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Subject: Westney Advisor article
Date: Friday, January 23, 2009 10:39:46 AM
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Jason,

Not sure if you saw this article when poking around the "new" Westney webpage...

Regards,
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Enabling Capital Project Predictability

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Are Stages & Gates Destroying Predictability?

The Unintended Consequences of Front-End Loading

The Westney Advisor
August 2008

The principles of Front-End Loading (FEL), and the various "stage-gate" processes that provide the framework for implementing them, are generally well-accepted and certainly broadly applied on major projects. Yet the overall predictability of capital project portfolios has become a significant issue as many major projects experience significant cost overruns and schedule delays even though a stage-gate process has been diligently followed.

Clearly, there are other forces at work. Is it possible that our focus on rigid adherence to process can blind us to important perspectives that need to be considered if projects are to succeed?

This article reviews the basis of our current best practices, compares it to the demands of projects in today's environment, and suggests a new approach to improve decision-making and predictability.

[*When Bad Things Happen to Good Projects*](#)
[*Conventional Wisdom Works Well – for Conventional Projects*](#)
[*Unconventional Projects Need Unconventional Thinking*](#)
[*The View from the Tunnel*](#)
[*An Unconventional Approach to Front End Loading*](#)
[*Summary*](#)

[*When Bad Things Happen to Good Projects*](#)

How could it happen? The team apparently did everything right.

Knowing the project would cost many billions, and had great strategic importance for the company, the project team carefully followed a stage-gate process, investing significant effort in each stage and preparing comprehensive decision-support packages at each gate. Project Reviews, Peer Assists, and Project Audits were conducted to ensure compliance. Years later, by the time the project was sanctioned, every aspect of the design had been thoroughly studied and defined.

The executive committee was assured that this level of "Front-End Loading" (FEL) provided high confidence of success. And so the project was approved, with all stakeholders expecting a final cost within budget, and a revenue stream beginning on or ahead of schedule.

Yet it did not take long for things to turn south. Unforeseen price increases caused early and significant overruns in engineered equipment and bulk materials, with corresponding increases in lead times. Host country legislation changes delayed permits and increased local content requirements, reducing productivity and further increasing cost. As the

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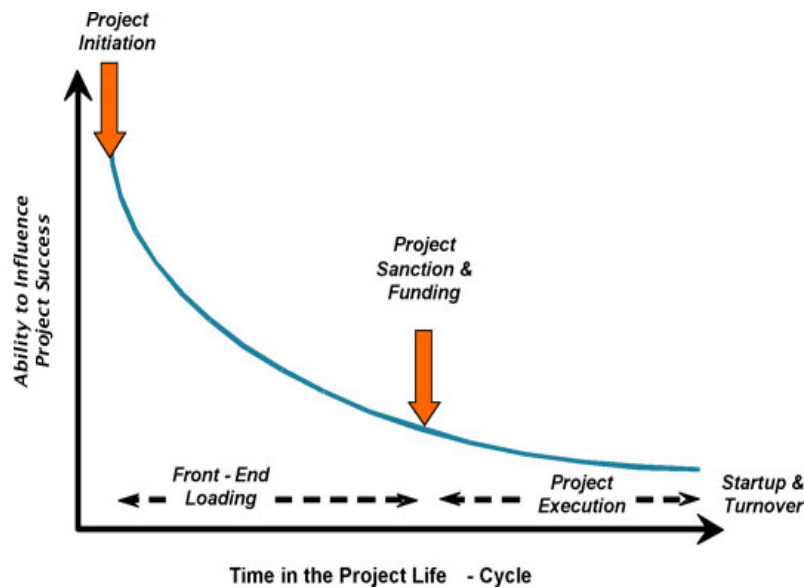
construction work began, the project found itself competing with unanticipated demands for skilled labor and supervision, and was never able to mobilize the full complement of required workforce. Since the engineering & construction contractors had been unwilling to accept project risks, the owner's executives found themselves explaining to analysts and shareholders why the project was costing much more than expected, and revenues would be delayed.

We see this story repeated over and over. Clearly, in spite of all the work being done in Front-End Loading, something important is getting missed.

