



NAC Executive Insights

Giga vs Traditional Projects

Key Points

- The tendency to think of the primary difference between mega/giga-projects and more traditional sized projects as one of scale.
- Scaling up in size has the concomitant effect of “unfolding” unseen dimensions.
- Unseen dimensions create and expose new challenges.
- References to related Executive Insights are provided.

Introduction

There is a tendency to think of the essential difference between mega/giga projects and more traditional sized projects as one of scale. If only it were that simple. A better analogy, and something that is more clearly evident in the world of giga-projects, is that this scaling up in size has the concomitant effect of “unfolding” unseen dimensions that were likely always there but whose effects were not readily noticeable.

The Unseen Dimensions

- Create new regions of “white space” that, if not aggressively managed, serve as nesting and breeding grounds for new, more systemic type risks, including so called “black swan” risks (unpredictable events that are beyond what is normally expected and have potentially severe consequences). These “white spaces” may also act as homes for new, yet to be discovered opportunities, if one only looks hard enough and understands the potential that exists.

Black Swan Risks – high consequence, low probability risks. Often considered unknown-unknown risks.

- Expose a subtle “coupling” across the giga project that at smaller scales was not as significant; this “coupling” is not only direct coupling, but importantly indirect coupling realized through “coupled constraints” or “white space” couplings that previously were not significant.
- Drive to a level of complexity where the scaling of activities is dramatically outweighed by the scaling of the possible network combinations and effects that are created. This is seen in non-linear scaling of complexity if one considers two combinational cases. In the first case there are 10 activities, which if combinations of two at a time are considered results in 45 possible combinations or said differently, 45

potential sets of interactions. In the second case, one might consider the result as a scaling up of the project tenfold. Even if this scaling up tenfold only resulted in twice as many discrete activities, the number of possible interactions would rise over fourfold.

Project complexity – properties of a project which make it difficult to understand, foresee, and keep under control its overall behavior even with reasonably complete project information.

- Expose the fragility of many assumptions. Longer project development and execution periods, an inherent characteristic of growing levels of capital, demonstrate that assumptions are far from static and instead experience “assumption migration.” This “assumption migration” can be thought of simply as the reasonable error band that might be recognized as existing at project initiation but that broadens as time passes. In a simple case, take project escalation that may have been forecasted at 5+/-1 percent at project initiation. If the worst of the initial assumption set materializes, a 10 percent growth will be experienced above the base estimate in a 10-year project. If this higher level of escalation persists, the assumption may migrate to 6+/-1 percent, which, if this new, higher potential rate is experienced (7 percent) from the midpoint of a 10-year schedule, it would drive the potential overrun even higher to 15 percent. In reality, the types of “assumption migration” that are most concerning are those that demonstrate 2σ or greater behaviors (95 percent of a population typically lie within 2σ) or are particularly sensitive to uncertain growth when confronted with extended time periods.
- Shift the management focus to the various “flows” (labor, materials, information, financial) that comprise the project, not just the tasks. The myriad of arrows (connecting tasks or work breakdown structure/WBS elements) then are not dimensionless.
- Highlight management requirements that are less significant on smaller scale projects such as those associated with:
 - Increased strategic importance (achievement of strategic business objectives or SBOs (with their outcomes focus) versus the output focus of delivering more traditional projects.
 - The emergence of a changed governance regime.
 - Owner, not just project, readiness given the increased level of owner organizational involvement and oversight that giga programs require.
 - Increased importance of multi-party contractual relationships in the various execution teams and potentially even in the project ownership structure.
 - Expose the need to think about “capital efficiency” in a broader way than is traditionally experienced on smaller projects where capital expenditures (CAPEX) or construction schedule usually suffice as project optimization points.

For Further Reading – Executive Insights

- Systemic Risks in Large Complex Projects
- White Space Risks
- Opportunity Analysis
- Coupling in Large Complex Projects
- Assumption, Risk Driver, and Constraint Tracking
- Flows in Large Complex Projects
- Importance of Strategic Business Objectives
- Owner Readiness
- Mega Project Joint Ventures

About the Author

Bob Prieto was elected to the National Academy of Construction in 2011. He is a senior executive who is effective in shaping and executing business strategy and a recognized leader within the infrastructure, engineering, and construction industries.

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