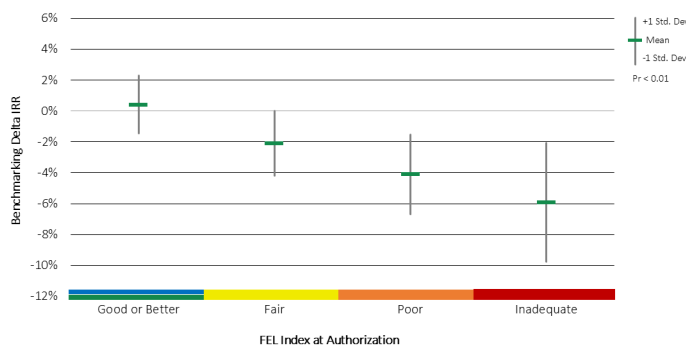


Figure 2

² IPA established a quantitative method to measure the level of definition, or FEL, on a scale that ranges from *Inadequate* to *Best*, with a *Best Practical* range that research shows correlates strongly with better project outcomes.

Why Don't We Do Better on the Front End?

Given its importance, why don't companies do a better job on the front end for site and sustaining capital projects? Peeling back the layers behind gaps in FEL reveals three key areas: work process, governance, and staffing.

Work Process

1. Common Process: Most companies that do their business through capital assets use a work process to govern the deployment of their capital. However, simply having a work process does not guarantee success. Companies that have projects routinely in the Top Quintile for FEL quality (TQ FEL)³ used a couple of key practices around the implementation of the work process. The first one is the use of a common work process that is independent of the size and complexity of the project it's applied to. While this may sound counterintuitive, when there is an option to use a simpler process, we find reasons to justify using it even when the project is more complex, and with time, exceptions become norms. A common work process is very usable across different project sizes and complexities: for simpler projects the deliverables and work process elements should be easier to do, but this does not mean they should not be done. There is of course a limit, and TQ FEL assets are more likely to have their major (large) projects managed by a central engineering group, allowing the asset organization to focus on the sustaining project portfolio.

2. Training: To ensure the correct use of the work process, TQ FEL assets regularly train not just their own staff but also contractors and other non-owner staff who regularly contribute to projects. These sites also measure the effectiveness of the training through various tests. Focusing on familiarity and ease of use of the work process through training is important, particularly with the relatively large personnel turnover observed in recent years.

3. Adherence: The last key work process practice is making sure projects adhere to the work process. TQ FEL assets don't just mandate the use of their work process; they also ensure adherence by measuring the completeness of work process deliverables. This is often done through an assessment tool, such as IPA's FEL Toolbox, and is ideally done through facilitation by an expert user of the tool who is independent of the project team. Unfortunately, we can see a clear decline in the use of FEL assessment tools (**Figure 3**). To remedy this, IPA is actively developing its Site

FEL Assessment Tools Use Has Declined to Almost None

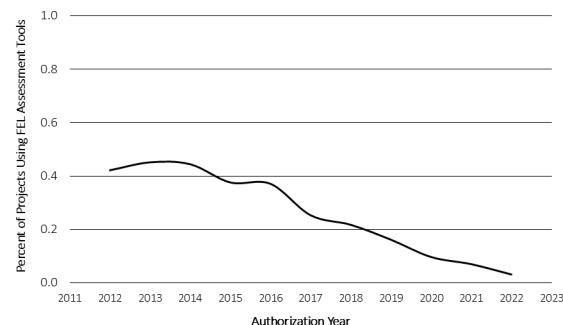


Figure 3



Site-Based Project Professionals: We Want to Hear from You!

Our goal is to make the upcoming SSC Portal the industry-leading tool for self-assessing risks and monitoring both project and portfolio performance in real-time! We're looking for site-based owner representatives with a passion for site-based projects to be a part of the development process!

Contact Pablo Cabezas at
pcabezas@ipaglobal.com for
more information.

³ Top Quintile for FEL quality projects are the top 20 percent of industry projects when ordered from best to worst FEL.

and Sustaining Capital Portal, an integrated hub of self-assessment tools that aims to provide real-time information about the status of projects and more valuable insights at both the site and portfolio levels to project practitioners and system owners alike.

Governance

Effective governance, and in particular gatekeeping, is also critical to ensure adherence to the work process. While almost all the sites that we studied have documented roles and responsibilities for the gatekeepers, TQ FEL assets' gatekeepers are better positioned to enforce adherence to the work process. These sites are more likely to formally train employees for the gatekeeping role and are more likely to base gatekeeper assignment on project size and technology to align expertise.

In the last 5 years, only 13 percent of projects started execution with **Good** or **Best Practical** FEL (Figure 4), which highlights an issue with the way companies enforce governance rules and closing gates for projects that have significant risks.

Staffing

Staffing project organizations is clearly a challenge across most capital-intensive industries. A company's inability to appropriately staff projects is a clear contributor to the lack of work process adherence and often the excuse⁴ for relaxation of requirements. TQ FEL assets use some key staffing practices regularly. At TQ FEL assets, project managers actually spend less time on their projects, which, at first, may seem surprising. However, they are also much less likely to fill multiple roles on the project team, which means they can focus better on managing the projects and rely on better functional support for areas where specialization (e.g., cost estimating) brings benefits to the project. In fact, TQ FEL sites had a functional competency turnover rate for estimating, controls, schedulers, construction management, and technical specialists that is two or more times less frequent than at the rest of the assets IPA looked at.

At TQ FEL assets, the project managers also have more control over their projects: they can hire non-owner staff when needed (with management approval), they are accountable for the day-to-day activities of key functions,⁵ and—likely as a result—they get better functional integration and participation in key project deliverables such as the project's schedule. The consequence of these

practices is that team formation norms are consistently better for TQ FEL assets—they are significantly more likely to achieve team integration, have clear roles and responsibilities, and identify key tasks and risks to the project.

Only a Small Portion of Projects Achieved Good or Best Practical FEL Rating

Only 13 percent of projects achieved *Best Practical* or *Good* FEL ratings prior to authorization

Over half of projects (58%) had *Poor* or *Inadequate* FEL ratings

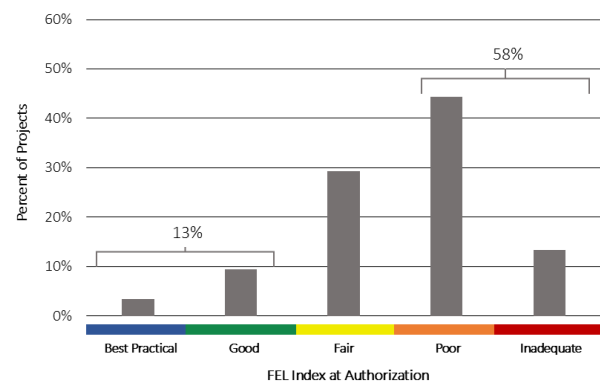


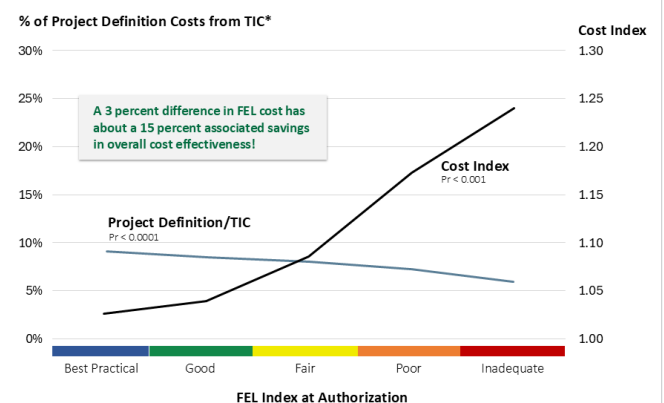
Figure 4

Project Definition Is a Good Investment

Worse Defined Projects Spend Less in Project Definition Costs but Suffer on Cost Performance

