NAC Executive Insights

Strategic Program Management of Giga Projects

Key Points

- Dramatic growth in the scale and complexity of capital construction programs.
- Non-linear scaling effects come into play as we scale up.
- Management of a step change in scale and a more exponential change in complexity is required.
- "Giga" programs require the owner and the program manager to re- examine their roles.
- Owner requires a partner that can help it translate its programmatic vision and broad objectives into a well-defined set of specific business objectives that underpin an actionable and implementable strategic plan.

Introduction

We are seeing dramatic growth in the scale and complexity of capital construction programs. Like all programs, these consist of a series of discrete but closely coupled projects that when taken in their entirety enable an owner to meet a set of well-defined strategic objectives. Just as we saw a set of non-linear scaling effects come into play as we scaled up from programs with total installed cost in the 100's of millions to the low single digit billion range (so called mega programs), so too are we seeing a new set of non-linear scaling effects come into play as we scale up to programs in the tens of billions. We have referred to this new scale of programs as "giga" programs to highlight the differences from more common mega programs.

"Giga" programs bring new challenges in many regards, but like mega programs, the two principal vectors are those with respect to the management of a step change in scale and a more exponential change in complexity as the number of interfaces and opportunities for impact grows in a decidedly non-linear way. But giga programs also bring new opportunities, with the primary ones being associated with the dramatically increased leverage these programs afford an owner.

Strategic Program Management is about understanding the differences between giga and mega programs, and more importantly, critically understanding the core elements of successful program delivery and how they may change and how they must relate to each other in the delivery of giga programs. Most importantly, giga programs require the owner and the program manager to re-examine their roles and together make the changes in focus, people, processes, and systems required to achieve success in the delivery of a giga program.

To illustrate some of the challenges and opportunities present in giga programs, some examples from the 'strategy phase work' performed on several giga programs are captured below:

1. Sweat the Small Stuff – Details Matter

In developing a project execution strategy for a large, global private client we reviewed current design and construction practices as part of our familiarization process for development of a delivery strategy for a new giga program. The existing work, as well as the new program, was sited in a remote, costly, labor constrained and environmentally harsh setting.

During observations we repeatedly passed one operation as we traveled back and forth to different projects within the current mega program. This operation involved a two-man crew bolting up a large hopper. Over the course of the day, we would see one of the men walking a kilometer down the road to a warehouse to retrieve additional nuts, bolts and replacement tools. It became evident that what was taking place was less than optimal so we stopped to watch the operation.

What we saw were two men, with eight different size sets of nuts and bolts and eight sets of tools working at low productivity rates because of the environmental conditions. Despite their best efforts, they would periodically encounter a defective nut or bolt and since the bolting operation had a defined sequence, they would have to obtain good parts from the warehouse when they ran short of a

particular size. Each nut and bolt combination had a different tool set and periodically a tool would fail in use and need to be replaced. Progress on the operation was slow and given the scale of the operation it was likely that this crew would be at this one particular operation for a good part of the month. In discussions with the construction manager, we could identify no good reason for different size bolts so we decided to ask the designers on return to the engineering office.

