

Managing the Monumental: How Project Controls Prevent Failure on the Largest Projects and Programs

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Thousands of tourists visit world heritage sites like the Giza pyramids, the Parthenon, and Chichén Itzá every day and wonder how our ancestors built such ambitious, impressive structures. Any modern project manager could offer at least one reasonable assessment: very slowly – and probably at a greater cost than the pharaohs, Pericles, and the Mayan monarchs expected. While these monuments have endured for thousands of years as lasting cultural symbols, they would likely be considered failures by modern project and program management standards.

A LASTING LEGACY

Despite our sophisticated, modern management toolkits, we do not need to look thousands of years into the past for megaproject failures. In fact, many of our largest infrastructure projects today continue to fail by going well over budget, concluding much later than expected, missing quality targets, or not otherwise meeting an owner's business objectives. Consider, for example, the Panama Canal Expansion project. Approved by a national referendum in 2006, this design-build project comprised the construction of a third set of locks and an expanded traffic lane to increase the size of the canal and enable it to handle larger vessels. Work on the project began in August 2010.

For some sense of scale, the megaproject comprised five separate projects totaling \$5.25 billion, with the third set of locks alone costing more than \$3 billion. Construction crews



excavated 46 million cubic meters, filled 21.8 million cubic meters, and used 192 million tons of rebar and 4.75 million cubic meters of concrete. Almost 40 countries participated in the engineering, fabrication, and delivery of resources and equipment – the team used cement from Mexico, gates from Italy, and valves from Korea. There were more than 14,000 activities in the master schedule.

The expansion also faced major challenges. Delays in engineering, shop drawings, fabrication, and equipment delivery plagued the project. The master schedule did not match the construction sequence, and schedule updates were frequently unreliable. A high level of construction complexity, poor productivity, and labor and equipment shortages compounded the delays and contributed to skyrocketing costs.

At one point, the contractor suspended the work due lack of funds.

The high-profile megaproject was eventually completed, and the new set of locks commenced operations in June 2016. While impactful and undoubtedly impressive in scope and ambition, the Panama Canal Expansion came in 600 days late, and with \$5.4 billion in claims. Although the expansion is operating and generating revenue, from a project management perspective, the project was a failure.

Why do large construction projects and programs like the Panama Canal Expansion fail? While we can cite many contributing factors, from bad and low pricing to increased costs related to changes in methodologies, lower-than-planned productivity rates, and labor and equipment shortages, the overarching reason is this: the bigger and more complex the project/program and the longer the timeline, the more opportunities there are for small risks to snowball into big problems.

program is big, complex, lengthy, and comes with thousands of risks. Yet, unlike many large programs and megaprojects, the Aviation Department's capital program has been remarkably successful from a management perspective.

Part of the success stems from the use of multiple alternate delivery methods, including construction manager at-risk (CMAR), design-build, and job order contracting. By weighing options and selecting the most appropriate delivery method for each project, the Aviation Department's program team has been able to deliver more projects on time, within budget, and as envisioned.

Another key to the successful management of so many projects, scopes, budgets, schedules, layers of risk, and stakeholders is the program's robust project controls approach. Led by an experienced project management consultancy team and expert City of Phoenix engineers, this project controls approach enables Phoenix's Aviation Department to plan, fund, schedule, defer, prioritize, and execute construction projects in an achievable way and without disrupting the passenger experience at the fully operational airport.

The program team leverages technological solutions for project controls, using Oracle Unifier as a project management information system (PMIS) to monitor and manage many different aspects of the capital program. Management tools like dashboards and reports help the Aviation Department and program and project leadership plan, evaluate project scopes, facilitate funding, track Federal Aviation Administration grant processes, track cost estimates and project schedules, track budget performance through project life cycles, execute procurement in line with project requirements, manage quality through design and construction, and manage communications throughout the entire program organization.

While the program team has been using this technology for more than a decade, the Aviation department is always on the lookout for beneficial upgrades and additions to the team's technological toolbelt. For example, the Department is currently reviewing business processes and implementing changes to streamline the flow of information. These changes will help project managers, division managers, and executives find program information more quickly, promoting data access and engagement and incentivizing the use of data in decision making. The department is also exploring additional software



THE PROJECT CONTROLS SOLUTION

The project management profession is predicated on an understanding that all projects and programs – even the most complex and the largest – can be executed successfully. Failure is not inevitable.

For example, the City of Phoenix's Aviation Department is undertaking a capital improvement program at Phoenix Sky Harbor International Airport (PHX). Comprising hundreds of modernization and maintenance projects to improve airfields and enhance the passenger experience, the five-year, \$2 billion

to further enhance the team's project controls approach and drive continued program success.

SUCCESS, REPLICATED

With experienced program and project professionals using proven tools and driving innovation across the capital program, the Phoenix Aviation Department has delivered hundreds of projects that facilitate airline operations and enable PHX's more than 44 million annual passengers to enjoy shorter gate times and improved navigation around the airport. Moreover, the program team has done so in accordance with the department's budget, schedule, and quality objectives. In other words, the team is achieving management success on a large, complex capital program.

This success is replicable, even on the largest, most complex megaprojects and programs. To position your project/program for success, collaborate with experienced project/program management professionals to identify the right delivery method for your project/program and establish a project controls approach as early as possible. To promote innovation and continuous improvement, reevaluate your team, delivery method, and project controls throughout your project/program's life cycle. Bring your management team together to discuss the following questions:

- » What type of project/program are you undertaking? Does your leadership team understand the scope? What are your requirements for project/program success?
- » Who are your stakeholders? What are their expectations?
- » Do you have the management and technical expertise required to complete such a project/program in line with your own/stakeholder requirements?
- » What kind of delivery method are you using? Why? How is risk being distributed?
- » What software are you using for a PMIS? Why?
- » Has your entire project organization bought into the use of the PMIS software? If not, how can you build and sustain that buy-in?
- » What is your baseline schedule? Is it realistic? As the project goes on, does your schedule still reflect the sequence of construction? Do schedule updates match construction's logic, activities, and duration?



- » What is your budget? Are your projects financed? Where are the estimates coming from? How are payments being processed? How will changes be processed? What are your schedule risks? Are you trending over budget?
- » Are you using the PMIS to incorporate delays and changes? Are you performing delay analysis?
- » What are your key performance indicators? Are they reflected in your reports?
- » How are you capturing and transmitting best practices and lessons learned?

By leveraging the power of an expert project team, the right delivery method, and project controls, teams on even the most complex megaprojects and programs will be able to achieve management success and deliver our own society's lasting infrastructure and enduring cultural symbols on time, within budget, and as envisioned. 📌



About the Author

Martin Lopez serves as senior director, program management at [Hill International, Inc.](#) He has 35 years of experience in global program and project management, project controls, and construction claims. His key experience includes the \$2 billion capital improvement program at PHX, the \$5.2 billion Panama Canal Expansion, and the \$7 billion Saadiyat Island in Abu Dhabi, UAE. He is a registered civil engineer in California. Martin can be reached at MartinLopez@hillintl.com.

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