Successful Program Delivery Starts Long Before the Program Does – Part 3

Frank R. Parth, MS, MSSM, MBA, PMP

The final paper in this series follows parts 1 and 2 by proposing new approaches to developing these complex projects. The emphasis is on treating these projects not as projects, but as starting a new business. We will also examine changes in the risk management, stakeholder management, and the procurement process to make these projects more successful.

6. Proposed Development Stages for Programs

6.1 Top Level Stages

Before anything else gets decided, the buyers/owners must ensure they are prepared to manage an effort that will require years of commitment under changing conditions and cost huge amounts of money. The readiness of the entire owner organization, from the Board of Directors to Senior Executives, to commit to this requires that they champion the effort to make it past upcoming obstacles.

The owner must have mapped out their strategic business objectives and show the relationship to the long-term strategic plan. This ensures that everyone involved understands the goals of the project. While this is necessary, it is not sufficient. The owner must be prepared to forecast annual costs over the duration of the project and ensure the financial resources will be available when needed. Access to the financial decision-makers must also be developed so they can be involved in decision-making when the environment changes, costs change, or the project overruns its planned budget.

How is the owner prepared to manage the work over the duration of the project? It is common to hire an integration contractor to oversee the work and an external consultant to act as the owner's representative. Again this is also necessary but not sufficient. The owner's organization must prepare itself in the same way as they would start a new business line. They must organization in a flexible manner so that as things change in the future they can adapt.

- How much risk are they willing to accept?
- How are business benefits measured throughout the duration of the project?
- What organizational changes are needed to ensure effective oversight and control of the project from initiation through commissioning and acceptance?
- Are they flexible enough in the procurement process to offer different types of contracts for the different types of work involved?

- What is the decision-making line of authority internally?
- How, and by who, will audit the project to ensure an independent assessment of progress?
- Does the owner intend to use their own internal QA/QC group to ensure high quality of the deliverables?

All of this must be decided and defined before any other work on the project begins.

The financial performance of these megaprojects is inherently fragile. Due to their complexity and their environment their response to an input is not a linear relationship to that input due to interactions among the multiple components. The behavior of these systems is better described by chaos theory than by classical project management. Chaotic projects can suffer huge changes in their behavior with small changes to their inputs. For example, a large greenfield oil development project can financially fail if the local government decides to withhold permits unless more money is paid to certain government officials (a common occurrence in Russia and in some South American countries), or if the feedstock for a refinery is not exactly as expected. Perhaps a better term for such semi-chaotic projects is that promulgated by Rittel and Webber and by D.J. Hancock. These projects are too often "wicked messes".

Our normal approach to project planning spends a great deal of effort on increasingly accurate cost and schedule tools and techniques. But the approach assumes perfect predictability and so builds rigidity into our management approach by incorporating schedule and cost deadlines into contracts. Locking in the approach through contracts makes sense from a pure planning standpoint, but it creates barriers in our ability to respond to future unknowns and to changing circumstances. Freezing the future in such a way ensures construction claims resulting in schedule delays and cost over-runs when the future is not exactly how we assumed it would be. As Flyvbjerg (Flyvbjerg 2013) puts it,

> *"The traditional way to think about a complex project is to focus on the project itself and its details, to bring to bear what one knows about it, paying special attention to its unique or unusual features, trying to predict the events that will influence its future."*

With all this independent research by both academics, consultants, and commercial companies we have gained a fair amount of confidence that our normal approach to managing complex projects simply doesn't work. There is a better way to approach this. Based on the previous discussion we have created a combined model, with an emphasis on the decision gates as shown here:

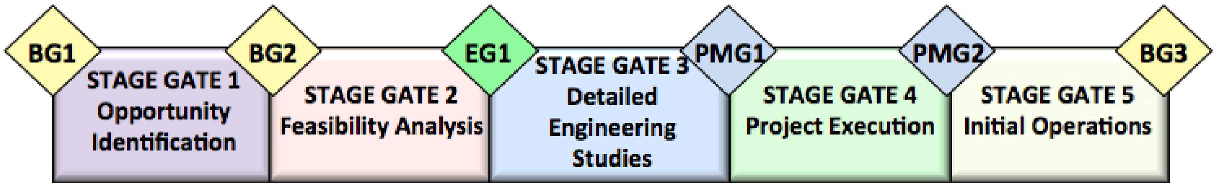

Figure 18: Proposed Stage Gate Process

6.2 BG1 - Business Decision Gate 1

This is the initial decision by the business to begin a new project or not. For the financial resources which can be made available, what projects should the organization invest in.

