Board Oversight Of Major Capital Projects

by Richard Westney, Jack Evans, and Stephen Tsai

"Bet the company" projects are more than just a figure of speech for corporate directors. Boards are often called upon to weigh and approve massive capital projects that will provide needed capacity for the future—or could break the company's finances. How should the board hone the expertise it needs to wisely review capital "mega-projects?"

Boards in capital-intensive industries face funding decisions for multi-billion dollar projects for new or expanded production facilities. Many directors are uncomfortable making these decisions. While they know that most large engineering and construction projects experience cost overruns and delays, they also know that the specialized, technical nature of these projects makes it tough to judge how much confidence they should place in a project sponsor's budget and schedule. They often feel they have no choice but to approve the funding and hope that, this time, things will go as planned.

Most large engineering and construction projects will exceed their estimated costs and time to full production.

Project cost overruns and delays on major capital projects are nothing new. Thirty years ago, the Business Roundtable, concerned about low productivity and inflated costs, initiated the *Construction Industry Cost Effectiveness Project.* The result was a loud wakeup call, and capital-intensive industries responded by making large and continuous investments in developing project management best practices and the capabilities needed to implement them.

While it seems reasonable to expect all that time and effort would, by now, have markedly improved project predictability and performance, this is not the case. Studies of large engineering and construction projects still show that:

☐ *Most projects are likely to exceed their estimates of cost and time to full production.* Industrial projects costing more than $1 billion have only a one in three chance of achieving completion within 125 percent of budget. In some industries, such as oil and gas, it is even worse, as the probability of success is closer to one in five.

☐ *Overall project predictability is poor.* Even among those organizations with formal project development processes, fewer than 20 percent have predictable outcomes across their project portfolio.

☐ *Few projects meet all their objectives.* Only 2.5 percent of major projects met all their objectives of scope, cost, schedule and business benefits.

These are the projects that drive future revenues. In some cases, they are a "bet the company" proposition. Analysts pay close attention to how well company leadership delivers on its capital investment programs. Recent trends have made these concerns even more acute.

☐ An energy project built today costs twice as much as the same project eight years ago.

☐ Project costs are rising twice as fast as a decade ago.

☐ Projects are much bigger. Eight years ago, a $1 billion project was considered so intimidating it was dubbed a "mega-project." Today, mega-projects are common, and can easily cost $10 to 50 billion.

Large projects continue to overrun despite widespread use of project management best practices. All this puts corporate boards in a tough spot. While investments in new facilities may be essential to growth, the funding decisions are surrounded by uncertainty.

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Mega-Projects, Mega-Overruns
Capital Projects That Went Astray

Most major cost overruns and delays result from issues that could have been discovered prior to sanction. Examples include:

☐ *Olkiluoto Nuclear Power Plant (Finland).* In February 2005, the Finnish cabinet gave permission to a power generation consortium to construct a new nuclear power plant. Today, the project is six years behind the original schedule, and the cost estimate has grown from $4.2 to $11.1 billion. According to an inquiry by the Finnish nuclear safety regulator, the root cause is that builders were not used to working to the exacting standards required on nuclear construction sites, since so few new reactors had been built in recent years.

☐ *Snohvit LNG (Norway).* Although liquid natural gas deliveries had originally been scheduled to start in October 2006, production did not begin until a year later, and the budget, originally set at $6.8 billion, was revised to $9.9 billion. Studies determined that the project was at an immature stage of definition at the time of sanction. This led to significant changes in both the engineering and the project execution plan which drove the overruns.

☐ *Sakhalin II oil and gas development (Russia).* The cost of this complex oil and gas development, originally budgeted at $10 billion, more than doubled, and completion was over a year late. Executives in the operating organization acknowledged that projected startup dates for offshore production were optimistic, and that cost estimates did not account for the technical and environmental challenges the project faced.

(Sources: Financial Times, Oil & Gas Journal, and Reuters)

Cost overruns and schedule delays are not inevitable. Board members can improve their understanding of project risks by asking the right questions, and knowing how to recognize good answers.

☐ ***Due diligence provides an outside view that can offset bias.*** In his best-selling book *Thinking Fast and Slow,* Nobel laureate Daniel Kahneman uses the idea of "WYSIATI" (what you see is all there is) to explain the misconception that causes overconfidence in decision-making. As Kahneman puts it: "You cannot help dealing with the limited information you have as if it were all there is to know."