Projects that reach *Best Practical* or *Good* FEL spent about 8 to 9 percent (of total costs) in project definition

Worse defined projects spent less, but had much worse cost effectiveness
Doing project definition right pays off!



*Project definition costs as a percentage of Total Installed Costs (TIC)

Figure 5

⁴ We consider this an excuse because hiring staff or slowing down the project is a more beneficial approach to dealing with staffing shortages.

⁵ Key functions include conceptual engineering, detailed engineering, control specialists, schedulers/planners, construction manager, and procurement.

What Can Project Leaders Do?

[Despite the global uncertainty around capital projects](#), site-based projects are here to stay. The message of our research is clear: improving our projects' Front-End Loading quality has a strong business proposition—a 3 percent difference in FEL cost has about a 15 percent associated savings in overall cost of the project (**Figure 5**).

As the number and size of site and sustaining capital projects increases, there are some key practices that site leaders and project managers can use to help turn the tide on declining outcomes and practices use:

1. Improve project definition quality to make sure site-based projects are well prepared for execution.
2. Ensure a system-wide understanding of the work process, including the gatekeepers, and establish a way to measure adherence.

3. Develop and empower project managers to drive the success of their projects through focusing on the drivers that matter for projects.
4. Measure performance to understand whether improvement is taking place and aim for goals that are achievable.

The purpose of a project system is to deliver on the business promise. Focusing on these actions will enable site-based project organizations to get back to using best project practices and consistently deliver projects that meet business expectations and improve their company's standing.

Does Your Site-Based Project System Need a Boost?

Contact Pablo Cabezas at pabezas@ipaglobal.com to start a discussion with IPA about identifying improvement opportunities for your organization.

What Is the Key to Delivering More Predictable Projects?

By Aditya Munshi, IPA Product Portfolio Officer

Predictable projects—those that meet competitive schedules and budgets—are becoming more and more elusive. Over the past 2 decades, we have lost about 20 percent in execution speed based on large project outcomes, as reported at the Industry Benchmarking Consortium (IBC) 2025 annual meeting. At the same time, the average slip has roughly doubled and now hovers around 18 percent. Although cost growth is around 4 percent (projects up to \$50 million underrun and larger projects overrun cost estimates, on average), cost competitiveness has also declined.

Why Has Project Predictability Declined?

Why is it so difficult to set competitive cost and schedule targets and meet them? Based on IPA data, both cost and schedule competitiveness and predictability have declined, but we also see a decline in project practice use. Thus, the root cause of today's poor predictability in capital

projects is in the key systemic performance drivers, such as project definition, team development, and controls. The decline in the use of practices has contributed to worse predictability for large and site and sustaining capital (SSC) projects.

IPA measures a project's definition, or *Front-End Loading (FEL)*, based on a scale from *Inadequate* (not defined) to *Best Practical* (optimal definition to move forward). Unfortunately, we have observed that FEL has not improved for more than a decade and has stayed in the *Fair* range, or roughly the middle of our scale. Only 16 percent of IBC 2025 sample projects—executed under some of the strongest project systems in the industrial world—entered authorization with what IPA research has identified as *Best Practical* FEL.

Of the three components that make up FEL (Site Factors, Engineering Status, and Project Execution Planning), Project Execution Planning is the weakest link. This likely explains why schedule outcomes have eroded more than cost as execution planning is a strong driver of schedule performance. We also find that better FEL supports other drivers of better projects. For example, projects with better FEL tend to have a higher likelihood of doing estimate validation, better project controls, and increased Constructability Reviews use.

Another pillar of good project performance, **team integration**, has declined since 2020, driven by a significant decrease in the presence of key owner functions. The owner construction manager (CM) is the primary missing function: only 45 percent of sample projects had an assigned owner CM at authorization.

Delays on the front end have also contributed to worse project predictability. For projects in development, 2024 was a year of FEL slip—about 30 percent of IPA scheduled interviews for project execution readiness evaluations were postponed—some by a few weeks and some indefinitely. The reasons given include the estimate came back higher than expected, teams are not ready, FEED is taking longer than expected, or—worst case—the project is no longer economically viable.

Achieving Predictability Despite Resource Limitations

IPA defines resource-limited projects as meeting one or more of the following criteria:

- Understaffed in line or support functions, or both
- Primarily staffed by contractors
- Missing one or more key functions
- Having an inexperienced project manager and engineering lead

It is no secret that many project organizations are strapped with resource limitations and are being asked to do more with less. IPA President and CEO Nekkhi Mishra touched on this in his insightful article on the [4 Big Challenges for Project and Engineering Leaders to Solve](#). The key question is how can capital project organizations deliver predictable projects, despite the resource challenges they currently face?

As product prices continue to hover at moderate levels and project prices have risen 30 percent (just based on observed escalation), the way to get to good business cases for upcoming projects is through good FEL and use of project Best Practices in the front-end, which will enable teams to set competitive cost and schedule targets and reduce risk in execution. The alternative is widespread project failure as we enter execution with stretch targets not supported by fundamentals, leading to execution issues that cause blowouts in cost and schedule.

Although projects that are resource limited perform worse than those that have adequate resources, given the current state of project organizations, we can learn something from those that were limited, but still successful:

Organize the project to cope with limited resources:

Strong matrix organizations enable project managers to do more with fewer resources because fewer interfaces make information flow simpler.

Form the core team before the FEL 2 gate: Resource-limited teams that are formed early have better definition, and better definition leads to better outcomes.

Form an integrated team as much as possible: Resource-limited teams that are integrated are more likely to succeed. This is particularly important when the project manager and engineering lead are inexperienced. Integrating the contractors to fill gaps in the owner team is critical to coming as close as possible to an integrated team.

Establish good roles and responsibilities: All successful resource-limited projects that we studied had clearly defined roles and responsibilities for their team members.

Adhere to the work process: Following an established company work process—especially closing the scope at the end of the Select stage—is critical for project success when resources are limited.