- For an aircraft development company such as Boeing or Airbus – preliminary work is done to identify what the industry wants in terms of aircraft, changing fuel costs, demographics, and flying patterns. This is done by the business to identify future needs. Once this step is done the marketing departments pre-sell the aircraft before any further engineering is done. Without sufficient pre-sales, the proposed aircraft dies and is no longer developed.
- For an oil/gas company – which are the most potentially profitable new fields for development (greenfield projects) at an acceptable level of risk? Or is the money better spent refurnishing and upgrading an existing facility (brownfield project)
- For a mining company – which are the most potentially profitable new mineral resources we can invest in?
- For a pipeline project – where should the pipeline be routed? How big?
- For a public works infrastructure project – what financial resources are available through taxes or bonds? Which possible projects will return the greatest public benefits?

This is the most critical decision point. Everything done later builds on this. There is a significant amount of pre-project work that should be done at this point to ensure success. The project at this point is led by senior executives – vice presidents and above. Unfortunately they are, as a rule, far removed from the day-to-day management activities and even further removed from project management activities. Their decisions are made without detailed analysis of whether the project is actually feasible or not.

This effort can be part of the normal strategic planning cycle, or it can be a dedicated effort undertaken to identify the organization's next major investment. In order to filter out the obviously bad ideas, the work can take months before agreement is reached on which projects to pursue at a high level.

For this and for the other stage gates, the British Office of Government Commerce (OGC) has a formal "gateway review process". Several states in the US, such as Texas (Texas (2013), have also adopted similar review/decision gates. We applaud this formal approach to making these critical decisions and suggest every organization involved in these megaprojects adopt the same formality.

6.3 BG2 - Business Decision Gate 2

Once a variety of potential opportunities have been identified, there is work done to develop the most beneficial ones. This is an area where the FEL process works very well and can provide significant information before a decision must be made to continue or not. The FEL analysis should be performed at the end of this stage to ensure everything needed to continue has been identified and developed.

The primary efforts here are to endure the organization is properly prepared to invest in a project considering the economic and market environment. Is the environment changing? Are our competitors bypassing us? Do the economics still make sense?

6.4 EG1 - Engineering Decision Gate 1

In preparation for EG1 we need to start getting the technical staff and the project managers involved in the project. Here we are beginning the design of the facilities (this is the FEED stage) and the planning for managing the execution itself.

This does not mean the business people have backed away from the project, they are still heavily involved in this stage. At some point towards the middle or end of this stage there must be an authorization for expenditure (AFE) to approve the funds that will finance the remainder of the project.

It should be noted that it is not unusual for some organizations to obtain a budget prior to this stage, without knowing the exact project costs but instead based on internal historical information. This approach is far less accurate than arranging funding after project costs have been analyzed. The Saline Water Conversion Corporation in Saudi Arabia mentioned earlier has a new project's budget provided by the government Finance Ministry prior to any understanding of the project itself based on rough comparisons with past projects. History shows that virtually none of their pipeline projects are completed within budget.

Financial arrangements can be a significant effort all by themselves. It can take months to arrange external financing and cost a significant amount of money. It is not unusual for financing to cost 5% or more of the project costs, a large amount of money in a $10 billion project.

If utilizing the CII PDRI assessment tool this stage would be a reasonable place to perform the first survey. The resulting numbers will not be good because much of the work hasn't been done yet, but will improve as the PDRI is repeated in later stages.

This decision gate again is one where ensuring detailed and complete data is critical. Rather than the business making the decision to continue here, it should be a decision of the engineers and the project manager whether to continue on or not. If the data are not adequate, the only decision is to continue to develop the data before going on.

6.5 PMG1 - Project Management Decision Gate 1

Preparing for this gate is where traditional project management does best. The business people have largely backed away from day to day involvement in the project at this point and the work is controlled by the engineers and project managers with construction contractors involved in the planning efforts.