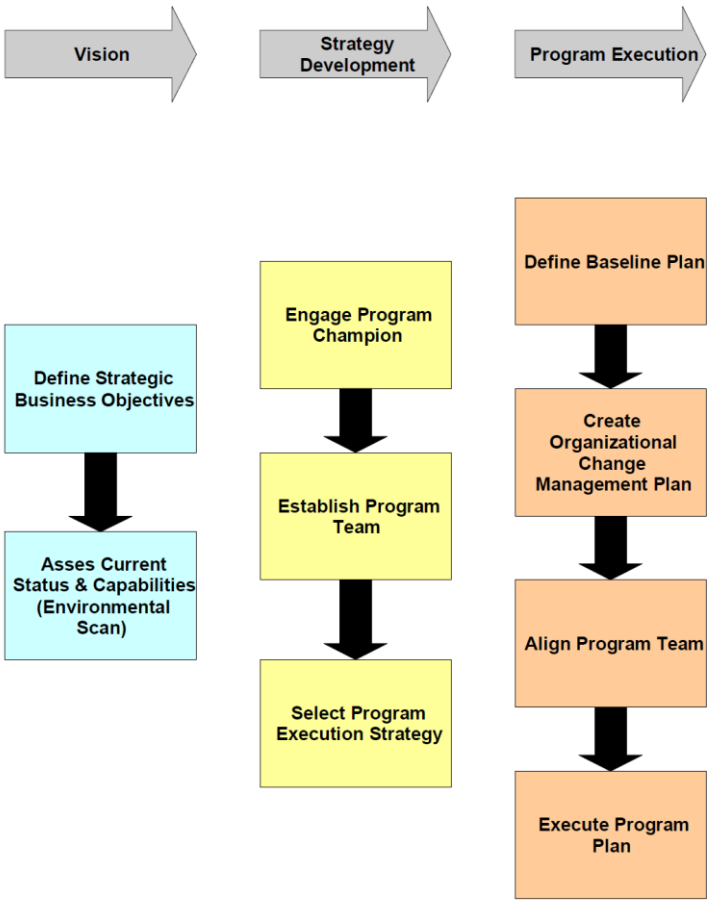
On our return to the principal design office, we identified the designer of this particular hopper and asked him a simple question, namely, what was he trying to optimize. His answer was quick and straightforward, “design”. As he pointed out, stresses were less towards the outside of the flange and as such he could use smaller bolts and smaller bolts cost less. So, we sent him off to figure out what the cost savings were versus using one size bolt. He came back the next day and told us $157.

The next call was to the construction manager who didn’t understand why multiple bolt sizes were needed. Our question for him was if all bolts were the same size what would his direct construction labor cost savings be (unskilled labor was about $1000 per day at this site and retaining labor was still a challenge). The following day he called back and told us with the likely efficiency improvements he could have taken 10 man-days out of this operation or $10,000 in direct labor cost. We started to thank him but he said he wasn’t done. He then went on to point out that for every $1 of direct labor cost he had $2 of indirect labor costs associated with maintaining a construction camp, taking care of meals and laundry and doctors, and transporting labor back and forth for periodic leave.

Again, we started to thank him but he interrupted and said he wasn’t done. He continued, pointing out that he now had a larger warehouse to house eight sets of nut, bolts and tools versus one size; that he had to track eight times as many items in the supply chain and eight different sets of cost codes for the benefit of the accountants and that given the remoteness of the site, they had to over order eight sets of parts and tools versus just one since the cost of delay was huge. Finally, he flagged that we would now have eight sets of waste streams, consisting of unused tools and parts, versus just one.

Throughout this process he was highlighting the cost of that $157 savings and the results were staggering. On the new giga program there were going to be close to fifty of these same hoppers, spread out at five site locations. Clearly a different philosophy was required, namely one that recognized the value of standardization, the scaling effects of a giga program, and more importantly one that recognized that the inefficiency one might encounter in the “nuts and bolts” of a “giga program.

Equally important was putting in place a strategy and change process that provided a path forward and a mechanism to constantly assess whether we were keeping the appropriate outcomes focus – one sensitive to the scaling effects and opportunities present in “giga” programs



2. Giga Programs Require Philosophy and Process Change

In developing an execution strategy for a giga program we reviewed programmatic needs for major commodities with an eye towards capturing the leverage opportunities that come with a large capital spend. We identified structural steel as a billion-dollar procurement opportunity if we could consolidate our steel buy and reduce the number of custom shapes required. The historical approaches to design, procurement and construction would not support this leverage opportunity so the challenge was to modify the management and program delivery approach to capture the tremendous leverage opportunity this giga program presented.

The approach developed was to do a consolidated programmatic steel buy for major structural steel, using an approach involving staged delivery over the life of the program coupled with locked in pricing (and select adjustment factors) and pre-negotiated option and cancellation provisions. All steel shapes were to be from a "catalog" of standard steel shapes the supplier produced, and this "catalog" was to be provided to all design teams together with a changed design approval process requiring any custom shapes to require program level approval (raised the bar to drive standardization). Consolidation of supply required a changed approach to quality control and assurance (to avoid systemic issues) and a more active role in the supply logistics chain to assure needs would be met. Construction contracts are

to be modified from supply to erection of owner furnished material. This required recognition of different risk profiles assumed by contractors and a re-base lining of the approach to appropriate fee determination.