Limit turnover: All projects are affected by the turnover of key team members, but resource-limited teams are even more severely affected. Cost growth increases by 24 percent and schedule slip by more than 16 percent when resource-limited projects have turnover. Similar projects that are not resource limited only see about 8 percent cost growth (one-third that of resource-limited projects) and no difference in execution schedule slip (vs. 16 percent higher slip).

For More Information

IPA has collected and studied detailed project data directly from owner firms for decades. This enables us to establish industry benchmarks, determine empirical key performance indicators, and ultimately help our clients [improve the performance of their projects and project systems](#). To start a discussion with IPA experts about driving more predictable projects for your organization, contact Aditya Munshi at amunshi@ipaglobal.com.



Developing Functional Project Teams

By Katya Petrochenkov, Deputy Director, Organizations & Teams and Kailyn Noble, Associate Research Analyst, Organizations & Teams

Think of your last project. Was it on time? Did you meet your budget? Given [the challenges that today's project and engineering leaders are facing](#)—including changing demographics, doing more with less, cutting corners—fundamentals, including a functional team, are even more important. But what is a functional project team and how do you develop one in today's environment?

What Makes a Strong Project Team?

IPA has long touted the benefits of strong teams because without them, project failure is almost guaranteed. A simple measure—having all core functions included on the project team with roles and responsibilities defined—is one of the strongest signals of how much risk a project is facing. These functions are represented on the project team prior to authorization and filled with people with decision-making authority.

These **core functions** include the project manager, engineering lead, construction manager, operations, and maintenance. Projects missing one or more of these core functions have significantly worse performance across outcomes (cost, schedule, operability). The causality is easy—when the key functions who shape the project are missing, so is their critical input.

Projects that do include all core functions are considered “integrated” and IPA research clearly links integrated teams to better Front-End Loading (FEL)—or project definition—as well as better cost and schedule performance (**Figure 6**).

However, simply having all of the right functions present on the project team does not guarantee that it will be “functional” or effective. So, what makes a team functional?

What Is a Functional Project Team?

In addition to being integrated, a functional project team:

- Is robust, with enough of the right people to produce complete, high quality project information
- Has a sound basis to work from, including clear objectives and an understanding of the project process
- Has good alignment, both with stakeholders and internally
- Is confident of project success

How Do You Know if Your Team Is Functional?

Having a well-functioning team requires an environment in which the team can function and thrive. IPA measures team functionality across six areas that we have found correlate with project outcomes:

- 1. External Support:** Do team members feel they have good support from stakeholders and others outside the project team who are critical to its success?
- 2. Project Technology:** Do the team members believe the selected technology is the best choice for the project? Do they understand it?
- 3. Execution Planning:** How well planned is the project's execution?
- 4. Cost and Schedule Targets:** Are those targets well defined and sound? Are they achievable?
- 5. Project Process:** Is the project following the company's project process? Do the team members understand it?
- 6. Team Collaboration and Composition:** How well does the team get along? Are roles and responsibilities understood?

Understanding how team members perceive all of these elements gives us a picture of a team's overall functionality. Although project team members are often in the best position to understand a project's true status, they often have no way of communicating their concerns. IPA's Team Functionality diagnostic tool includes a survey given to

team members to discover the answers to questions around these key elements. A key part of this survey is that team member responses are confidential to provide a safe space for honest responses.

What Effect Does Team Functionality Have on Project Outcomes?

IPA research shows that poorly functioning project teams average 30 percent budget overruns and over 50 percent schedule slip. For over two decades, capital-intensive organizations have used our Team Functionality Assessment to clearly understand project risks from this perspective. In that time, we have collected team functionality data across thousands of projects and received over 40,000 individual survey responses.

With all of these data, we recently set out to make some improvements and further our team research with two goals:

- Create a composite score and strengthen its relationship with outcomes
- Explore respondent characteristics and their influence on outcomes (role, experience, etc.)

Team Functionality Composite Score

To further investigate how team functionality is linked to project outcomes, all themes assessed in the survey (External Support, Project Technology, Execution Planning, Cost & Schedule, Project Process, and Team Collaboration & Composition) were aggregated to get a singular measurement of team functionality: the Team Functionality Composite Score. This latest research has linked our composite score with measures of project performance, including cost competitiveness (Figure 7).

The Team Functionality Composite Score is further qualified by one of three rating categories (**Good**, **Fair**, or **Problematic**) based on its correlation to project outcomes. Our research found that project teams with Good Team Functionality ratings have cost outcomes that are 35 percent lower and schedules that are 22 percent faster than their **Problematic** counterparts. This signals the importance of continuously making sure your project teams are on the same page throughout the project life cycle and are implementing corrective actions when they are not. This is particularly important as the project approaches critical milestones, like the final investment decision.

Integrated Teams Enhance FEL and Overall Project Performance

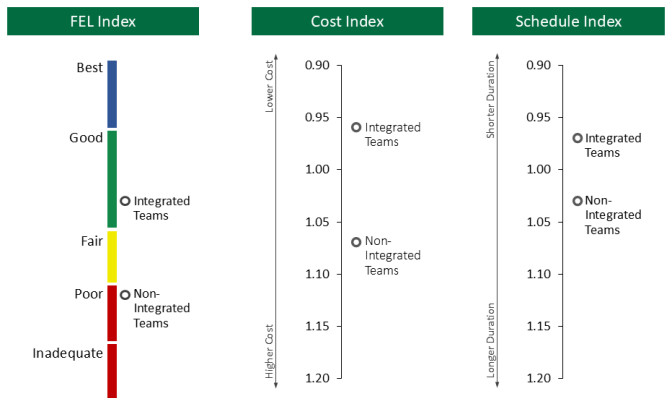


Figure 6

Strong Correlation Between Team Functionality and Competitiveness

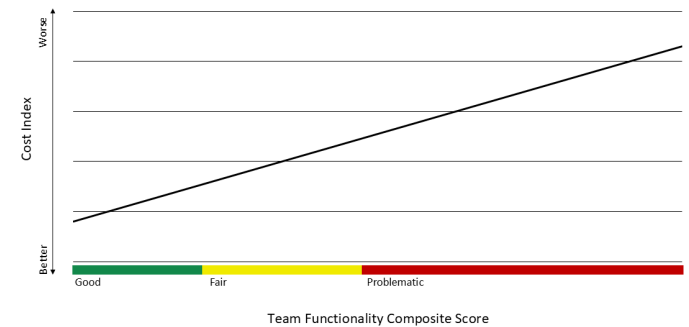


Figure 7

Cost Index by Function First Tier Relationships

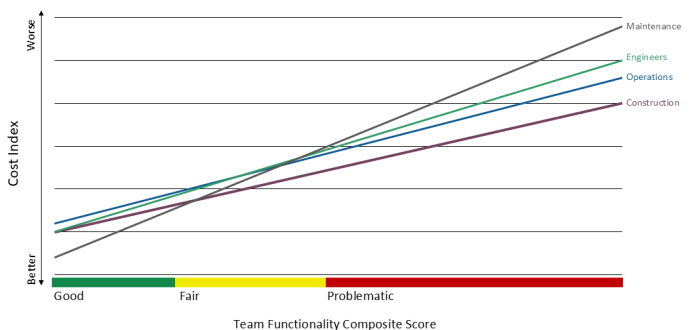


Figure 8

Respondent Characteristics

Our latest research further identified that the perceptions of certain core team members are particularly powerful. Responses from maintenance, engineering, operations, and construction manager team members stood out as having the strongest signals of risk (**Figure 8**). These findings reinforce our Best Practice principle of having maintenance, operations, and construction management representation for a project team to be considered fully integrated.