In the capital project scenario, there is a lot to see—the impressive amounts of costly engineering, planning and analysis that form the basis of the proposal. Yet that is not all there is. Kahneman cites the high failure rate of major projects as an example of how this tendency towards tunnel vision creates the illusion of predictability that results in unfortunate outcomes.

He suggests that an outside view be used to test the validity of the proposal. Many key business decisions require due diligence by an unbiased third party to ensure that the costs and benefits of a proposed investment, such as an acquisition, are realistic. However, when the investment is a major capital project, it seems the level of due diligence tends to be minimal or absent altogether.

Project sponsors should be able to show the board how an outside view, via such techniques as peer reviews, "cold-eyes" reviews, independent risk and readiness assessments, benchmarking, and/or predictability metrics, can give the board confidence in the funding decision.

☐ ***Estimate "contingency" is not meant to cover the risks that cause most projects to fail.*** The "contingency" estimate is usually among the largest single elements of a project cost estimate. In spite of its impact on project cost, the derivation and use of contingency are widely misunderstood. Contingency is included in an estimate to acknowledge the fact that what you see is not all there is. Project cost estimates are always based on imperfect information; quantities, pricing, execution methods, and productivity will inevitably differ from the basis of the estimate.

Since, in most cases, these tactical variations to the estimate basis add time and cost, a contingency is required, typically from 10 to 25 percent of the base estimate. Contingency funds should be considered an inherent part of a cost estimate—money that will be spent even if everything goes according to plan.

Since the dollar amount of contingency is often

quite large, it is easy for a director to assume that there is plenty of money there to cover all the risks. This creates yet another source of overconfidence, since contingency is not meant to cover the external, strategic risks that are usually the reason projects fail. Geopolitical, location, global economic and project-specific market risks can greatly impact major projects, but are outside the capability of project teams to control.

Project sponsors should be able to show the board how strategic risks were assessed, ensure they are well-understood by board members and, since they are not included in contingency, be able to recommend funding provisions, such as management reserve, to cover them.

☐ ***Large projects have numerous stakeholders who are inevitably misaligned.*** When stakeholders are misaligned, the project suffers from delayed decisions, wasted effort, and lost opportunities. A partial list of typical stakeholders includes:

- Financial stakeholders: joint venture partners, non-operating (passive) investment partners, lenders.
- Governmental stakeholders: regulatory agencies, taxation agencies, government-owned operating companies.
- External stakeholders: community organizations, non-governmental agencies (NGOs), labor organizations.
- Internal stakeholders: business units, functional organizations, audit and oversight functions.

These stakeholders will inevitably have different goals, levels of risk tolerance, priorities, and perspectives. Still, project sponsors should be able to show the board how alignment between them has been established and will be maintained. Possible techniques include steering committees; integrated teams; and well-defined plans for communication, allocation of responsibilities, issues management, change management, and decision-making.

Mega-projects consist of numerous subprojects, each a major project in its own right. Project management skill must now be supplemented with overall program management.

Too Optimistic?
Seven Questions Boards Should Ask

Following are seven questions boards need answered before funding a major capital project—to correct the bias toward optimism and overconfidence:

- ☐ What due diligence was done to ensure that the estimates of project cost and time are realistic?
- ☐ What risks are considered in the assessment of contingency, and what risks are excluded?
- ☐ What was done to ensure alignment within the company, as well as with partners and external stakeholders?
- ☐ What is the plan to ensure that the company can provide the specific capabilities this project requires?
- ☐ What is the level of confidence in the contractors who will be working on the project?
- ☐ What is the probability that the actual, final cost will exceed the estimate by more than 10 percent?
- ☐ What lessons learned from other projects, both by our company and others, are reflected in the planning and estimates?

☐ ***Competencies to address the size and complexity of today's major projects are often lacking.*** As mega-projects have become more common, the competencies needed to manage them have become less so. Just as best practices were developed for the projects of the 1990s, so were many of the systems now in place to manage them.

For example, a mega-project consists of numerous subprojects, each a major project in its own right. Project management competencies must now be supplemented with overall program management.

Since the number of interfaces increases exponentially with project size, interface management competencies become critical. With project-level risk management focused on tactical issues, strategic risk management is now required to focus on external threats. While contractors provide many of the needed competencies for conventional projects, now a strong and capable owner organization is required to provide capital stewardship and assure a predictable outcome.

Project sponsors should be able to show the board how they have identified all the required competencies and developed an organization that will provide them.

