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 1, Issue 1** **March 2009**

## Research Spotlight:
## *10 Most Common Estimating Mistakes*

1. **Too many estimates are prepared with the sole objective of determining "the number."**
   The cost estimate must be suitable as a basis for making an authorization decision AND prepared for project control (capable to support physical progressing).

2. **Cost targets are unrealistically low.**
   Many marginal return projects are authorized because they are based on unrealistically low cost estimates. One common contributor to unrealistically low cost targets is a very low contractor bid. Such low bids are common when project activity declines.

3. **The owner does not prepare a detailed cost estimate, and relies solely on the contractor's detailed estimate.**
   The owner *needs* to prepare a detailed estimate in order to validate bids from the EPC contractor, major equipment suppliers, fabrication and installation contractor, and the FEED contractor's deliverables for the authorization package. In addition the owner's detailed cost estimate should be used for overall project control.

4. **Setting contingency without regard to the project's risks.**
   In many organizations contingency is considered discretionary spending, so when the cost estimate starts growing contingency is seen as a way to cut costs. Contingency money is funds that should be expected to be spent. Higher contingencies are needed

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***Inside this issue:***



NEW COURSE!

## Establishing Effective Capital Cost and Schedule

Setting attainable cost and schedule targets is an important consideration in making investment decisions. A high-quality cost estimate is vital to making informed decisions on the best business opportunities to pursue. Projects often slip their expected completion dates, negatively impacting the cash flows of the investment. This seminar is offered as an in-house company course. By focusing the seminar for an individual company, specific issues concerning the company work process can be discussed. Courses will be customized to meet each individual organization's needs.

***Critical questions this course will help project teams answer:***

- What are the business constraints?
- How does the investment fit into the portfolio?
- What are the various project options?
- What is the best single option for the business case?
- Is the cost estimate reliable enough to judge the robustness of the business case?
- Does the team have enough data and adequate definition to develop a competitive estimate?
- Is the estimate prepared for control?

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for riskier projects, including those that have included new technology and those that are not well-defined.

5. **A cost estimate is often based on published costs or what is heard "around."**
Often a cost estimate is based on the cost of a similar project that is published in a magazine or reported at a conference. As shown in Figure 1, these published numbers are almost always wrong and, more often than not, under-report the costs.

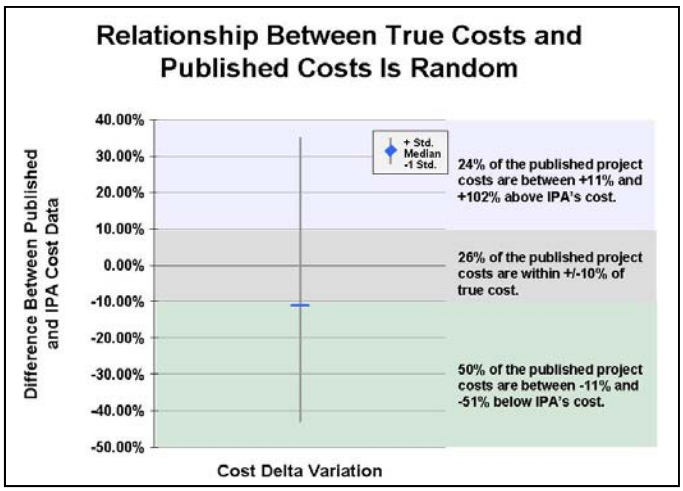


***Figure 1***

6. **Soft costs are meant to be squeezed down to reduce the overall costs.**
A common area of underestimation is in "soft costs" — that is engineering, project management and process design costs. Some common estimating issues with these costs are to overestimate productivity so costs in this area look to be lower than what is needed. Reuse of other similar designs is also a common reason for assuming lower engineering costs. Often these projects with unrealistic engineering cost targets have high overall costs.

7. **Closure is not reached on the project scope until too late in the project's life.**
When a project moves forward into the final stage of definition without reaching closure on the scope, it has a significantly higher risk of design changes, project functionality shortfalls, cost growth, and uncompetitive cost and schedule performance. Without scope stability, there can be no estimate. Projects with less scope development are actually more likely to be authorized because they appear to be less expensive due to the unidentified scope which carries no cost. Costs then rise and these projects do not meet the business goals as defined in the authorization package.