These “first tier” relationships demonstrate the importance of seeking cross-functional feedback throughout the project life cycle. Not only do these functions provide critical input required to develop and execute projects, their opinions about how the project is going also need to be listened to. When project teams are not integrated, construction management, operations, and maintenance representatives are the most frequently missing team members. IPA has also seen an increase in recent years of teams missing the engineering lead function. This demonstrates that when you are missing a core function from the team, you not only miss that function’s input, but you are also lacking someone who would otherwise be positioned to provide a valuable perspective on the project’s overall health.

Keep Tabs on Team Functionality Throughout Your Project

Although project team members are in the best position to understand how well the team is functioning (or not), they often have no way to communicate their concerns. IPA’s method to measure team functionality is an easy way to take the pulse of your team throughout the life cycle to identify whether corrective actions are required.

IPA’s Team Functionality Assessment can be used at any time in a project’s life cycle as a tool to gauge the status of the project and team. It will help you answer key questions at various stages of your project, including:

- FEL 1: Is there a coherent charter from the business?
- FEL 2: Is the team aligned on the project’s readiness to move forward? Does the team really feel the scope is closed?
- FEL 3: Does the team feel the project is ready to move forward into the execution phase?
- Execution: Is the project on or off course?
- Operations: What are the key lessons learned on team functionality that can be applied to future projects?

In addition, the Team Functionality Assessment can be useful to gather perspectives from the project team in preparation for a major transition point in the project, such as:

- Adding a significant number of people to your team
- Entering a new phase of the life cycle
- Major change to the project scope
- Restarting a project

Curious About Understanding Your Team Functionality?

Contact Katya Petrochenkov at kpetrochenkov@ipaglobal.com to start a discussion with IPA’s Organizations & Teams experts.



Organizations & Teams

Is your organization understaffed and being asked to do more with less?

IPA’s Organizations & Teams experts can help you find solutions to your complex challenges!

LEARN MORE »

IBC Membership: Getting Maximum Value to Drive Continuous Improvement

By Pam Wertz, IPA Chief Development Officer

Throughout IPA's history working with industrial projects and systems, one of the best indicators that a company has embarked on an ambitious continuous improvement effort is membership in the [Industry Benchmarking Consortium](#) (IBC). The IBC currently includes 37 members—owner companies from a range of sectors with diverse portfolios, project organizations, and capital spend.

These companies are at different places in their improvement journeys, with some just starting out and others well along the path. Although IBC member companies have a commitment to continuous improvement in common, they use their IBC membership, including attendance at the annual conference, differently. We set out to find out how members get the most value out of IBC to drive improvements faster.

What Is the IBC?

Established in 1992, the IBC is a premiere group of the world's leading industrial companies in the processing, refining, infrastructure, chemicals, life sciences, and mining and minerals sectors. IBC member companies actively discuss the latest capital project industry trends and performance hurdles through an annual meeting, competency-focused subcommittees, communities of practice, and periodic webinars. The four founding IBC member companies still retain active membership today, two of which have been members for all 35 years of the IBC.

How Does the IBC Help Companies Improve?

Not all companies that benchmark with IPA are IBC members—but all IBC members are required to benchmark a representative sample of their projects with IPA, to actively participate in the sharing of Best Practices and research, and to set a baseline for continuous improvement.

Through benchmarkings of both large and site-based systems conducted by IPA, IBC member companies receive exclusive insights into how their capital project system performance stacks up against their industry peers with respect to safety, cost, schedule, and operational performance. IPA helps each company to assess the

strengths and weaknesses of its project system and map out a plan for improvement.

Why Do Clients Benchmark and Join the IBC?

In interviews with our member clients, we found several reasons for benchmarking with IPA and joining the IBC:

- IPA provides an external view, which is unbiased and can be eye-opening
- CEO requests proof of capital competitiveness from their projects organization
- Project and engineering leaders want an independent, respected voice to convince upper management of performance
- Consortia provides companies with the ability to see the bigger industry picture: Understanding industry trends is crucial, sparking new ideas and ways of thinking
- Assist with developing improvement plans for the next year

Overall, IPA information—both overarching research studies and client-specific metrics—can serve as a starting point for defining, defending, and re-focusing process improvements. We found three main ways member companies improve through benchmarking and IBC membership:

Discovering Best Practices: Research studies and data gathered from project analyses help us to identify what we call Best Practices. IPA defines Best Practices as those that research and experience have shown to produce optimal results and that are suitable for widespread adoption. Best Practices highlight what has worked well in the past and provide real applications that give a path forward for projects and portfolios.

Comparison versus peers: Comparisons both within the company's sector and outside of the sector show companies where there is room for improvement and what is possible to achieve.

Real-time feedback through metrics and insights: Company-specific metrics provide a snapshot of the current state, help identify root causes of unwanted outcomes, and generate insights on how to adjust and make improvements. (See **Figure 9**.)

What Are Key Practices for Making the Most of Benchmarking and IBC Membership?

We want member companies to get maximum value out of the IBC to drive their change agenda. As a first step

to maximizing value, we developed a set of key practices to set your delegation—and ultimately your company—up for success for the IBC journey.

Start With a Robust Project Sample

A reliable sample of representative projects forms the basis of a company’s current state. This is the only way to ensure an in-depth analysis is done to accurately determine the health of your project delivery system. [Benchmarking](#) (Figure 10) is the first step to improvement, providing both a performance baseline and data-based reasons for change.

Before the IBC Meeting: Preparing the Delegation

One key practice to maximizing the value of IBC membership is preparing for the annual conference by choosing the employees who can make the most of their time at the meeting. Company attendees should be a cross-functional group, with some consistency from year to year, and representing those who can effect change in your organization. The company’s contingent should include non-project representation like business and should be shaped by the topics on the conference agenda (e.g., a construction manager should attend if there is specific construction content).

Once you have decided who will go, set expectations for what they will accomplish during their time at the conference, including what general and breakout sessions to attend, how they will bring back what they have learned to others in the company, and how they themselves will incorporate learnings.

During the IBC Meeting: Participating for Success

The annual meeting of the IBC provides a wealth of information, from company-specific metrics to broader research findings. The goal is for participants to make the most of their time by fully participating in sessions and by networking with others within and across sectors, as well as with IPA subject matter experts and leaders. Member organizations should also use their individual company breakout session to strategize for change based on key takeaways.