☐ ***Engineering and construction contractor capabilities must be vetted and risks well allocated.*** The global population of engineering and construction contractors provides impressive capabilities. Nevertheless, major projects can fail even when such world-class contractors are engaged. There are many reasons for this, but a major factor is how well a specific contractor, in a given location, can provide a specific project's resources and skills. Another is the extent to which the contract strategy provides the optimal allocation of responsibilities and risks.

As size, complexity, and risk increase, past experience with certain contractors and their skills become less relevant. Questions such as how best to allocate responsibilities and risks become more critical, as does assurance that the required capabilities will be in place. Many executives mistakenly believe that a lump-sum, turnkey contract means all risks have been transferred. In fact, the terms and conditions of these ventilated lump sum contracts may leave the owner holding most of the risk.

Project sponsors should be able to explain to the board how a project-specific contract strategy was developed, how the contractors' ability to perform was vetted, and how the contracts provide an optimal allocation of risks.

☐ ***Project sponsors often use single-point estimates that fail to reflect the full range of likely outcomes.*** Estimates of project cost and time require forecasting multiple future events and conditions. What is important is not so much the validity of a single-point estimate, but the likely range of possible outcomes. Nevertheless, project sponsors and boards often become anchored on a single value, and infer an accuracy that is not achievable.

Given the uncertainties associated with large projects, board decisions need to be informed by well-thought-out probability analyses of project cost and time. This requires simulation models that reasonably reflect future realities, plus open-mindedness to potential scenarios that are quite different from the proposed plan. These results are critical in ensuring that the board is aware of the full range of tactical and strategic risks, and the associated financial exposure.

Project sponsors should be able to discuss all the risks and uncertainties, their potential impact, and the plans to mitigate them. The board should be able to review the results of the various probabilities, and decide whether the proposed budget and schedule represent an optimistic outcome in which everything goes according to plan, an equal chance of over-run or under-run, or a conservative value. Since most boards will tolerate a 10 percent cost overrun without requiring further approvals, know the probability that the actual final cost will not go over 110 percent of the approved budget.

☐ ***Lessons learned are often ignored.*** Project sponsors and teams may tend to ignore or minimize clear indicators from comparable projects that their optimism and overconfidence may be misplaced. These may involve trends in market conditions that will increase prices and lead times, difficulty in complying with unstable regulations, or problems with a particular technology. While an outside view may help identify lessons from others, an internal review of past and current projects is also useful. Lessons may also point to things that worked well, such as a new strategy to comply with local content requirements overseas.

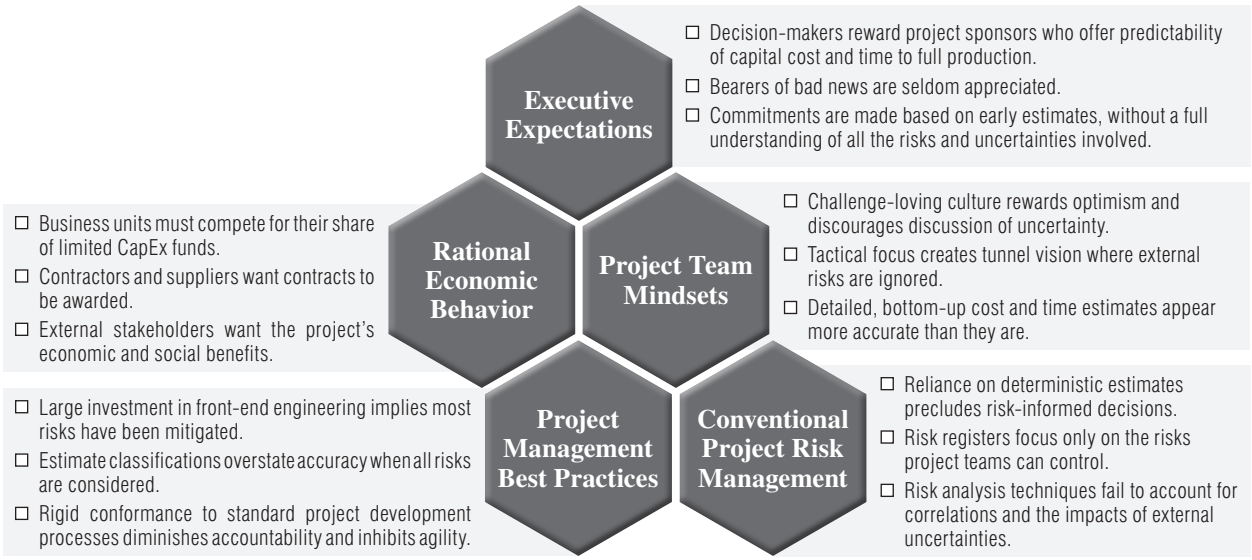
Project sponsors should be able to show the board how the realities learned from external and internal projects have been identified and incorporated into the project plan, budget, and risk assessments.