8. **There is no documented "Basis of Estimate" for a Class 3 cost estimate.**
A "Basis of Estimate" documents assumptions, allowances, exclusions, sources, rates, crews, caveats, markups, etc. It serves as definition of the cost estimate.

9. **Critical project resources are not loaded into the schedule using appropriate units of measure.**
A resource-loaded schedule ensures alignment between the cost estimate and schedule. It is impossible to determine if the project's planned approach, schedule, and cost are feasible without evaluating a resource-loaded schedule. A critical element of resource loading is having a common WBS for both the schedule and estimate. A WBS is a grouping of project elements that organizes and defines the total work scope of the project. Without a good WBS, an estimate is useless for control purposes.

10. **The project team performed an insufficient validation of the cost estimate.**
Estimate validation is a quantitative check of the cost estimate as part of the estimate review process. Formal cost validation results in more competitive cost targets and actual costs. Examples of mistakes in this area include estimates that are not validated by an in-house cost engineer and a reliable cost database is not used. IPA data show that owner companies need an in-house expert skilled in cost engineering to validate project cost estimates. Additionally, the use of an owner historical database of solid conceptual cost knowledge, based on empirical data, is correlated with better cost effectiveness.

This list of common estimating practices was compiled from various research studies conducted using IPA's proprietary databases. These research studies were presented at several IPA conferences, including the Industry Benchmarking Consortium (IBC), Upstream Industry Benchmarking Consortium (UIBC), Cost Engineering Committee (CEC), Contracting and Procurement Committee, and the Upstream Cost Engineering Committee (UCEC). For more information regarding these conferences, please visit IPA's website at www.ipaglobal.com.

# Major Components of Process Facility Costs

IPA evaluates capital projects on an ongoing basis. We interview project teams and collect project information throughout the year. However, a disproportionate amount of information is obtained in the fourth quarter. This new information allows us to update and improve our historical trends.

Generally, IPA views the procurement of engineering services, bulk materials, and major equipment to be sourced from world open markets. While local taxes or procurement regulations may affect the price levels, the rates of change over time tend to be closely aligned across regions.

***Engineering Services*** – Figure A reports the historical trend in engineering services. The recent decline is associated with reduced bonuses, profit margins, incentives, etc. The actual decline has not been dramatic to this point as the industry tends to lag overall economic activity, demographic issues continue to challenge the industry, and wages tend to be "sticky downwards."

***Bulk Materials*** – Commodity markets tend to adjust very rapidly to economic conditions. Bulk materials are heavily influenced by commodities, especially metals, such as steel. Since the summer of 2008, many metal prices have dropped by about 50 percent. Figure B reports the trend for a typical mix of bulk materials.