This decision point is the beginning of the execution phase. This is where the majority (typically 85-90%) of the overall costs will be spent and the greatest amount of time committed. Both the FEL and the PDRI have areas related to this stage.

At this point the data required for decisions should be getting much more detailed and the project planning areas should be much more thorough.

6.6 PMG2 - Project Management Decision Gate 2

This is a combined decision point of the project management team, the engineers, the contractors, and the operations/maintenance people from the business side. Here the decision is made to start the commissioning process and slowly ramp up production to full scale. For infrastructure projects such as roads and bridges, this is usually not a major decision gate and almost never receives a "No-Go" decision.

For production plants this is a danger point. If everything did not go as expected in the design/execution stages, the plant will not achieve its designed operational capabilities. A plant that is only capable of 50% production capacity will never return the economic investment and should be shut down before too much money is lost.

One consideration in the decision is "How has the economic environment changed since we started?" If the price of the feedstock for a processing plant has risen, the price of the final product has dropped, or the regulatory environment has changed significantly the decision becomes non-trivial. What does the future economic environment look like? This is not a decision for the engineers or the project management team. This becomes a decision on the business side to continue if the future looks profitable or to mothball the plant if it does not.

This decision is repeated after the next gate, once the plant is commissioned and ready for operations.

6.7 BG 3 - Business Decision Gate 3

Of all the gates, this one might be the least important. Not trivial, but the gate which has the least impact on whether to go into full operations. If everything earlier has been done with a reasonable degree of success, the only data that can cause a negative vote to go forward will come from the outside environment. If a company has spent 6 years developing a new oil refinery, then the only thing that can cause them to mothball or to decommission the project at this point is that oil prices have dropped so low that they would lose money by operating the plant.

For infrastructure projects, BG3 will always be a positive vote to go forward. Regardless of the actual benefits achieved there is no benefit to not going into operations for roads, bridges, and so on. If the politicians requested a project and it's completed, nobody is going to say don't use the new bridge or road. A rare exception to this rule was the Shoreham Nuclear Power Plant on Long Island, New York. Construction began November 1, 1972; commissioned on August 1, 1986; and was immediately shut down due to political concerns over the Three Mile Island incident in 1979. It was decommissioned in May, 1989. Total cost? US $6 billion.

At each gate there are specific data that is required and specific criteria that must be met for the decision to go forward. If data is missing or inadequate the decision must be to not approve further work until the data is sufficient. A gatekeeper should be identified whose job description is to track the data needed and ensure it is adequate for the decision-makers to make an intelligent decision.

7. Recommendations

With four changes in the traditional approaches, classical project management works fairly well in the later stages. The proposed changes are:

1. Treating each project as a new business,
2. Risk management,
3. Stakeholder management,
4. Requirements definition, and
5. The procurement approach.

7.1 Business Approach

To increase the project success rate a different approach must be taken than traditional project management. The first is to treat each such new project as you would treat setting up a new business. Because the future is so unpredictable and so subject to outside influences this requires a highly entrepreneurial approach by all the participants.

Identify the goals of this new business and set up the organization chart and the financing to achieve those goals. While there needs to be support by the parent organization (or organizations in the case of a joint venture), the business should have the flexibility to develop their own approach as much as possible to this unique project.

Set up an Integrated Project Team (IPT) that serves as the core management team to oversee each stage of the project. The leadership of the IPT must be with Operations and Maintenance as the owners of the final delivered facility. While there is a core IPT membership, the specific membership evolves as the project moves through the different stages. The business should be involved throughout the project from beginning to end. Engineers and project managers should be involved in the team in Stage Gate 2, the feasibility analysis. Once past BG2 the team is grown by adding contractors or consultants to gain input on the engineering and constructability of the facility.

The research clearly shows that to make these projects successful the emphasis must be placed on the pre-engineering stages. Competent decisions made here will significantly improve the success rate so there must be heavy involvement from the business users. A business "owner" should be identified at the very beginning stages and remain with the project into operations. This would be a major cultural change for many organizations because business people tend to move around more and get promotions faster than engineers do. By keeping them on the project through completion it ensures they learn from their business decisions instead of not seeing the long-term impacts of their own decisions.