A bias towards optimism and overconfidence is built into almost all project proposals.

Peter Drucker once said, "Management by objectives works if you have the right objectives. Ninety percent of the time, you don't." Major projects often start off with the wrong objectives. Project sponsors, managers, and teams have a strong bias to be optimistic in their predictions of cost and time to full production, and overconfident in their assessment of the range of possible outcomes.

The Illusion Of Predictability

How Organizations Unintentionally Encourage Biased Decisions



This is not to suggest intent to deceive. Instead, it is the result of the following five characteristics that drive the built-in bias in project proposals:

☐ *Executive expectations.* Many executives believe that setting aggressive targets inspires people to their best performance. This can work when individual effort is the primary driver of results, and many managers see project management as that sort of situation. However, the large projects of today are more vulnerable to external risks and uncertainties, many beyond a project manager's ability or authority to control. Nevertheless, most executives reward the project manager who displays a can-do, confident attitude.

Making matters worse is the tendency to make commercial commitments and set stakeholder expectations early in the development process, when the estimates of cost and time are preliminary and likely to be low. Early commitments can have the effect of anchoring management in unrealistic expectations. Later, a project manager who has better information on which to base more realistic estimates may well decide to keep quiet, fearing that to reveal higher values would be a career-limiting move.

☐ *Rational economic behavior.* Heads of business units who seek to expand an existing facility or build a new one usually must compete with other executives for funding. To be competitive, their project must exceed the "hurdle rate" (i.e., the minimum return on investment), and this tends to cap the capital cost the project can bear. This pressure to minimize the estimates of cost and time to full production is then passed on to the engineering contractors and key suppliers who develop the project scope, plan, and cost estimate. They also have an interest in seeing the project get funded.

☐ *Project team mindsets.* Engineering and construction projects require hard work and long hours, often under very difficult and sometimes dangerous circumstances. The managers and teams who self-select for this work are typically optimistic and self-confident. This is a good thing, as long as the associated tendency to underestimate cost, time and risk is recognized.

Project teams are usually dominated by the engineering mindset, which is focused on developing technical solutions and working the details. They may ignore or simply make assumptions about the

ambiguities that surround the project. For example, "bottom-up" cost estimates are often thought to be the most accurate, but this is not always the case, since the bottom-level details are seldom fixed at the time the estimate is prepared.

☐ *Project management best practices.* Much has been done to develop and implement project management best practices. The goal is to ensure that a project is predictable when the final investment decision is made. This requires a considerable amount of effort in the early stages (the "front-end") so that the engineering and planning are reasonably well-defined. Governance models ensure processes and procedures are applied consistently to every project in the portfolio.

Corporate boards are told that, as a result of conformance to these best practices, there is an acceptable probability that the actual final cost and duration of the projects they are asked to fund will be reasonably close to the estimates. Yet statistics show that, even when best practices are dutifully applied, a high percentage of projects have major overruns. So, while best practices are certainly worthwhile, this alone is not sufficient to provide the predictability that corporate boards require.

☐ *Conventional project risk management.* Given the high occurrence of cost overruns and delays, it is not surprising that a great deal of attention has been paid to project risk management. Common practices include listing detailed risks in a risk register, and using Monte Carlo simulations to calculate the probabilities of cost and schedule overruns.

Project teams tend to focus on the risks they understand and can control. The resulting tunnel vision causes the broader, external risks that drive large projects to either be ignored or minimized. While it is easy to be impressed by the mathematics involved in this type of analysis, too often it only gives unwarranted credibility to an unrealistically narrow distribution of possible outcomes.

Corporate boards have a definite role to play in making capital projects predictable. Even though directors are far removed from the technical and planning details of a project, the funding decisions they make, and the way they make them, are major drivers of project success. Understanding the root causes of bias towards optimism and overconfidence, and knowing what to look for to assess and correct them, are important steps in developing a reasonable level of confidence that a project will succeed. ■