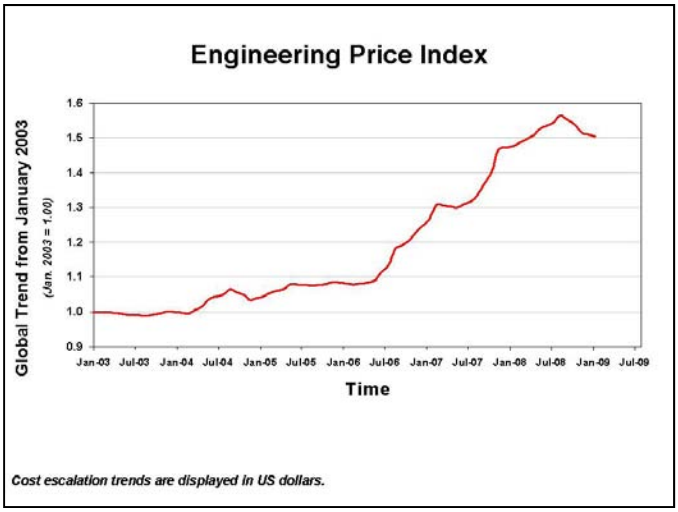


***Figure A***

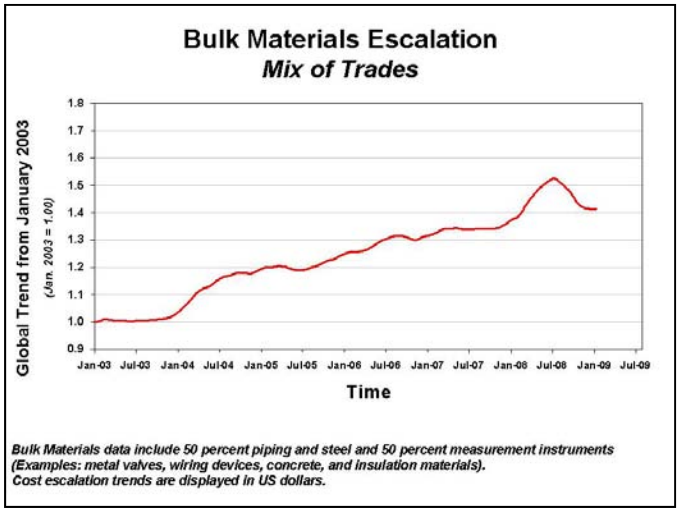


***Figure B***

***Major Equipment*** – The expansion of major equipment production over the past several years has been achieved through multiple shifts and extended delivery times. The economic contraction has seen a shortening of delivery times and the reduction in overtime and multiple shifts. Price fluctuations among major equipment have been quite modest, relative to commodity items. Figure C reports the recent price trend for a typical mix of major equipment.

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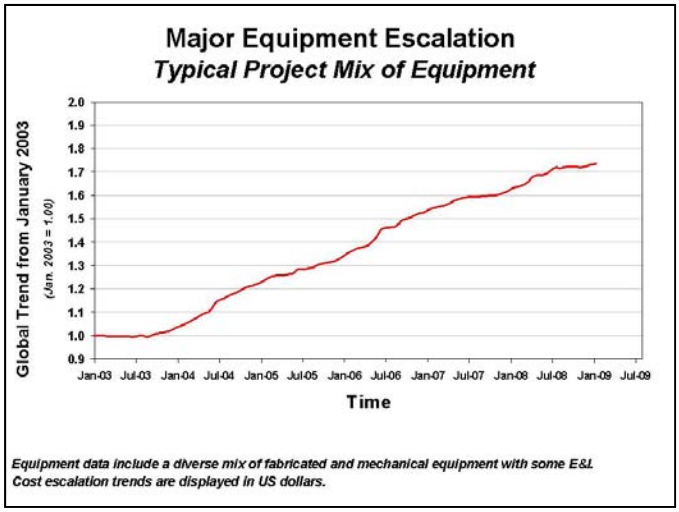


***Figure C***

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***Construction Labor*** – Generally, "all-in" wages for construction labor have begun to decline as overtime pay, bonuses, and per diems have dropped recently. With the decline in overall work activity and unemployment increasing, construction wages will certainly not continue the rapid rate of increase seen over the past few years. Figure D reports the recent trends for several regions.

