# Ma a M a: H P C P Fa La P a P a

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Thousands of separate projects totaling $5.25 billion, with the third

locks alone costing more than $3 billion. Construction crews

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 new set of locks commenced operations in June 2016. While impactful and undoubtably 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.

## 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

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

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

team's technological toolbelt. For example, the Department is currently reviewing business processes and implementing

will help project managers, division managers, and executives

and engagement and incentivizing the use of data in decision

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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.