Conventional Wisdom Works Well – for Conventional Projects

There is well-developed body of knowledge for planning, development, and execution of major engineering and construction projects. Since the seminal Business Roundtable study in 1984, considerable effort has been spent in improving our understanding and inventory of best practices. Chief among these has been an increased emphasis on the critical early stages of a project, when plans and decisions have by far the most influence.

The "Influence Curve" promulgated by the Construction Industry Institute (and illustrated below) has been the driver of much of the conventional wisdom.



In order to implement the influence curve concept, the idea of Front-End Loading (FEL) took hold, placing more emphasis on the planning and design development activities and structured decision-making in the Front-End (i.e., pre-sanction) stages of the project. "Stage-gate" processes became a widely used best practice to codify the activities, deliverables and responsibilities required for effective FEL. A typical process is shown below.



The implementation of stage-gate processes over the past 15 years has provided considerable improvement in project performance. Well-defined and carefully thought-out projects clearly have a better chance of success than do those that are ill-conceived and sanctioned in haste. Decisions that are based on good information are certainly better than those that are based on optimistic assumptions.

So what's the problem? Why do today's projects not enjoy the predictability that practitioners of Front-End Loading surely have a right to expect?

Unconventional Projects Need Unconventional Thinking

Part of the problem is that many (if not most) capital projects today are considerably different from those of a decade or two ago.

Megaprojects Present New Challenges

Much has been said about “mega-projects”: projects so large that conventional approaches are insufficient to ensure success. Many people define a mega-project as one that cost \$1 billion or more. The past decade has shown that even the best owners and contractors have been largely unable to scope, define, plan, estimate and execute these megaprojects with any sort of predictability. Cost overruns of 100% or more have been widely reported, along with years of schedule delays. In fact, such experiences are so common there is even a word for it: a “mega-wreck”.

Today, of course, billion-dollar projects are common; even projects that were considered routine a few years ago now cost billions. By the standards of past projects, those for which the current best practices evolved, these projects are certainly unconventional and require a new approach if predictability is to be achieved.

Independents & Developers Require a Lean, Fast-Track Approach

Another unconventional view of projects is that of smaller owner/operators, such as independent oil companies or alternative energy developers. These organizations often enjoy competitive advantage from their lean organizations, efficient decision processes and willingness to take risks and their approach to project planning and execution reflects that. On the other hand, a major project is generally of great strategic importance and may even be a “bet the company” proposition. Unlike large owner/operators, whose project portfolios are large and diverse, a “mega-wreck” can be devastating.

Independents and developers take an unconventional approach in many aspects of their business model and, clearly, require one in the way they plan and execute their major projects. Their model must provide predictability while, at the same time, leveraging their lean organizations and fast-mover culture.

Investors & Lenders Require Improved Understanding, Quantification and Management of All Project Risks

The recent pricing trends in oil & gas have accelerated the pace at which new players are participating as investors in capital projects and the companies that will own and operate them. For example, much of the investment in alternative energy is by developers who must rely on other investors, such as private equity, as well as project finance to fund the project. These investors and lenders often have a completely different risk profile from large owner companies, and require that all risks be understood and handled if financial close is to be achieved.

The View from the TunnelYou Can't See the Swans From Inside the Tunnel

In his excellent and highly relevant best-seller *The Black Swan*, Nicholas Taleb explores the reasons why financial disasters often occur for reasons which, with hindsight, seem eminently predictable. He defines “Black Swans” as risks that are considered to be outliers and thus ignored until they occur with great impact, at which point explanations are quickly concocted to make them seem to have been predictable.

The relevance of this thinking to the process by which capital projects are sanctioned, and the messaging attached to the subsequent overruns, is profound. Major engineering and construction projects have many Black Swan risks such as:

- Economic & market conditions
- Location – related risks
- Commercial / Financial conditions and trends
- Behavior of partners and host country agencies
- Organizational and governance capabilities

Taleb offers a wide range of explanations as to why well-intentioned, competent professionals seemingly ignore significant risks when making plans or critical decisions. Among these is this concept:

“Tunneling: the neglect of sources of uncertainty outside the plan itself.”

Tunneling is evident when data that supports our proposition is embraced and utilized to further increase that support, while data that challenges it is ignored, dismissed, or severely discounted. As our investment of time, effort and money in developing and supporting our proposition increases, we are tunneling deeper. We are likely to become more anchored to our solution and, of course, to be reducing our ability to see outside the boundaries of our assumptions.