However, even with competent business decisions there is no guarantee of success, only an increased probability. Errors in the engineering stage and construction problems can still have an impact.

No entrepreneur would begin a new business without developing a detailed business plan to think through and to document goals, planning assumptions, and to strategize about the future. This is done to ensure that possible future states have been identified and contingency plans made. Using the same approach, each new megaproject should begin with a high-level future execution plan. This is similar to, but is developed earlier than, the normal Project Execution Plan (PEP) that is written early in the execution phase, or developed at a high level during FEL 2.

This is the project's strategic planning document (SPD) that will guide the project once the business has authorized the release of funds for the project. It may begin as early as the end of the feasibility analysis (Engineering Gate 1) but should begin no later than the end of the engineering analysis (Project Management Gate 1).

7.2 Increased Risk Management

Project managers have typically spent little time on formal risk analysis. A risk is something that "could" happen in the future and most project managers are too swamped with planning and running the day to day details of the project to worry about something that might not happen.

A more effect risk management approach is to emphasize formal risk management processes with the staff and tools needed to thoroughly understand those things that can impact the successful completion of the project. Professional risk managers with significant experience in the specific type of project should be used. Because of the potential for pressure from the project manager to downplay risks, the risk staff should report to a higher level of management within the organization.

The universe of risks should be all-inclusive, with a particular emphasis on external risks such as environmental, regulatory, labor, and so on. These are the risk that are far more likely to be uncontrollable than are the technical risks of the project.

Many of these risks are predictable in occurrence, if not in impact, by looking at comparable projects in the same geographic/country area. Mining projects in South Africa, for example, consistently deal with labor unrest and strikes as well as with fluctuating commodities prices for the output product. Once these risks are identified, mitigation actions can be taken to deal with potential impacts.

Any approach to risk management should involve identifying business risks as part of the overall effort. The PDRI is a widely used risk identification approach that begins by identifying the business risks very early in the stage gate process as discussed earlier.

7.3 Stakeholder Identification and Management

While identifying the primary stakeholders is important enough on a software development project, it becomes more difficult, more complex, and more important by orders of magnitude on a megaproject. It can easily be shown that a primary job of the program manager on these programs is to work with the stakeholders.

John Furlong was the CEO of the 2010 Winter Olympics in Canada. In a keynote address to PMI's North American Congress in 2013 he stated that his primary emphasis was to deal with the stakeholders, everyone from the Canadian government, to the First Nation tribes, to the major Olympics sponsors such as Coca Cola.

In Fall, 2011, the US Federal Government's General Accounting Office (GAO) released a report ("Critical Factors Underlying Successful Major Acquisition") highlighting the success factors in seven major IT systems acquisitions ranging from $35 million to $2 billion. The primary reason for success? The project managers were "actively engaged with the stakeholders."

The pipeline projects developed by the Saline Water Conversion Corporation mentioned earlier often suffer significant schedule delays created by stakeholders appearing late in the project, after construction has started, and demanding changes such as a side pipeline over to their local town.

With effective identification, communication, and coordination of major stakeholders projects can be much more successful. The increase in success is matched only by the challenges of the stakeholder management process.

When we discuss stakeholders we can categorize them in multiple ways. We will divide our stakeholders into short-term stakeholders and long-term stakeholders, with some stakeholders sitting in both categories.

Who are the stakeholders in a typical oil or gas refinery? For the sake of discussion let's put a new LNG facility at the combined Long Beach/Los Angeles port, with a combined capacity of 243 million metric tons (2013 figures) per year.