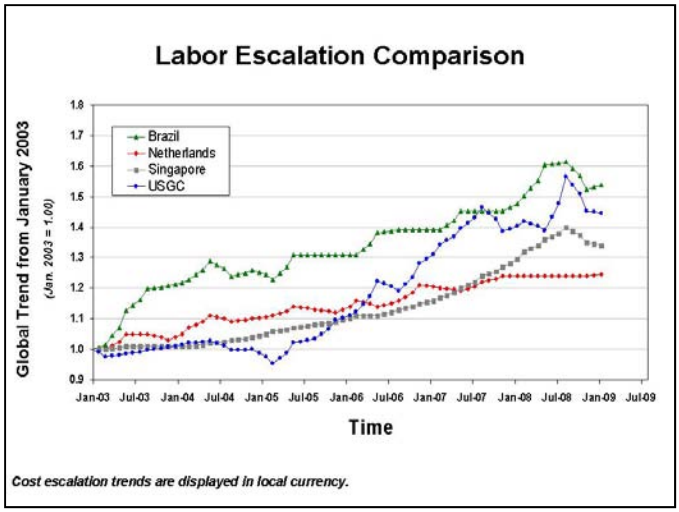


***Figure D***

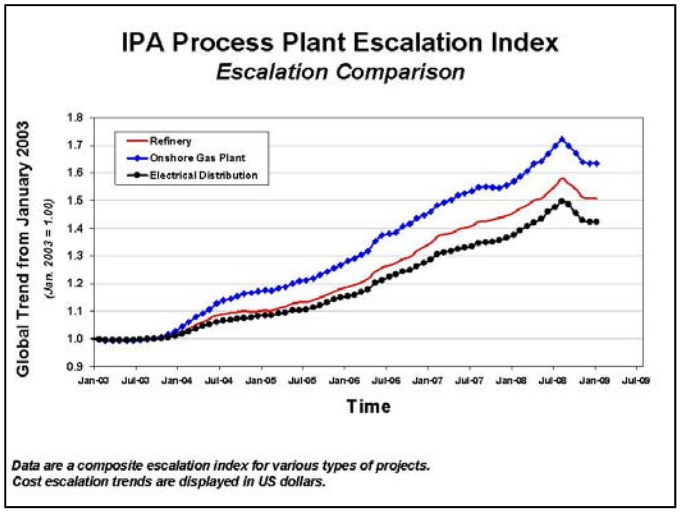


***Figure E***

In summary, capital project prices have begun to decline. The historical composite trends for a typical refinery project, onshore gas plant, and an electrical distribution project are reported in Figure E.

## Boom and Busted - Considerations for Projects Abandoned in Construction

Volatile project input markets and product selling prices have wreaked havoc on project economics. The mixture of souring economics and tight credit markets has caused some projects to be abandoned during construction. Media reporting on abandoned projects focuses on larger projects of major economic and political significance ( e.g., oil sands), projects physically in the public eye (e.g., real estate) and radical new technology projects (bio fuels). However for all these high profile projects there are undoubtedly many more smaller projects that have also been abandoned.

***"...the mixture of souring economics and tight credit markets has caused some projects to be abandoned during construction."***

Projects abandoned in construction are most frequently associated with corporate insolvency. Many of the recently insolvent companies were new entrants to large project development. These owners pursued aggressive capacity growth. Frequently they were recently formed companies seeking to rapidly expand and/or break into new markets. The rapid growth was often outside their corporate experience and area of expertise. Further the risk from an investment in one or two projects could not be balanced against a portfolio of assets. The management and balance sheets of these companies were ill equipped to cover the sharp rise in project cost and the schedule delays. By the time the project was nearing completion, cash had been depleted, product price was depressed, and financing was scarce.

Abandoned construction sites must be either cleaned up or construction is resumed at some point in the

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future. Considering only the projects to be restarted, IPA has collected a log of interesting experiences from projects that were either suspended, suffered major unplanned stoppage (e.g., labor standown) or were heavily cash constrained during construction. Common issues faced by these projects could help future project teams appreciate the complexities resulting from stoppage in construction.

First, there is *almost* no such thing as an orderly shutdown. (We'll come back to the "almost" qualification.) Teams usually cite the reason for project shutdown as the same reason that shutdown was not "orderly". Namely, the project is uneconomic and does not merit further investment or the business is so strapped for cash that it cannot fund its continuation. Either way the project most likely started scrimping well before being abandoned. At the time of shutting the construction site, value preservation was a lower priority than cash preservation. Consequently expectations of a smooth, effective resumption of the project are unrealistic from a cost, schedule, and potentially operability perspective.

The most commonly occurring issues relate to materials and equipment preservation. Construction sites have a poor record of preserving construction materials over long periods. Corrosion, abrasion, contamination, accidents, and shrinkage (theft) all aggressively erode the value of stored material. Common examples include: rainwater accumulating in equipment cavities and causing corrosion, dust and ice destroying sealing surfaces of valves, seizure and damage to equipment bearings that are not rotated. Failure to do thorough inspection and testing of equipment and materials prior to installation can result in heavy rework and very long startup. This applies to both the material in the laydown yard and installed materials.