How Stages & Gates Promote Tunnel Vision

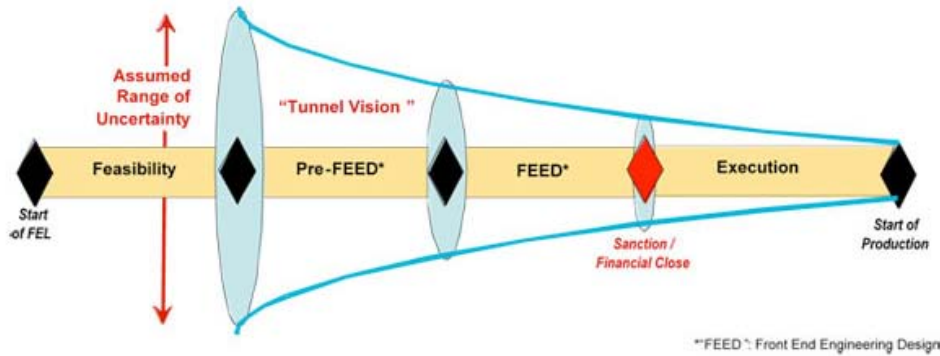
Here is an example of how tunneling can play out on a major project:

- Very early (and usually optimistic) expectations of project cost and time to production are established. Although at this early stage there is little information on which to base these numbers, they effectively define a base-case which anchors all the work that follows. In many cases, critical commercial commitments are made based on this base case, and expectations set for the investment community.
- As the work progresses, assumptions are made to support the base case. Of course, any deviations from the base case

are apt to be met with great resistance if not hostility.

- A design configuration that seems to support the base case is defined. In order to minimize the time to sanction and to start of production, little time is spent exploring alternatives or testing the hypotheses underlying the base case.
- The stage-gate process drives considerable effort to develop and define the base case. Recycle is discouraged in order to keep progressing toward sanction.
- Eventually, when the time for sanction arrives, the time and effort invested in Front End Loading is considered a primary indicator of the predictability of the cost estimate and time to first production. If the stage-gate process has been followed diligently, predictability is assumed to be high.

The figure below illustrates this process. Note that the first formal assessment of risk and uncertainty usually occurs at the end of the Feasibility stage. As the work progresses, uncertainty and risk are assumed to decrease, resulting in "tunnel vision". (Note, the "Operations" stage is not shown.)

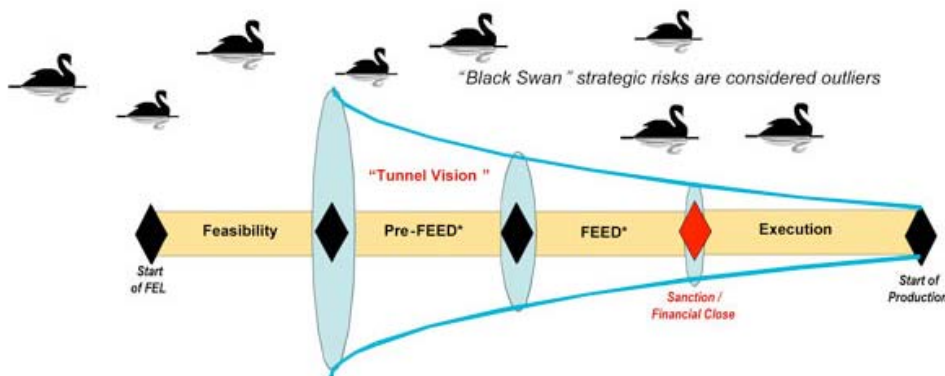


Clearly, stage-gate processes encourage tunneling and care must be taken to ensure that their implementation does not result in sanctioning a project that is, in fact, based on false premises. What can be done to improve this practice?