A quick review of the primary short-term stakeholders might include:

- The owners of the completed facility
- The financers of the facility
- The Port of Los Angeles and the Port of Long Beach
- The shipping companies
- The cities of Los Angeles and Long Beach as well as surrounding cities such as San Pedro and Wilmington (with multiple city agencies involved in permitting, inspections, traffic control, safety, and so on)
- The government environmental protection agencies such as the:
  - South Coast Air Quality Management District (SCAQMD)
  - The federal Environmental Protection Agency (EPA)
  - The Department of Energy's Office of Fossil Energy
  - The Federal Energy Regulatory Commission, and others
- The contractors and consultants who will do the engineering and construction work
- Local labor suppliers
- Environmental NGOs who are opposed to all work related to fossil fuels
- Local newspapers and media
- Local residents who will be impacted by the construction work

In the long term, stakeholders include many of the ones just mentioned (the financers leave the list once their loan is repaid), but also:

- The local housing market which will expand to include housing for the operations staff
- Local hospitals
- The utility companies providing gas, electric, and water
- Real estate developers and agents
- Local schools, police, and fire services
- Local retail shops, gasoline stations, and other providers
- Local transportation services as well as the roads agencies who must deal with the increased population

- Tax collection agencies

When you examine the list you may realize that not all the stakeholders want the project to be successful. Some of the local homeowners are going protest vehemently against an LNG facility in their neighborhood. The environmental NGOs are going to oppose the facility and they have become quite good at media relations, web sites, activism, and lobbying to fight against your facility as long as possible.

One significant source of stakeholder concern for the project manager are the local politicians. Some will be supportive because it creates new jobs and increased tax revenue for them. However, they will be supportive only as long as the project is going well. If the project runs late or over budget, they will turn on the project and attack it in order to protect themselves in the next reelection campaign.

Some politicians will not be supportive from the very beginning. They don't like these types of projects, they are environmental activists themselves (or they see a significant voting bloc among environmentalists), or they are looking for a point of attack on the current political incumbents with claims that the money could have been spent better elsewhere.

Politicians in some countries see these large, high-dollar projects as sources of personal financial gain. They demand high "fees" for granting permits or for expediting the approval processes.

Even for people experienced in these projects it can be easy to overlook the significant impact of stakeholders. In a 2009 article by Al Kharashi & Martin Skitmore on the causes of delays in public sector projects in Saudi Arabia, they completely ignore delays created by stakeholders external to the project, instead concentrating on delays caused the owners and the contractors. Yet these external stakeholders have a significant impact on both cost and schedule.

7.4 Develop the Requirements and the Data

Experienced Project Managers know that they cannot adequately plan out a project until they understand the requirements that define the final product.

For small or medium-size projects this is often an area where not enough time and effort are allocated. Scope creep is often identified in many research publications as a major cause of projects running over budget and behind schedule. Yet scope creep is nothing more than not having done a thorough job gathering, analyzing, and freezing the requirements before the project is planned out and the execution phase begins. While there are some causes of scope changing outside of the project's control, the primary source is inadequate requirements.

While difficult, it is possible to freeze the requirements so that planning can proceed without the necessity to re-plan due to requirements changes. In 2003 Aramco completed a complex gas project in the area of Haradh in Saudi Arabia. The plan was for US $2 billion in budget and a 27 month schedule. The project was actually completed 27% under budget and delivered six months early. A significant contribution to the success was freezing the requirements at the end of the

FEED stage and not permitting any changes that were not safety or environmental related. In the development of off-shore floating platforms, the philosophy of "Design once, build many" has allowed significant cost and schedule reductions each time a platform is build using an existing design.

For projects in the construction industry, the requirements flow from the architect who does the top-level design and architecture, to the engineering firms which do the detailed engineering calculations, to the contractor who implements the architects vision and the engineer's calculation. For engineering projects there is often a Front End Engineering Design (FEED) performed to produce the top 25% of the design, which then goes to the contractors who develop the more detailed requirements and design. Barring any errors in the process, there is a relatively straightforward flow of requirements from top level to detailed engineering drawings.

But the initial set of requirements comes from the business. These are generally not true requirements as engineers think of requirements, they are often goals to be achieved. These initial requirements are decided on by the business people to answer the question *"What can we do that will give us the greatest financial benefit at an acceptable level of risk?"*

This is where the disconnect occurs that causes significant problems later in the EPC phase. The business people think in terms of the ultimate goals and pay little attention to the technical requirements. The business just wants the construction to begin so they can start production and obtain revenues from the final operational facility.

To the engineers and contractors, goals are insufficient to create a successful project. They need much more than goals to design the end facility. They need detailed technical information, data, before they can even begin design work.