After the IBC Meeting: Turning Learnings Into Action

After the annual meeting, it is critical to share learnings across your organization, for practical application at the project, site, and system levels, as well as to create the case for change with company leadership. To do this, most members centralize general IBC content for larger consumption and then deliver targeted research and findings to specific groups. IPA also provides webinars, which can serve as a refresher for those who attended in person or as a learning

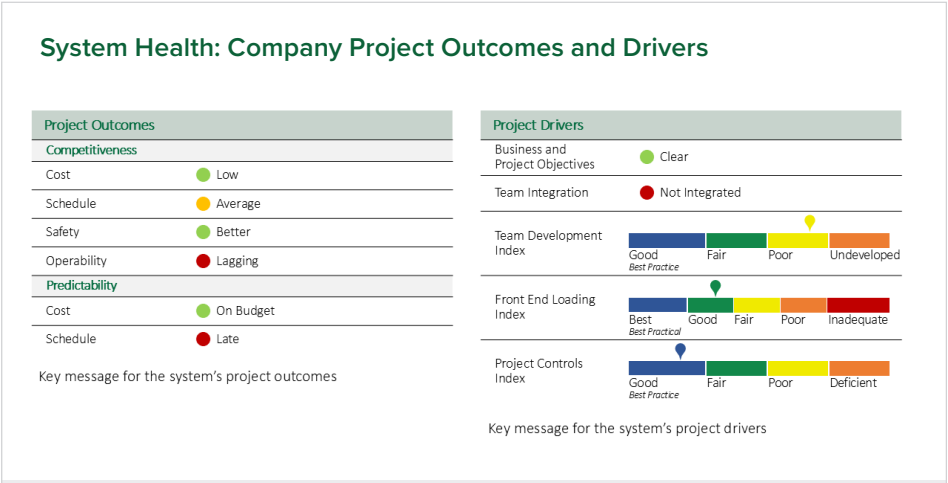


Figure 9

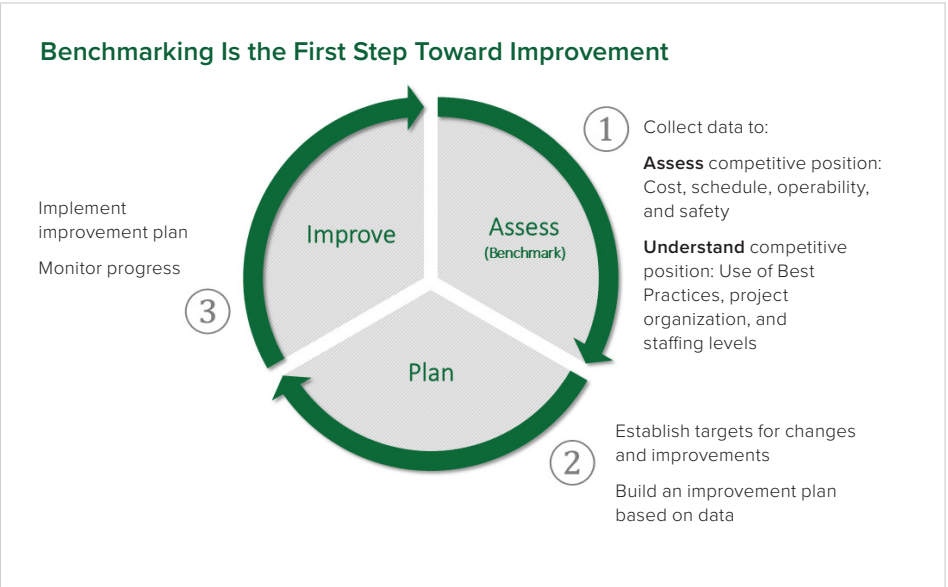


Figure 10

opportunity for others in your organization. In other words, the conference itself begins the learning journey, but the learning extends far beyond the meeting, ultimately shaping your company's continuous improvement efforts and priorities.

This set of key practices gives you an actionable path forward to absorb the content fully and get the appropriate messaging and key issues to the right people in your organization—up, down, and sideways—to decision makers and those who can influence change. The better you are at disseminating important findings and research, the easier it is to implement the right actions to continuously improve.

Still Curious About the IBC and Driving Continuous Improvement?

Please contact Greg Ray, IBC Manager at gray@ipaglobal.com start a discussion about using the IBC to drive your company's continuous improvement efforts.



Risk Register Generator

Are you identifying project risks early enough to avoid costly surprises and lengthy delays? Get a definitive risk register before your core project team is even in place!

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IPA Organizational Announcements

Please join us in congratulating Aliya Mukanova and Sue Ellen Federovitch on their new roles at IPA!



Aliya Mukanova

Aliya Mukanova has been appointed as Operations Manager for IPA's Project Evaluation System (PES®) products, expanding on her current role as Global Quality Manager. In this additional role, Aliya oversees the full lifecycle of IPA's PES® products, driving continuous improvement, while continuing her responsibilities overseeing quality across IPA's worldwide offices. With her extensive experience across multiple industrial sectors (including E&P, refining, and CLSN), countries, and languages, Aliya brings a deep understanding of key IPA decision-making products. Her dedication and expertise will ensure IPA continues to deliver positive change for our clients.



Sue Ellen Federovitch

Sue Ellen Federovitch has been promoted to IPA Chief Executive Assistant. In this role, Sue Ellen provides administrative and strategic execution support to the top executives at IPA. This includes Ed Merrow, our Founder and Executive Chairman; Nekkhlil Mishra, our President and CEO, and our Board of Directors. With more than 20 years at IPA, Sue Ellen is the engine behind keeping our C Suite leaders highly effective. Her exceptional organizational skills, international travel planning savvy, ability to anticipate needs before they arise, and other behind-the-scenes contributions have played a vital role in IPA's success.

What Constructability Review Practices Help Projects Most?

By Andrew Griffith, Director, The IPA Institute

IPA has been measuring Constructability Review use since the mid-1990s. Constructability Reviews have emerged as the most used Value Improving Practice and are applicable to every type of capital project. Over the years, our measure has been binary: done vs. not done. Our new metric, based on decades of IPA research, has further identified Constructability Review (CR) practices that improve outcomes for those projects that use CRs.

What Is Constructability?

The Construction Industry Institute defines constructability as, “The optimum integration of construction knowledge and experience in planning, engineering, procurement, and field operations to achieve overall project objectives.” Achieving this optimum integration requires:

- Proper staffing of project teams
- Established constructability programs
- Structured Constructability Reviews

What Is a Constructability Review and Why Is It Important?

A Constructability Review is a systematic assessment of a construction project’s design, specifications, and execution strategy to identify potential issues that could affect its feasibility, efficiency, and cost effectiveness during construction.

When IPA evaluates a project, the Constructability Review must meet these five requirements to be considered complete:

- Done using facilitated working sessions
- Participation of a multifunctional team, including construction input
- Conducted during FEL, prior to authorization
- Concepts applied to the entire project scope
- Documented results, including a list of proposed actions

IPA research has long shown that CR use is correlated with better project definition (**Figure 11**), which is the

primary driver of improved predictability and execution competitiveness. Moreover, CR use is correlated with more competitive targets and better outcomes (**Figure 12**).