An Unconventional Approach to Front End Loading

Bringing Black Swans to the Surface

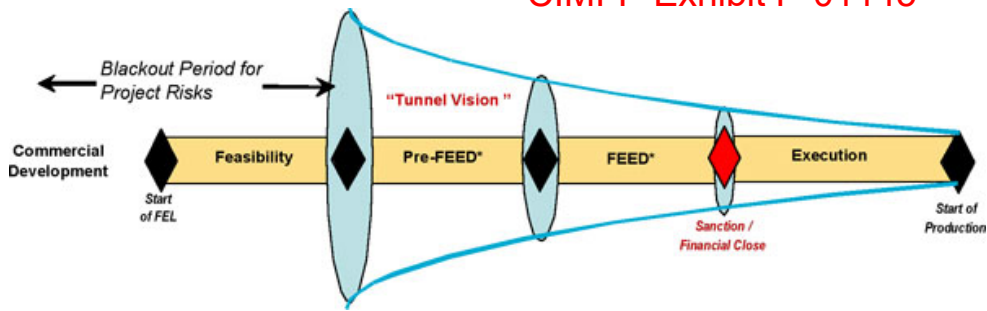
Black Swans, i.e., strategic risks outside the assumptions underlying the base case, are typically not addressed by stage gate processes (see illustration below). Note that Black Swan risks are typically not correlated with time or progress – in fact, their severity may well increase over time. For example, the geopolitical risks impacting an international project may increase over the project's life – indeed, a mega-project in some locations may itself be a driver of political risk. Although the diagram is not scaled, we can also note that the magnitude of the uncertainty and potential impact of these risks tends to be far greater than the tactical, project-level risks covered by contingency.



So the first thing we can do to improve predictability is to ensure that strategic risks are identified, assessed, and managed proactively.

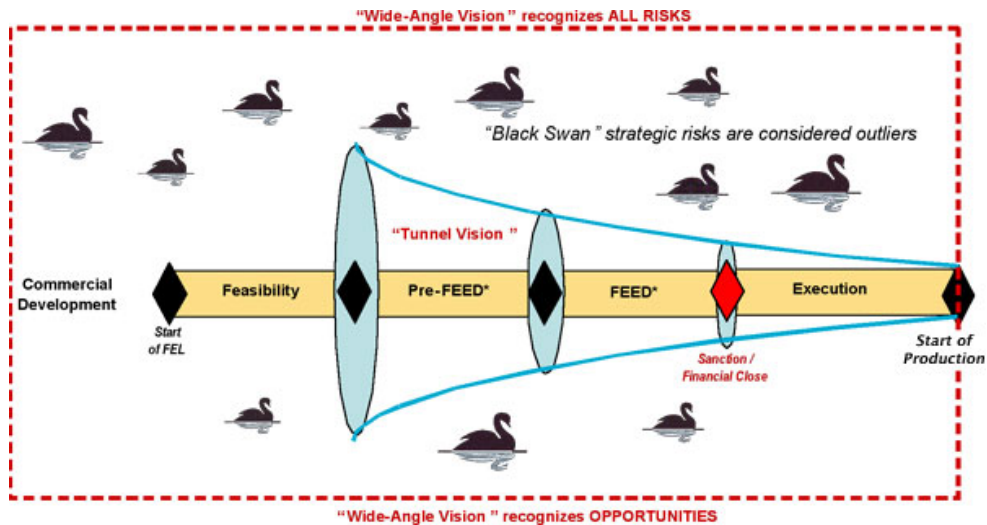
Illuminating the Blackout Period

The next shortcoming of conventional Front End Loading we must address is the Blackout Period. As the chart indicates, most projects conduct their first meaningful assessment of risks around the end of the Feasibility stage – and, in many cases, much later. However, major commercial commitments are often made long before that – during Commercial Development. Clearly, it is important for all risks to be understood before expectations are set, deals are struck.



Taking the Wide-Angle View

By proactively identifying, assessing and mitigating Black Swan risks, and starting this process as early as possible (well before the start of the conventional FEL process), we can change tunnel vision to wide angle vision that recognizes all risks, and, as a result of this process, can also identify opportunities. For example, early recognition of a market risks can lead to a proactive procurement strategy that provides competitive advantage across the project portfolio.



Creating a Risk-Driven FEL Plan

If we have the discipline and methodology to gain an early insight into all project risks, we can consider a risk-driven approach to FEL that is tailored for each project.

Consider a risk-driven FEL process as shown below.