When the industry hits a rough patch the equipment vendors also suffer. Sometimes equipment vendors go bankrupt while the equipment is in storage. Aside from warranty and installation concerns, sourcing commissioning and operating spares can be a major concern that is only discovered after restart has already commenced.

Permit conditions do change over time. Many projects cite changing emissions requirements or reduction available emissions within a given permits a source of scope change on a restarted project.

Team continuity is an issue for cost and schedule effectiveness but often not an issue we can do a lot about. It takes time to form a construction management team as it does to attract construction contractors and labor who may have reservations going back to a job which was not previously viable.

In summary, every part of FEL that was applicable at the time the original project was sanctioned, is also applicable at the time of project restart. This includes: site factors, project execution planning and validation of as built condition and engineering design. A restart project needs time to complete team formation as well as conduct field inspection before it can assemble an authorization grade estimate. Business should quickly dismiss thoughts of using "to go" costs of the previously abandoned project as a proxy for a detailed bottoms up estimate and schedule.

Lastly, we said there is almost no such thing as an orderly shutdown. In fact there is one type of project shutdown which might be called orderly. There are examples of projects that elected to complete construction and then used inert gas to preserve the projects until the project operation was required. This technique not only assisted with capital effectiveness during execution but also preserved the value of the purchased equipment. This is not an option for all projects and should be weighed against a pessimistic assessment of the stop/restart approach. The threshold at which the project should be abandoned or the project should be completed and preserved is a function of the fixed costs associated with site remobilization and the time period during which the projects will be inactive.

## Upcoming IPA Events for 2009

***March 29-31*** Ed Merrow, President of IPA, will speak at the 2009 International Petrochemical Conference.

***April 21-22*** Rob Young, Regional Director Asia-Pacific, will speak at AusIMM Project Evaluation 2009: *Moving Forward in Challenging Times.*

***April 23-24*** The IBC Roadshow will be held at the Amsterdam Schiphol Airport in The Netherlands. The roadshow will include a Food and Food Ingredients Producers Forum and a Turnaround Effectiveness in the Process Industry Forum.

***May 20-21*** Hunter Mayo, Senior Project Analyst, will speak at the NPRA's 2009 Reliability and Maintenance Conference and Exhibition.

***June 9-11*** The **Upstream Cost Engineering Committee (UCEC)** will be held in Reading, UK. The purpose of the UCEC is to improve upstream project and business results by improving cost engineering functional processes through the use of cost and schedule metrics by developing and analyzing upstream cost metrics. For more information on the IBC UCEC, please contact Carlton Karlik at ckarlik@ipaglobal.com.

***September 15-17*** The **Cost Engineering Committee (CEC)** will be held in Dulles, VA, USA. The purpose of the CEC is to extend the IBC forum to cost engineering practices with a focus on cost and schedule metrics. By using these cost and schedule metrics and research findings, companies can improve their project and business results. For more information on the IBC CEC, please contact Robert Brown at rbrown@ipaglobal.com.

***November 9-11*** The **Upstream Industry Benchmarking Consortium (UIBC)** will be held in Tysons Corner, VA, USA. The UIBC provides an independent forum for each participating company to view its performance against the performance of other companies. The consortium highlights Best Practices, reinforcing their importance in driving improvements in asset development and capital effectiveness. For more information on the UIBC, please contact Rolando Gachter at rgachter@ipaglobal.com.

## 2009 IPA Institute Course Offerings

### *Capital Project Delivery Excellence—A Course for Project Managers (21 Professional Development Units)*

This 3-day training course presents key learnings and Best Practices for project planning and execution.

| | |
|---|---|
| **4/14/09 - 4/16/09: Santiago, Chile** | **6/02/09 - 6/04/09: Chicago, Illinois, USA** |
| **5/13/09 - 5/15/09: Reading, England** | **6/16/09 - 6/18/09: Shanghai, China** |

New!

### *Establishing Effective Capital Cost and Schedule*

This 2-day session provides an understanding of the key elements of cost and schedule estimates.