What Does a Constructability Program Include?

A constructability program is an ongoing effort implemented through appropriate staffing of projects, training, tools, and corporate support. Experienced construction professionals provide input into the project design and execution plan following a structured, repeatable work process.

Constructability programs guide engineering to focus on construction requirements. Because construction personnel function as part of the project’s early planning and design team, an effective constructability program changes the focus of engineering. Engineering and construction work are planned together with the construction needs driving the engineering approach. Engineering details are designed with immediate construction input to more closely optimize project costs and schedule. Engineering schedules are crafted based on optimal construction sequences, as opposed to construction schedules based on the promised drawing issue and material delivery dates.

Constructability Reviews generate ideas for improvement. Proposed ideas that target construction cost, time, or safety are documented, prioritized, and assigned for follow-up, including:

- Design sequence to facilitate construction
- Modifications to designs to avoid difficulties or inefficiencies in construction
- Changes to the execution strategy that consider construction
- Modifications to site layouts to provide crane access, adequate laydown space, and access for materials and personnel
- Modifications to methods of construction to improve safety, cost, and/or schedule
- Modifications to schedules that improve efficiency during construction

How Does IPA Measure the Quality of Constructability Reviews?

Following IBC 2022, IPA began gathering data to measure the quality of Constructability Reviews. While maintaining our existing yes/no measure of CR use, which has been a reliable predictor of project results for over 30 years,

we will now measure the depth of CR Best Practices (see **Figure 13**) in individual project evaluations, including pacesetter, prospective, and closeout evaluations, and in our site and system benchmarkings. Our research allows us to provide recommendations to implement these identified Best Practices.

What Does a High Quality Constructability Review Look Like?

Our research identified seven additional practices that go beyond the minimum requirements for a good CR and result in measurable improvements to project outcomes:

- Constructability Reviews conducted in both FEL 2 and FEL 3
- Project team includes the Owner Construction Manager
- Project team conducted a site visit as part of the review process
- Robust documentation was provided to the team prior to the review
- Robust analysis/review that covers a range of issues
- Assignment of responsibility for identified action items
- Documented estimated benefits of each idea

These practices all contribute to high quality CRs and improve project outcomes above and beyond basic CR use. CRs provide value in FEL 2 and FEL 3, and projects that use them in both phases have better outcomes, although only about 50 percent of projects using CRs do them in both phases. Having an owner construction manager on the team for the last review is a more common practice, used by about 80 percent of projects that did CRs. Having this function

Constructability Reviews Use Is Strongly Correlated With FEL Index at Authorization

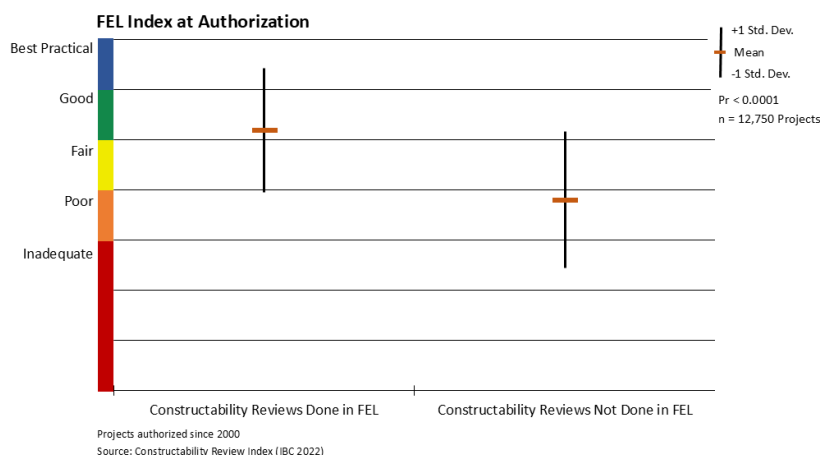


Figure 11

Constructability Reviews During FEL Drive Better Outcomes

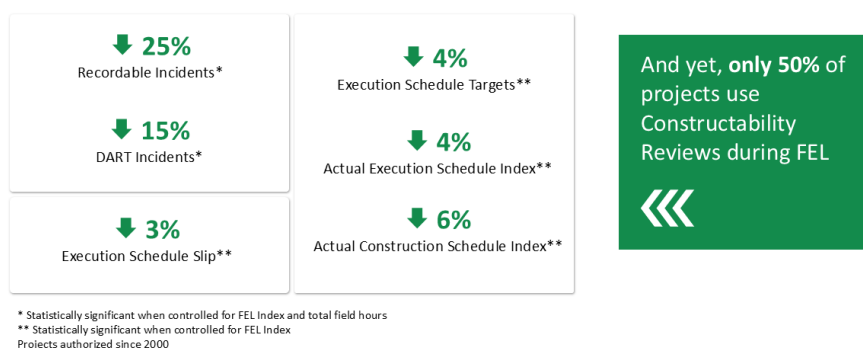


Figure 12

How IPA Measures Constructability Review Implementation

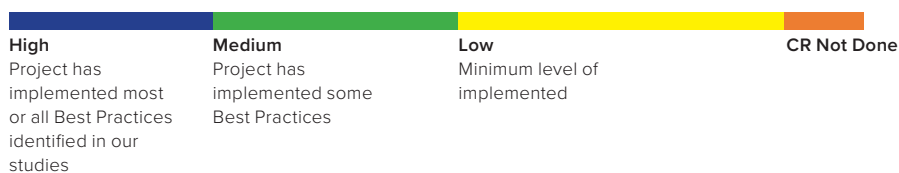


Figure 13

on the team and participating in the CR helps ensure important topics are addressed and minimizes changes during construction. Conducting a site visit, though not always possible, was also used by 80 percent of projects that used CRs and is another important characteristic of high quality CRs.

Among the additional practices, those used the least are robust documentation and robust analysis/review. The elements comprising robust documentation and review are outlined in **Figure 14**.

Another commonly missing element of a high quality CR is the estimate of benefits derived from implementing the identified CR recommendations. Identified actions that have clear benefits, especially those requiring low effort to complete them, are more likely to be implemented than those with unclear benefits. Finally, while two-thirds of projects that did CRs named a specific responsible party for each idea generated, that means that one-third did not, increasing the possibility that the recommendations will not be executed and the identified benefits will not be delivered.

Why Does It Matter?

As mentioned earlier, IPA research has highlighted the value of conducting Constructability Reviews. Continuing research to identify Best Practices for higher impact CRs shows additional ways to make this key practice even better—and to get even better results in schedule duration (**Figure 15**) and cost and schedule predictability (**Figure 16**), important project metrics that have faced performance declines in recent years.

As challenges to project execution—including supply chain issues, labor shortages, and staffing concerns—increase, fine tuning the use of this important practice gives capital projects organizations another tool to drive continuous improvement.