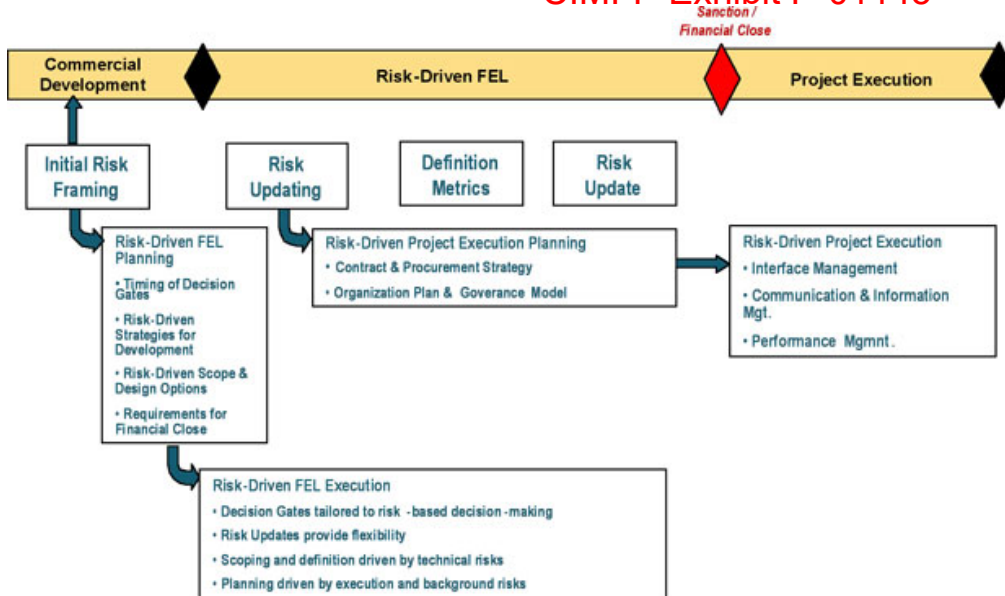


Distinguishing characteristics of this process, when compared to the conventional approach are:

- The Commercial Development Stage is included, and with it the commitment to do an early framing of risks before expectations and commitments are set.
- Project Development is one stage leading to sanction. Decision gates are defined based on the early risk framing and the work is focused on those areas that contribute the most to cost, schedule and operational risk.

Effective implementation of the Risk-Driven FEL concept can result in a shorter path to sanction and improve the likelihood of financial close. The diagram below illustrates how Risk-Driven FEL works:

- Based on the Initial Risk Framing (prior to the start of FEL), a Risk-Driven FEL Plan is developed. Decision Gates are placed at major points of inflection in the project risk profile, and the work leading to each gate is entirely focused on addressing the project's risks and uncertainties.
- Risks are periodically updated during FEL. At key points, definition metrics such as the Project Definition Rating Index (PDRI) from the Construction Industry Institute (CII) may be used to measure the level of scope/definition risk and determine the specific areas in which the design development effort needs to focus.
- A full Risk Assessment, covering all tactical and strategic risks is performed prior to sanction.



A Risk-Driven FEL process reduces recycle, thereby reducing the time required to reach sanction. And, since it is risk-driven, financial close is more likely as well.

What If I've Already Got a Stage Gate Process?

For organizations that do *not* have a stage-gate process, (and this is true for many independents and developers) Risk-Driven FEL is an easy transition. But what of those that have spent years developing, implementing and refining a conventional process?

Our recommendation is to continue to use and refine the existing process, but keeping the following ideas in mind:

- Extend the process into the Commercial Development Phase (known to some as "phase zero" or the "pre-project" phase.) Use that involvement to gain an early understanding of project risks, and plan FEL accordingly.
- Allow the flexibility for each project to develop a Risk-Driven FEL Plan. This can be responsive to the project's specific risk and also consistent with the broad requirements of the company's stages and gates.
- Encourage a "wide-angle" view of all project risks at every point in the process.

Summary

Stages, Gates and an emphasis on Front End Loading are good things, and their acceptance and implementation have undoubtedly had a beneficial impact on capital projects across the industry. The fact that benefits of Front-End Loading have become conventional wisdom is a testament to the achievements of the many people who changed the way project planning and development was viewed and practiced. But, like anything else, there is always a need to do better, and, where today's projects are concerned, that need has never been greater.

As Peter Drucker said: *Efficiency is doing better what is already being done.*

A risk-driven approach is the key – by starting early, being flexible, and keeping the wide-angle view, the predictability of capital projects is being improved.



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