Recognizing the inherent leverage this giga program represented allowed us to leverage our spend for significant volume discounts; strengthen our quality control and assurance approaches; gain greater certainty about the state of the overall supply chain; simplify the design process by discouraging custom shapes; simplify the site logistics and material tracking requirements by reducing the total supply categories to be tracked, stored and dispatched to the right place at the right time (each custom shape was previously a unique item of supply); reduce total programmatic construction pricing by reducing commodity pricing and delivery risk and reducing quantity risk allowances in contractor bids.

In addition, there is a critical need to appropriately 'qualify' potential suppliers (can they really supply this much in this time window at the quality required) for these types of leveraged high-volume purchases. Further assurance of supply reliability can be obtained by limiting the volume to be purchased to less than 25% of the supplier's total global capacity. Placing a very large buy on a single supplier can easily overload that supplier and cause irreparable harm to the program should that supplier fail to perform in any way (or just hiccup). Finally, such supply arrangements will need to have a contingency backup plan should any difficulties develop with the selected supplier.

3. If We Could Parachute Your Whole Plant In, Would You Care?

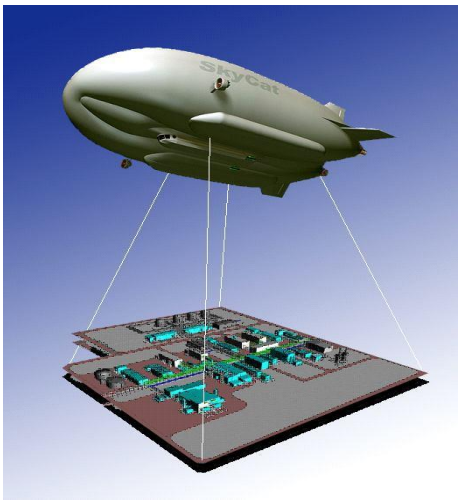
Upon being asked by the Chief Operating Officer (COO) of a major private sector client with an upcoming giga scale program to work with his delivery team to develop a strategy to deliver this program in a way that would meet the owner's aggressive strategic business objectives related to schedule we quickly determined that success would be possible only if the delivery team was willing to go outside the box and their normal design and contracting approaches. An assessment of available labor and remote site productivity rates quickly flagged the near impossibility of meeting the schedule objectives if we were to stick-build the entire facility at the ultimate site location. In order to kick the process off an initial call with the head of the delivery team was scheduled before a strategy team (whose help he might or might not want) arrived.

At the start of this kickoff call, we posed a simple question to the head of the owner's delivery team, "If we could build your whole plant somewhere else and parachute it in, would you care?" There was a long pause. Clearly this was not the opening question that he expected. Finally, he answered, "No…but where will you get a parachute big enough?" We replied that this was our problem.

As we went through the strategy development process, we continuously looked at opportunities to take man-hours away from the site, ultimately opting to build select facilities as modules which would be transported to the site. But even in the modularization discussions we had to work to change mindset and frameworks. We needed to get the existing delivery team past how many 40 (or 53) foot containers were we talking about, to the notion that we were talking about 1,000 ton plus modules that were either major segments of a project or even the entire project.

The choice of modularization changed the design sequence, procurement approach, logistics and construction sequence but it took unavailable man-hours of effort off the critical path and away from the highest cost, least productive construction location.

And yes, we did consider flying the plant in…but not parachuting it down.