Learn More About Constructability Best Practices

Contact Andrew Griffith, IPA Institute Director at agriffith@ipaglobal.com to learn more about how improved Constructability Reviews practices can boost your projects' outcomes.

Robust Documentation & Review/Analysis

Robust Documentation

- Design Drawings/3D Model
- Project Schedule
- Project Cost Estimate
- Project Execution Plan
- Project-Specific Safety Plans

Robust Review/Analysis

- Design With a Focus on Constructability
- Placement of Job Area (laydown areas, temporary facilities, etc.)
- Plot Plans/Equipment Arrangements/Site Access/etc.
- Construction Methods
- Construction Sequencing
- Project Schedule (design sequencing/procurement/construction)
- Labor Availability

Figure 14

Constructability Review Implementation Index Drives Absolute Schedule Performance

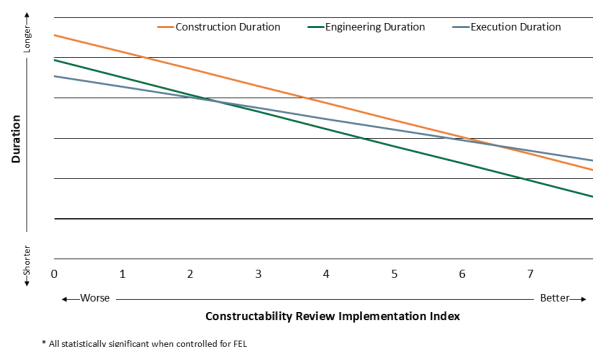


Figure 15

Constructability Review Implementation Index Also Drives Cost Growth and Schedule Slip

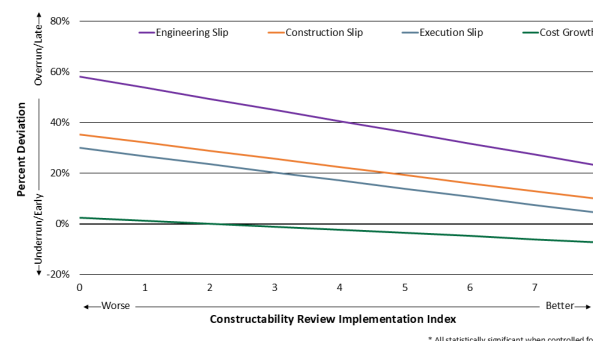


Figure 16



UCEC 2025 Addresses Schedule Risk, Project Controls, and More

By Cheryl Burgess, IPA Senior Editor and Writer

This year's annual meeting of the Upstream Cost Engineering Committee (UCEC 2025) was held on Thursday, June 12, 2025, in downtown Houston, Texas. The annual meeting is an opportunity for cost engineering professionals from our member companies to gather and review the latest UCEC metrics packages prepared by Independent Project Analysis (IPA). Members use the UCEC cost, schedule, and quantity-based metrics and tools for unbiased:

- Conceptual estimating and schedule development
- Estimate validation and review
- Comparisons against industry norms
- Calibration of owner tools

At UCEC 2025, IPA's cost engineering experts shared the updates and highlights of this year's metrics program in addition to the research topics listed below:

Schedule Risk This study analyzes quantitative schedule risk analyses performed in the E&P industry, typically using probabilistic simulation methods, and their effectiveness given the substantial schedule slip observed in upstream capital projects. Through analysis of recent risk registers and IPA data on risk factors that have historically affected upstream projects, the research provides a realistic picture of the effect of key risk categories, while also recommending the inclusion of systemic risks that are often underrepresented in a traditional risk analysis. The study

concluded with recommendations to strengthen schedule risk analysis practices and improve schedule predictability.

Exploration & Production (E&P) Market Trends Study

The E&P Market Trends Study provides the state of the E&P industry in terms of the overall macroeconomic conditions, supply chain situation, observed escalation, and upcoming trends of note on upstream capital projects. The study discussed owner perceptions on supply chain and escalation trends from IPA's first E&P Market Trends Survey.

Project Controls Excellence Decades after creating the Project Control Index, IPA is providing an update to better define what makes good project controls so beneficial. This study covers project controls practices across the industry and their effect on project outcomes, focusing on resource utilization, estimate validation, and progress measurement Best Practices. This session concluded with a presentation of the new Project Control Index and recommendations on how to use this study to strengthen project controls effectiveness.

UCEC 2025 also featured a member presentation from Shell on how to effectively use the UCEC metrics. In addition, live webinars will be held for key presentations in the weeks following the meeting for those who were unable to attend in person.

The UCEC is a committee of IPA clients that have a common interest in cost engineering and metrics development for oil and gas E&P projects. The committee's primary focus is the development and analysis of upstream cost metrics. UCEC also provides research into practices and project characteristics that drive better cost and schedule outcomes.

Contact Shubham Galav, IPA Deputy Director, PRD, Cost Engineering at sgalav@ipaglobal.com to request more information about UCEC membership.

IPA Special Study Highlights: June 2025

Independent Project Analysis (IPA) is most well known throughout the capital projects world for our Project Evaluation System (PES®), a suite of products that we use to help our clients de-risk their projects at different phases in the project life cycle. Many are also familiar with the exclusive metrics and research we provide to members of our Industry Benchmarking Consortium (IBC) and its upstream counterpart, the UIBC. However, many people are surprised to learn that IPA's Project Research Division (PRD) also conducts dozens of short-term special studies for our clients every year.

Each bespoke research study starts with a key question from an owner company about how to overcome the complex challenges they are facing—whether for a project, their portfolio, or their project system at large. When the question cannot be answered through one of our standard products, a new special study is launched. Over the course of a few weeks, our talented research analysts uncover deep insights to answer the question and provide actionable recommendations to help the client make informed decisions. This is made possible by leveraging IPA's vast database containing more than 24,000 projects and 21 million data points, coupled with our proven methodology of measuring project drivers and their effect on project outcomes.

Continue reading below for brief summaries of a few of the special studies we've conducted for our clients over the last few months. If you have a burning question you would like IPA to explore, contact IPA CTO and Director of the Project Research Division, Luke Wallace, at lwallace@ipaglobal.com to start a discussion.

Recent IPA Special Studies

Is Accelerating Project Schedule Worth the Cost?

A large national oil company wanted to understand the risk of cost growth and schedule slip from accelerating a project timeline and circumventing parts of their work process. To meet aggressive target dates to achieve mechanical completion and startup, the team was planning to bypass several assurance steps and reviews. The client's project team recognized that bypassing their process may save time during project definition but would likely result in longer execution times and higher costs because of incomplete front-end work. The question was, how much extra cost and schedule? We answered this question by



examining similar completed projects across the industry in our database and quantifying the influence of skipping specific work process steps on cost and schedule outcomes. These data helped the owner understand the impact of their decision on project performance.

What Are Best Practices for Guiding a Site and Sustaining Capital Project Organization?

