

Synchronizing execution to accelerate infrastructure projects

Published: Mar 1, 2010



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Execution speed has always been critical in the oil and gas industry, especially for infrastructure owners-operators. The benefit of faster execution is straightforward: the faster the infrastructure is built, the faster it starts generating returns on the investment.

Moreover, time equals money not only from an income perspective but also from a cost perspective; the longer a project takes, the more it costs. With projects becoming more and more complex and capital intensive, there is a driving need to change the way execution is managed.

Faster project execution is equally critical to the equipment and machinery suppliers for these infrastructure projects, even though they face a different challenge. Due to the cyclical nature of demand, they must contend

with either too much backlog or not enough backlog.

For these suppliers, it's important to capitalize on demand during the boom of the demand cycle, without the need to invest in additional capacity. Faster project completion frees up manufacturing capacity to start the next project sooner.

By improving execution, equipment manufacturers with severe backlogs can capitalize on peak demand and substantially improve their bottom line. Moreover, faster delivery can also become a source of competitive advantage for these suppliers.

Project "executors" are the final group that must be considered. Executors – or those that conduct the actual work on the projects – may not have an incentive to speed up project delivery if they are paid for time and materials. The longer a project takes the more revenue they earn. However, even for them the situation is changing: many of their contracts now carry bonuses and penalties tied to project delivery.

The question, therefore, is not whether to speed up project execution, but how to go about it. Project execution is a challenge and the current situation is unsatisfactory, not only in the oil and gas sector, but across all industries. So, what does it take to finally get a handle on project execution and realize the full potential of projects?

Execution impediments

There are three major impediments to improving project execution: uncertainties, limited resources, and project complexity.

The supply chains for designing, fabricating, assembling, and commissioning rigs and specialized machinery are riddled with uncertainties. Vendors don't always deliver as planned, customers are slow to approve completed stages, specifications change, unexpected technical problems emerge, designs change to adjust to situations on the ground, work can take longer or shorter depending on who does it, etc.

When uncertainties strike, execution priorities (which tasks to do first) become unclear and unsynchronized – each department and each person then starts prioritizing their tasks differently based on their own pressures and local milestones without regard to overall project delivery.

In addition to uncertainties, different groups within the organization or within a project often contend for limited resources, such as engineers, fabricators, assemblers, barges, trucks, mechanics, facilities, tools, and equipment. To cope, resources are constantly pulled from one area to fix other area's problems. The result is not surprising: delays and firefighting break out all over and the total project time increases.

To compound these problems, large-scale oil and gas projects are extremely complex, combining a large number of people, departments and organizations, often in different locations. Coordinating the activities of all of these individuals and groups is very difficult, but because of the complexity of the project, coordination and synchronization are more important than ever.

As projects become late, firefighting occurs and resources are pulled in multiple directions at once, priorities change and people are forced to multitask. When this happens, managers' ability to control outcomes is compromised and they often suffer a near-total loss of control. They cannot predict when a project will finish because holdups keep happening. Also, they don't know how much capacity is really needed because no matter how many resources they provide, projects continue to be late.

The net impact is that projects take much longer than they should, deliver less scope than originally planned, and are costlier than they need to be. In addition, resources are less productive than they might be.

Methods that fail to deal with uncertainties

Experienced managers intuitively know the devastating effects that uncertainties and limited resources can have on a project. Their response is to start projects as soon as possible, hoping that it will give them room to deal with uncertainties as well as resource contentions. However, the reality is quite the opposite. Starting new projects only creates more competition for existing projects, and the resulting multi-tasking destroys schedules and kills productivity.

Examples of Results¹

Projects Description	Before	After
Design and manufacturing of oil and gas platforms	Design Engineering took 15 mos. Production Engineering: 9 mos. Fabrication & Assembly: 8 mos.	Design Engineering: 9 mos. Production Engineering: 5 mos. Fabrication & Assembly: 5 mos. 22% higher labor productivity
Design, development & upgrade of telecommunications switches (300-400 active projects, 30+ deliveries a month)	Lead times were long On-time delivery was poor 2,000 people	10-25% reduction in lead times 90+% on-time delivery 45% increase in productivity
Pharmaceutical research and development	Completed 5 projects/qtr in 2005 55% projects delivered on time	12 projects/qtr in 2008 90% projects on time No increase in resources
Customized customer billing and management systems for the telecommunications industry	Market pressure to reduce project cost and cycle time	Increased revenue/person for 4,000 people by 14%, reduced project cycle time by 20%
Steel plant maintenance	Boiler Conversion: 300-500 days Routine maintenance and upgrade took too long	Boiler Conversion: 120-160 days Reduced maintenance and upgrade durations by 10-33% in Yr 1, and another 5-33% in Yr 2
New product development (home appliances)	34 new products per year 74% projects on time	Increased throughput to 52 new products in Yr 1 and 70+ in Yr 2, with 88% projects on time and no increase in head count
Helicopter repair and overhaul	H-46 aircraft turnaround time was 225 days H-53 aircraft turnaround time was 310 days Throughput was 23 per year	Reduced H-46 turnaround time to 167 days, with more scope Reduced H-53 turnaround time to 180 days Delivered 23 aircraft in 6 mos.
Repair & overhaul of C5 aircraft (cargo planes used by the U.S. Air Force)	Turnaround time 240 days 13 aircraft in repair cycle	Turnaround time 160 days 7 aircraft in repair cycle 75% reduction in defects
Equipment for manufacturing solar panels (engineer-to-order)	Revenues of €130 M Profits of €13 M Cycle Time 17 weeks 80% on-time delivery	Increased revenues to €170 M Increased profits to €22 M Reduced Cycle Time to 14 weeks 90% on-time delivery

