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MEGAPROJECTS IN THE ENERGY & CHEMICALS INDUSTRIES:
A Comprehensive Guide for Boards and Executives

Part 3 of 4



PILKO & ASSOCIATES GREY PAPER

Concise summaries of key Operational/EHS and Transaction Risk challenges and how to unlock value for your organization

Pilko & Associates is the Leading Advisor to Corporate Officers and Boards on Operational and EHS Risks – working with clients in 78 countries and advising on M&A deals worth more than \$600 billion.

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Inspiring Transformation 

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Staying on the Rails from Execution to Startup

EXECUTIVE SUMMARY

In this series of Pilko Grey Papers that focus on avoiding **Megaproject Failure**, we explore important aspects of successful projects: a well-staffed project management team (PMT), managing the critical path, and preparedness for successful startup and operation of the facilities.

Successful projects should be executed safely and delivered on-time, on-budget, operate as intended, and deliver the business objective. The success of a megaproject, however, extends beyond schedule, budget, and mechanical completion; true success lies in the safe and successful startup and operation.

Poorly planned and executed completion activities often contribute to cost and schedule overruns. When a project does not operate reliably and deliver the desired commercial results, costs will accrue for repairs and fixes. Achieving project objectives requires meticulous attention to PMT staffing, execution planning, and effective transitions between stages of the project.

What is a leader's role in ensuring successful execution of a capital project?

At the beginning of a project's Execute and Operate phase, project funding has been fully appropriated, detailed engineering is in progress, major equipment has been designed and is in fabrication, and all permits have been obtained. The project team's focus now is to align remaining engineering with final procurement and field execution, finalize the project schedule and staffing plan, and initiate major site preparation and field staff mobilization.

Leadership's role at this stage is to ensure the project is ready for the execution phase ramp up, ensure the organization and the project team are adequately resourced for execution, and enforce

a change management plan that avoids scope changes.

Many projects go-off-the-rails during this stage due to well-intended and justified changes. Even small, seemingly inconsequential changes have a ripple effect adversely impacting cost and schedule. Leaders play a key role supporting the discipline required to effectively manage change.

1. **Build a comprehensive project management team** that includes operations and maintenance representation; understands cost, schedule, and quality tradeoffs; and clearly communicates key issues with stakeholders. Team member responsibilities and accountabilities should be developed, documented, and communicated.
2. **Know and understand the project critical path** including the tailwinds and headwinds that will impact it. Ask probing questions to the project management team. Does the team know the critical path and economics of schedule changes?
3. **Ensure the project is prepared to move to the next phase** in your gated project management system. The project gatekeeper should ensure there are clear standards to measure when the project is ready to move through the gate to the next phase.
4. **Conduct Cold Eyes Reviews ahead of phase gates passage.** A Cold Eyes Review (CER) or Independent Project Review (IPR) can uncover the project team's blind spots while there is still time to react.

1. Building a Project Management Team

The size and complexity of megaprojects requires thoughtful PMT composition. The team should have

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the required decision authority, understand who is and who isn't accountable, communicate with stakeholders, and respect their final customer – Operations.

Team Composition: A successful PMT will have the appropriate skill sets; a holistic approach that balances the need for delivering the project; planning for commissioning, startup, and operations; and developing future project leaders. Define the ways to measure team effectiveness, quantifying team strengths and weaknesses, and skill sets to match the complexities and scale of the project.

The best project management teams consist of the right number of people with the right experience, skillsets, availability, durability, and expertise – all deployed at the right time. Creating a best-in-class PMT, and the mobilization schedule, accounts for project type, complexity, schedule, contracting model, contractor capability, execution plan, and an understanding of project risks. These factors will dictate the activities an owner's team must perform throughout each stage of the project.

Expectations: A successful PMT will receive guidance from the gatekeeper, including requirements to communicate with stakeholders, proactively manage risk using a well-defined risk management system and risk register, ensure operations and maintenance input, and conduct Cold Eyes Reviews to uncover and address blind spots. These practices help maintain alignment, prevent scope creep, schedule delays, and operability. The PMT leadership should have documented project execution plans, milestones that clearly define the project priorities, expectations, and tradeoffs of cost, schedule, quality, and operability. Safety is normally excluded from this list because safety is a value, not a priority.

Communications: A successful PMT will establish regular clear communication and establish practices to collaborate with stakeholders. Items should include functions within the owner company (e.g., operations, procurement, public affairs, human resources) and with external organizations (e.g.,

contractors, governmental agencies, community organizations). Megaprojects should have a well-developed scorecard that can be used to track and communicate performance and progress against indices (KPIs) and milestones.

All projects should have a mechanism for communicating with management, formally and informally.

Operations & Maintenance: A successful PMT will include Operations and Maintenance representative(s). Operations and maintenance personnel bring a perspective to the design process that engineers cannot replicate on accessibility, maintainability, repairability, ingress, egress, and emergency response.

Planning for successful operations and maintenance should begin in the earliest possible project stage in business planning, facility design and layout, and anticipated operations. Early collaboration ensures that operational needs are foreseen and embedded in the planning, layout, and design from the outset; and provide timely input to the commissioning, start-up, and stable operation phases.

The best Operations representative will have respect from their peers and decision-making authority on the project.

2. Understanding and Managing the Critical Path

As previously mentioned in [**Grey Paper #1 Megaprojects in the Energy and Chemical Industry**](#), megaprojects are especially vulnerable to delays due to unforeseen technical issues, weather-related disruptions, and supply chain problems.