A competency center within an international mining, minerals, and metals company needed to boost its ability to support its decentralized site and sustaining capital (SSC) spend. Specifically, the group wanted to be able to confidently guide its many sites on capabilities, staffing, and organizational structure. IPA leveraged our extensive database and decades of experience working directly with SSC project organizations to provide the client with detailed insights on a range of topics. Now, the client has a package of Best Practices that they are using to advise their SSC organization on topics including:

- Project Manager (PM) workload
- Best practices for implementing different site staffing strategies
- Structure models for SSC organizations
- Site staffing analysis
- Project team reference for large SSC projects
- The quantitative value of site-based full-time equivalents (FTEs)
- The quantitative value of centralization
- The effects of functional turnover at the project and portfolio levels

How Do Project Size and Contracting Strategy Affect Team Staffing?

A multinational fuels industry company sought to understand the differences in required project team staffing levels across two dimensions: project size and contracting strategy. IPA reviewed the client's staffing plans for six different project classes—three distinct project sizes (US\$100 million, US\$500 million, and US\$1 billion) with two different contracting strategies for each. IPA has long used machine learning to understand industry staffing norms for capital projects. By comparing the client's staffing plans to similar completed projects in our database—based on project characteristics, scope, and execution factors—IPA was able to identify where the client was aligned and misaligned with industry norms regarding key functions across the life cycle for each project class.

What Is the Market Outlook for the Next Few Years?

Given the continued global market uncertainty, a multinational oil and gas company sought to improve its understanding of industrial capital project markets and ability to forecast market capacity constraints for industrial onshore and offshore sectors. The company was specifically interested in gaining insights to inform portfolio decision making at or before Gate 2 (end of FEL 2). IPA has performed similar assessments for various companies over the years and has developed a Market Stress Index (MSI) to measure the state of the market for this purpose. IPA provided the client with 20+ years of historical trend data on each element of the MSI—including project price

escalation at composite and component levels, lead times for major equipment, market conditions sentiment as reported by project teams, capital investment indicators, macroeconomic leading indicators, and much more. IPA also provided MSI trend data over the last several years and included our forecast for where it is heading through 2028. Now the company has an expected outlook for capital project market conditions over the next several years to aid in portfolio decision making.

What Are the Risks for Using New Technology in a Megaproject?

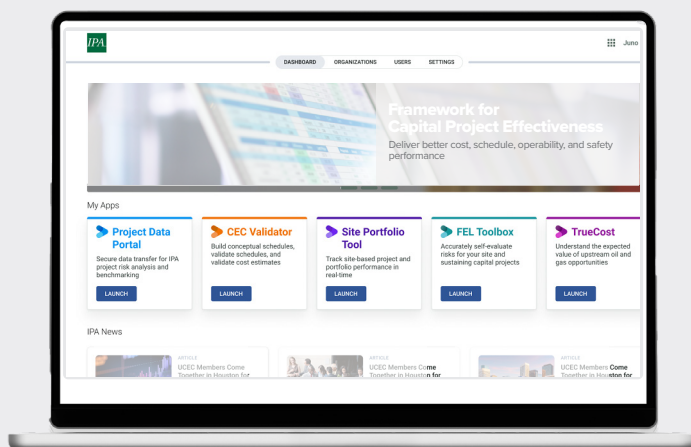
A large multinational oil and gas company asked IPA to perform a risk assessment of a megaproject using technology that is completely new to the company. The client wanted IPA to produce an independent view of the likely cost, early operational performance, and duration of similar new technology commercialization projects. IPA analysts first drew a subset of nearly 2,000 completed projects from its vast database that were similar to the project in question in terms of complexity and technological step-out. IPA then produced a set of metrics for ramp-up, startup, and early operational performance to highlight industry performance as well as potential risks. IPA also provided risk mitigation strategies to increase the client's likelihood of meeting its early operational performance and startup duration goals. The company has already asked IPA to perform a similar New Technology Risk Assessment for another project that is in the early planning stages.

Introducing the IPA Platform

The official gateway to IPA's renowned capital projects database is here!

- 5 powerful applications on 1 shared platform
- 1 password for your IPA applications
- Streamlined user management

LEARN MORE »



IPA Institute Course Schedule

**THE IPA
INSTITUTE**

Advancing Project Knowledge

In-Person Courses	Dates	Language	Click to Register
Best Practices for Site-Based Projects* Houston, TX, USA	September 9–10	English	REGISTER
Framework for Capital Project Effectiveness* Calgary, AB, Canada	September 23–25	English	REGISTER
Megaprojects—Concepts, Strategies, and Practices for Success* Perth, Australia	October 14–16	English	REGISTER
Contracting Strategies for Major Projects* Houston, TX, USA	October 21–22	English	REGISTER
Megaprojects—Concepts, Strategies, and Practices for Success* Houston, TX, USA	December 9–11	English	REGISTER
Virtual Courses	Dates	Language	Click to Register
Front-End Loading (FEL) and the Stage-Gated Process	October 7–9	English	REGISTER
Front-End Loading (FEL) and the Stage-Gated Process	October 27–29	Portuguese	REGISTER
Front-End Loading (FEL) and the Stage-Gated Process	November 25–27	Spanish	REGISTER
Project Stakeholder Alignment Through Successful BEAM Implementation	December 4	Spanish	REGISTER

***Group Discount Available:** Register 3 and send a 4th for free!

About the IPA Institute

The IPA Institute is the training and education division of Independent Project Analysis (IPA), the world's leading advisory firm on capital projects. Our courses equip industry leaders and capital project practitioners with Best Practices for projects, portfolio, and project system management/delivery. All course instruction, presentations, and supplementary course materials are rooted in IPA's unparalleled capital project knowledge and research, and based on data from IPA's proprietary project database.

IPA Events

IBC GCC Roadshow

June 24, 2025

Khobar, Saudi Arabia

Industry Benchmarking Consortium (IBC) members had the opportunity to attend the IBC GCC Roadshow, an exclusive meeting specifically for companies operating in the Middle East! The IBC GCC Roadshow was held in Khobar, Saudi Arabia on 24 June 2025. Attending companies compared key performance and practice metrics—for both large and site-based projects—to understand how well their capital efficiency improvement efforts compare to their peers. Please contact Emily Norman at enorman@ipaglobal.com for more information.

Cost Engineering Committee (CEC)

September 16-17, 2025

McLean, VA

The CEC focuses on advancing the cost engineering and project controls capabilities of the world's leading industrial companies to drive improved business results for capital projects. CEC members get exclusive access to cost and schedule metrics and tools, in addition to cutting-edge IPA research and industry trends—all of which aid in unbiased conceptual cost and schedule estimating and validation. Attendance is limited to CEC members only. Contact Shubham Galav at sgalav@ipaglobal.com to request more information.

Upstream Industry Benchmarking Consortium (UIBC)

November 17-19, 2025

McLean, VA

The UIBC provides an independent forum for each participating exploration and production (E&P) company to view key metrics of its project system performance such as 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. Attendance is limited to UIBC members only. Contact Carlos Tapia at ctapia@ipaglobal.com for more information.