¹Source: Presentations by respective organizations at Realization's Project Flow conferences, 2004-2008 available at www.realization.com/results, where more examples can be found.

In addition, to gain control, managers insert hard dates (artificial milestones) in the schedule and hold people accountable to meeting those due-dates. Yet, setting hard dates in an uncertain environment only makes people add hidden "buffers" to their estimates, which are vigorously defended if questioned. Unfortunately, these buffers get wasted in execution as "Parkinson's Law" (i.e. putting off starting work until it becomes urgent) sets

in. Work rarely finishes early.

Finally, organizations have invested a great deal of time and money implementing detailed planning and tracking systems to give them "visibility" into projects. Unfortunately, these systems primarily provide after-the-fact reports that help assign blame for delays and do virtually nothing to improve project execution.

To synchronize execution, frontline supervisors need clear task-level priorities, within and across projects. Moreover, highly urgent tasks should be highlighted so that managers can focus their attention and take extraordinary actions where needed. Project managers need early warning signals to spot problems that threaten project completion.

Synchronizing project execution

While the execution problem is complex, its solution need not be. In fact, complex methods and sophisticated software that rely on detailed schedules and complex inputs are not practical in the real-world. What's needed is an elegant solution that solves the synchronization problem while making the work-lives of first line managers and projects managers easy.

Synchronized project execution challenges conventional wisdom and changes three main precepts of project management.

- **Instead of trying to keep people busy, concentrate resources on fewer streams of work at a time** – this eliminates multi-tasking and the need for individuals to decide which of multiple tasks they should work on first
- **Instead of finishing tasks on time, focus on finishing the project on time** – requiring tasks to finish on time only induces people to build safeties (local buffers) into their commitments. Eliminating the focus on individual task deadlines and implementing an overall project buffer allows the entire project to be finished sooner. The final project deadline is the only deadline that really matters.
- **Instead of creating highly detailed schedules, focus on task prioritization** – Tasks that are consuming the most project buffer are given the highest priority to keep the entire project on track. Engineers and crews focus on a single task at a time and, when finished, are give a new task based on priority. Since the entire organization works towards the exact same set of priorities, synchronization improves, work flows faster, and productivity increases. The status of the project buffer also provides early warning signals so managers can react before problems become worse.

Engineering organizations and project-based manufacturers around the world have implementing this new Project Execution Management method to shorten delivery times by 20% to 30% and increase productivity by 15% to 20%. These types of savings in the oil and gas industry can dramatically increase profits and accelerate cash flow for all participants in the infrastructure supply chain.

Change management

Putting the new method in place and sustaining the new rules requires the implementation of a complete execution management system that includes:

- **Operational goals and measurements to achieve business goals.** Operational goals include targets for cycle time reduction; improvements in throughput; and due-date performance plus measurements that promote execution according to synchronized priorities and early warning signals.
- **Management policies and processes** to enforce the new rules, as well as translate these rules into decisions and actions readily understood by all.
- **Execution-oriented project plans** with enough detail to provide good execution priorities, but not so

detailed that control becomes difficult.

- **Enabling software** that helps managers prioritize and meter the release of new projects, put buffers in the right place, and synchronize day-to-day priorities and alert managers to potential problems.

Real world example

After implementing a Project Execution Management system that includes the elements described above, one Houston-based manufacturer, designer, and implementer of systems and equipment for a wide range of heavy industries, was able to complete the design engineering of a first-in-class class rig in 35% less time than it took using traditional project management methods, creating six months of extra capacity. In product engineering, a hull structure design was completed in 44% less time, dropping from nine months to five months.

Conclusion

Project execution has been an unsolved problem for too long. A new method of managing project execution that is simple, straightforward, and field-proven in a wide range of organizations is available. Many players in the oil and gas sector can take advantage of this method, provided they are ready to challenge the conventional management precepts.

About the author



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