**3/26/09 - 3/27/09: Herndon, VA, USA**

### *Contracting in the Changing World of Projects - A Seminar on Contracting Strategy*

This day and a half seminar will share knowledge on how contracting approaches and strategy are linked to business value

**6/09/09 - 6/10/09: The Hague, The Netherlands**

### *Mitigating Risks of Innovation*

This IPA workshop shares the findings of IPA research to help participants minimize problems they may experience when incorporating innovation into their capital projects.

**3/31/09 - 4/01/09: Houston, TX, USA**

### *Small and Plant Project Delivery Excellence—A Course for Project Managers (21 Professional Development Units)*

This 3-day training course focuses on capital project planning and execution in the context of small (less than US $5 million) and plant-based capital projects.

| | |
|---|---|
| **4/01/09 - 4/03/09: Brisbane, Australia** | **5/26/09 - 5/28/09: Singapore, Singapore** |
| **4/21/09 - 4/23/09: Houston, TX, USA** | **6/23/09 - 6/25/09: Salvador de Bahia, Brazil** |

### *Successful Megaprojects - A Seminar for Those Involved with Large and Complex Projects*

This seminar is designed to communicate the risks associated with these US$1 billion-plus projects, and share the practices associated with improved megaproject outcomes.

| | |
|---|---|
| **4/28/09 - 4/29/09: Calgary, Canada** | **5/12/09 - 5/13/09: Sao Paulo, Brazil** |
| **5/06/09 - 5/07/09: Perth, Australia** | **6/30/09 - 7/01/09: Singapore, Singapore** |

# New Products and Offerings...

## *Assessing and Mitigating Risks for Capital Investments*

- ***How can you increase the chances of your project coming in on-time and on-budget?***
- ***How can you reduce the chances that design changes and poor execution will erode your project's NPV?***
- ***How can you be sure that contingency funds are appropriate - neither too little or too much when you approve a project?***

IPA is uniquely able to address these questions for high risk project and major capital investments. We have evaluated many projects and have built a database of over 10,000 capital projects performed by the oil, chemical, minerals, pharmaceuticals, consumer products, and other capital-intensive industries. By analyzing the histories of so many projects, IPA has determined the significant success factors for projects and those factors that introduce risk for meeting cost, schedule, and operational goals. In short, IPA has extensive experience in the evaluation and support of "high-risk project execution.

While different project characteristics, execution strategies, and business drivers can all introduce risk to projects and to the companies executing these projects, there are important factors that these projects must have in common in order to be planned and executed successfully: the recognition of the risk and the ability to bring the best tools and strategies to bear to mitigate the risks successfully. IPA offers an empirical perspective to help companies, project teams, and investors assess the level of risk inherent in a project and how that risk carries forward through the project life cycle.

For more information, contact Allison Aschman, Manager, Chemicals, Life Sciences, and Nutrition (+1 703.726.5338), Mary Ellen Yarossi, Director, IPA Institute (+1 703.726.5344), Paul Barshop, Chief Operating Officer (+1 703.726.5351)

## *Customized IPA Institute Programs*

Programs can be customized to meet your organization's needs on request. Any of the Institute course offerings (listed on Page 6) can be offered to a group of project professionals at a location of your choosing. Private company courses provide a more in-depth discussion of your organization's issues. In addition, the topics within the established curriculums can be combined to build a session tailored to your interests.

The following are just a few examples of the types of customized courses we can provide your organization with:

- ***Customized Megaproject Course:*** We provided one of our clients with a 3-day customized Megaproject course. The curriculum consisted of the standard 2-day megaproject course, plus an additional day to discuss specific deliverables of the early project stages and how the client was progressing versus these practices.
- ***Contracting and Risk Management Workshop :*** A 2-day workshop was developed to help a project team understand and quantify the risks associated with their megaproject and with its contracting strategy. This workshop also helped the team to develop plans to manage and mitigate the risks specific to their megaproject.
- ***Scheduling Seminar:*** For a client that needed in-depth training around their schedules, we provided a 2-day workshop. This workshop provided the participants with best practices around scheduling and included an analysis around the client's own project schedules.

To learn more about the IPA Institute's customized courses, please contact Mary Ellen Yarossi at myarossi@ipaglobal.com or e-mail ipainstitute@ipaglobal.com.

IPA
Excellence through measurement®

**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.**



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