The project schedule is foundational to the success of capital projects, providing a structured approach to managing the myriad tasks, stakeholders, and challenges involved. By using detailed project scheduling techniques and understanding the benefits of effective project scheduling, project teams can maximize efficiency and effectiveness,

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ensuring the achievement of project goals. This schedule needs to be collaboratively developed with primary contractor(s) input.

The most prolonged project duration is known as the critical path, and it provides a clear timeline for project completion. A critical path is the longest sequence of dependent tasks that must be completed to execute a project. The tasks are called "critical" activities because the entire project schedule lengthens if they're delayed.

Identifying the critical path is essential for megaprojects because of the numerous interdependent activities. It allows project managers to see where potential bottlenecks may occur. By identifying the critical path, project managers can prioritize tasks, efficiently and effectively allocate resources, mitigate risks, and better ensure project progress. Tasks on the critical path will have zero float, meaning they can't be delayed without impacting the project timeline.

The Owner's PMT uses input from contractors in every project phase (development planning, pre-FEED and FEED), but ultimately determines the startup date that drives the economics.

Managers should ask what activities on the critical path are most vulnerable to delay and what is being done to preclude a delay.

3. Managing Project Transitions

Gated project management systems are now ubiquitous and used to delineate project phases and inject a go/no go decision point between phases. Transitions between gate include concept selection to pre-front end engineering (FEED), pre-FEED to FEED, FEED to detailed design, detailed designed to fabrication, and construction to systems completion, commissioning, and startup. Each transition needs to be tested, planned, and managed.

One test of a company's project management system is how often, if ever, a project is paused at a phase gate because the project hasn't

progressed as expected. Too often, projects are automatically passed through the gate to the next phase. Gates are meant to be "normally closed" and passed only when the gatekeeper is satisfied the project is ready to progress to the next phase.

Let's focus on three of the more important phase gate transitions: detailed design to fabrication, fabrication to systems completion, and commissioning to start-up.

Detailed design to fabrication is a critical transition and there is always schedule pressure to start fabrication. Depending on the fabrication location, the start of fabrication is highly dependent on the completeness of both design deliverables and procurement to match the fabrication sequence. North America and Gulf of Mexico (GOM) fabrication tends to be more design-build sequence with high use of stick-built modules, but with lower relative productivity. Asia fabrication usually requires a high level of design and procurement completeness to match modular fabrication sequences, but with higher relative productivity. Knowing fabricator expectations and planning accordingly will ensure a better schedule.

Fabrication to systems completion is another critical transition. It is essential to start with the end in mind (startup) and work backwards to define the true critical systems required for startup, trading off productivity of work versus first product production.

The last phase of a construction project is the commissioning phase, where the subsystems are integrated together to form the desired process, and tested as a system to verify project specification requirements are met. The term commissioning refers to the activities from the point in the project when construction is mechanically complete (or equipment is installed) until the equipment is placed into service and handed over to Operations. It is essential that Operations is involved with commissioning.

The commissioning team should be defined during the design and early construction phase, to determine the core members of the commissioning

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team as well as the required support resources. The Owner's Operations team is an essential part of the commissioning team because commissioning activities are the best opportunity for the Operations team to learn about the systems and become familiar with new facility operating requirements prior to taking over the systems.

Finally, understanding the impact of carryover work from one phase to another is critical. The carryover of work from the shop to the field or the fabrication site to remote onshore or offshore locations will impose a multiplier on productivity and unit cost and can adversely impact quality and cost.

Managers – specifically gatekeepers - should determine if the project is ready to proceed to the next phase. Are all critical activities complete? Is there carryover work, and is the project staffed for success in the next phase? Are relative priorities understood? Is there a clear understanding of assumptions underpinning cost and schedule estimates? Is the change management updated? Is the updated control plan in place?

4. Conduct Cold Eyes Reviews

Cold Eyes Reviews or Independent Project Reviews are all designed to review and validate a project before committing to the next phase. The scope of CERs can be tailored to review schedule, cost, execution plans, manpower or technology critical for the next project phase. Implemented correctly, CERs can provide information to the project team and gatekeepers allowing them to correct deficiencies and gaps to better improve the potential for a successful outcome.

KEY TAKEAWAYS AND CALL TO ACTION

The best projects start up and operate as designed while meeting cost, schedule, and quality requirements.

Key elements for the best possible outcome are:

- ▶ **Managing the project critical path**
- ▶ **Testing preparedness to pass phase gates**
- ▶ **Requiring well-timed Cold Eyes Reviews**

Pilko has project management professionals with decades of experience managing multibillion-dollar international projects. They can help your company successfully plan, execute, and operate a megaproject.

ABOUT PILKO & ASSOCIATES

Pilko is the Leading Advisor to Corporate Officers and Boards on Operational and EHS Risks in the energy, chemical and related industries, with a vision of transforming operations to be the safest, most reliable, and sustainable.

We help Clients solve their toughest challenges by identifying and mitigating Operational and EHS risk. We advise Clients on Driving Rapid, Dramatic and Sustainable improvement in Operational and EHS performance, as well as advise on mergers, acquisitions, divestitures, and major projects. Pilko Advisors are always brutally honest but respectful.

Throughout 2024-25, Pilko is celebrating our 45th year as a trusted advisor to senior leaders in the energy, chemical, and related industries. The Pilko journey, spanning nearly half a century, has been enriched by each relationship we've built and every project we've undertaken.

This milestone is a significant testament to the outstanding expertise, knowledge, and practical perspective of our team, as well as the trust and loyalty of our clients and partners.

To learn more about developing a world class approach to managing risks, email us at greypaper@pilko.com or contact us at pilko.com.

- ▶ **Building a well-rounded project management team**