For an oil refinery, that detailed technical information is an accurate chemical analysis of the feedstock that the refinery will process. For a mining facility, that detailed information is the exact composition of the raw ore that will be processed. For a desalination plant that information is the exact salinity of the input. Bad data at this stage will result in a design that does not work as expected, leading to extensive redesign efforts with concomitant impacts to cost and schedule when more accurate data on the feedstock is available.

If the project is being financed externally, the situation is even more challenging. There is schedule pressure put on the contractors by the financers to complete the project quickly so they can get their return on the investment. Financers are not engineers or project managers. They simply don't realize that putting schedule pressure on the project will do exactly the opposite of what they want, the project is likely to run into even more problems by rushing the work and creating expensive errors and rework. Even if this situation is pointed out to them, they believe that their project is different and past history has nothing to teach them.

Similar problems occur with public infrastructure projects. If the projects begin running into delays, there can be intense political pressure to complete the work so the politicians in office can claim credit for a completed project. The Sydney Opera House is a classic example of construction work that began before the design was completed under political pressure from the New South Wales government. A large amount of already built structure had to be torn out and rebuilt once the design was done.

7.5 Change the Procurement Approach

In 2010 KPMG estimated that over 50% of all major construction projects used a lump sum contracting approach and this percentage is increasing every year. A lump sum contract gives the owners the feeling that it gives more risk to the contractor (only partly true) and they can pay less attention to the contractor's work progress (not true at all). Hindsight shows us that the only consistent items created by lump sum contracts are that the contracting price is much higher, there are more claims filed, and there is a strong incentive on the contractors part to do low quality work and utilize low quality materials. As has been said by several authors, "Nobody has ever paid less than the Lump Sum amount, and almost everybody has paid more, often considerably more."

Any form of fixed price contract (FFP) is a poor choice for mega-projects. Locking in the schedule and budget when the future is highly unpredictable puts significant constraints on our ability to adapt to changes in the future environment. This situation is compounded by the fact that there is only a limited number of contractors capable of constructing mega-projects. As Berends (Berends) states: 'Some 75% of the current global LNG capacity has been realized by four contractors, acting alone or as leading contractor in a JV'. While the situation in most fields is not that restricted, there is not an infinite supply of contractors capable of doing this complex work and that constraint needs to be understood during the procurement strategy approach planning. When the California Department of Transportation (CalTrans) released the initial RFP to replace the eastern span of the Oakland Bay Bridge, they received only one response at a estimated cost more than twice what they calculated.

Instead, the contracting strategy should be phased. During the architectural, FEED, and engineering phases a FFP approach can be utilized. However, in the actual construction phases a Cost Plus contract is more effective. The best contracting strategy will allow for flexibility to respond to external changes and will require more owner involvement in the construction stage.

This mixed approach is similar to that recommended by Merrow (Merrow, E.W.). As he states it: *"Mixed contracting is a strategy that involved reimbursable engineering and procurement, including, in some cases, the procurement of some lump-sum package items, followed by lump-sum contracts of construction or fabrication by constructors or fabricators that are independent of the engineering and procurement firm(s). The construction lump-sum contracts can be a single lump-sum contract to a construction management organization or a series of lump-sum contracts by craft discipline."*

Returning to our 5 Stage model, we can identify the specific contracting and procurement (C&P)

documents required at each stage. Harris et al. have laid out a high-level plan for procurement which has been modified slightly below to fit into our model. As you might suspect, the C&P process is equally challenging as the actual work itself.

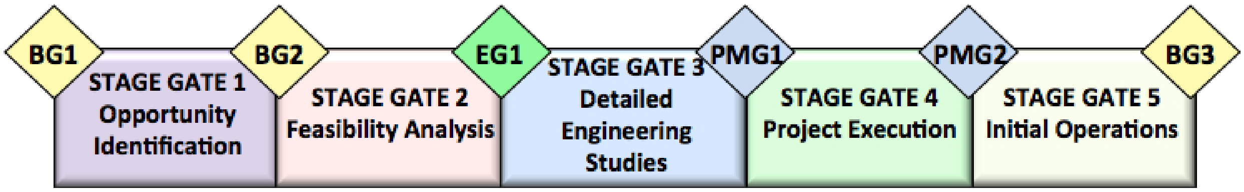

Figure 19: Proposed Stage Gate Process

Stage Gate 1:

The procurement process begins during Stage Gate 1. The preliminary procurement strategy is defined here in accordance with the normal approach for the organization.