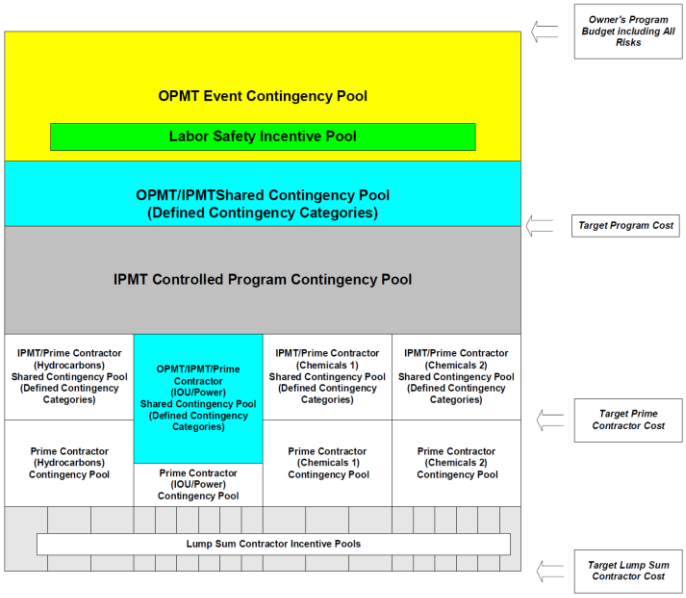
4. Sharing Contingency for Result

In another giga program development effort, a tiered shared contingency approach was developed that ensures that risks that do not squarely fit into one "box" for management by a single party, but rather straddle two contracting levels or organizations, are adequately managed for shared success.

The recommended commercial approach is based on:

- a balance between risk and incentives
- a shared approach to sharing of saved contingencies
- overlapping contingency pools between organizational levels to promote achievement of broader program objectives.
- multi-factor contingency pools to promote balanced achievement of program objectives

Simply put, the approach attempts to "fill in" much of the "white space" between boxes to ensure that the risks that lurk in between well-defined contract packages (and inherently are retained by the owner) are squeezed out to the extent possible. Giga programs carry risks well beyond those encountered on mega programs because of the nonlinear increase in scale and complexity risks. The tiered contingency pools provide for augmented risk management, recognize that a greater percentage of risks require the efforts of one or more parties and reduce the number of risks totally within the owner's purview, allowing appropriate risk management to be focused on the remaining retained risks.



5. Meet the Objectives – All the Objectives

On one giga program, the owner was faced with a broad array of stakeholders with often competing objectives. He attempted to satisfy these needs by developing a broad, compelling vision which would serve to satisfy all stakeholder groups in one grand sweep. He failed, however, to ensure that this grand vision met his other strategic business objectives with respect to cost and schedule. The immediate effect of this grand vision was to raise the bar for each and every stakeholder's expectations. The owner continued to try to cajole each and every stakeholder through a series of further concessions until cost and schedule forecasts could no longer be ignored. By then it was too late.

Strategic Program Management is built on defining a set of true, strategic business objectives and then developing a strategy to achieve each and every strategic business objective. Strategic Program Management is built on the word "and" when it comes to meeting these objectives. Strategic Program Management is not about placing primacy on one of the strategic objectives. To be successful, giga programs require careful attention and selection of the over-arching strategic business objectives. These objectives cannot be a set of wishes and wants but rather must be those things which are required for true program success.

6. Governance governs

On giga project after giga project, governance is a key issue. The roles of the program manager and owner change when compared to projects of a smaller scale. Simply put, the highest levels of the owner's organization are more engaged but with a focus built almost exclusively around achievement of a small set of well-defined strategic business objectives and assessing the effectiveness of the primary strategies being employed to achieve those objectives. Similarly, the program management organization requires broader performance metrics, aligned with achievement of these strategic business objectives, and higher degrees of delegation than what would typically be practice on a mega program.

One question which arises in many of these giga programs is whether an integrated program management team is possible, staffed by both owner and third-party program management personnel. While the answer is yes, on one particular program this integrated management structure blurred accountability and responsibilities, and discouraged proactive management. This integrated management structure was implemented without the governance protections required for it to be workable.

The Strategic Program Management Opportunity

As each of these examples illustrates, Strategic Program Management is about meeting challenges head on to capitalize on these and other opportunities inherent in a giga program. Giga program owners require a program manager that:

- can assume overall responsibility for the program, working under the direction of and acting as an extension of the owner
- can develop, evaluate, and manage a range of procurements to ensure that program objectives are achieved and that opportunities are fully leveraged
- will ensure that applicable regulations, criteria and accountability are fully met, and that
- safety, quality, cost and schedule performance are achieved

Most importantly, the owner requires a partner that can help it translate its programmatic vision and broad objectives into a well-defined set of specific business objectives that underpin an actionable and implementable strategic plan for the giga program.

For Further Reading – Executive Insights

- Complexity
- Coupling on Large Complex Projects
- Importance of Strategic Business Objectives
- Nuts and Bolts of Engineering and Construction
- Governance Under Program Management
- Owner-Procured Materials

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.