Stage Gate 2:

- C&P Strategy
- Long-lead items list
- Preliminary local industry participation plan (mandatory in countries with government-mandated set-asides for local suppliers and contractors)
- Insurance strategy
- Materials management strategy.

Stage Gate 3:

- C&P Plan
- Orders placed for long-lead items and equipment
- Major contracts ready to execute
- Participation plan for local industry
- Insurance plan
- Materials management plan

Stage Gate 4:

- Monitor contractor performance
- Close out contracts and purchases orders as appropriate
- Gather project and vendor data and documentation
- Local industry participation plan

- Updated materials management plan
- Spares management plan

Stage Gate 5:

- Ensure delivered products satisfy requirements and perform as expected
- As-Built documentation

Because we are dealing with facilities that are expensive to operate over a life cycle of many years, the contracting strategy should be to minimize life cycle costs rather than the pure cost of construction. It is more important on these type of projects than it is on smaller projects, it is also correspondingly more difficult. There are major stakeholders involved, such as the financers, who are not involved in operations and do not care about operational and maintenance costs. Their emphasis is to minimize construction costs and to get their money back as quickly as possible. However, it should be clearly stated in all contracts that the goal is to minimize the full life-cycle costs and not just the construction costs.

8. Summary

Programs cannot be successfully managed using traditional project management approaches. There is a much broader perspective required. Setting up a multi-billion dollar, years-long program is much more like creating a new company than it is like managing a smaller project.

The most effective approach to program management begins with the business, ensuring the right decisions are made to make the program successful. Shortcuts in money, resources, schedule, and requirements will only lead to later failure. The right contracting vehicles must also be used to ensure the contractors have the same success criteria as the owners.

This paper examined common approaches identified by both academics and real life approaches by private industry in developing complex, large-scale, costly projects. It expanded on both theory and practice to develop a more effective way to approach the early management of these projects. We suggest starting each new megaproject the way you would start up a new business, and developing a strategic planning document to guide the stages of the project, from the early study/feasibility stages through engineering/ architecting and through construction/commissioning.

The emphasis of the approach was on effectiveness, not on efficiency. We can be truly efficient only if we can perfectly predict the future. Since we cannot do that, we must build adaptability into the process, flexibility, to respond to changes and to unexpected events. To effectively produce these projects we need a different approach than the traditional project management approach than has been promulgated by professional organizations for smaller, less complex projects. This approach begins long before the traditional project management approaches and extends into the early operations stages.

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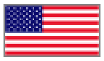
About the Author

Frank R. Parth

Rancho Santa Margarita
California, USA



Frank Parth, MS, MSSM, MBA, PMP is the President of Project Auditors LLC, a past member of PMI's Board of Directors, and is currently on the core management team for PMI's PMBOK Guide version 6. Mr. Parth brings 35 years' experience in project and program management to his teaching and consulting work.

He had a first career designing satellite systems for the US government and in 1993 he set up a consultancy and began consulting in program management and systems engineering. He has created PMOs for several Fortune 1000 companies and for companies internationally. He consults to clients in multiple industry sectors, including telecom, construction, high tech, chemical processing, utilities, government, healthcare, mining, financial services, and aerospace. He is currently supporting Saudi Arabia's Saline Water Conversion Corporation in improving their project management processes and in developing a PMO.

Mr. Parth teaches project management courses throughout the world and has taught over 4000 students worldwide in preparing for the PMP certification exam. He is a guest lecturer at USC's Marshall School of Business, the University of California, Irvine, and at the American University of Sharjah (AUS) in the UAE, is an accomplished international speaker, and does pro bono teaching of project management in Vietnam.

He has co-authored or contributed to multiple books on project management and has published numerous papers in project management and systems engineering. He is actively involved with PMI, serving on local and national committees and was PMI's Project Manager for the Standard for Program Management, 2nd edition published in 2008. Mr. Parth can be contacted at fparth@projectauditors.com.