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4 Reasons Why NASA Projects Miss Deadlines and Blow Budgets

Managers think their projects are “too big to fail,” and believe future scientific progress will excuse any delays or cost overruns

By **Robert N. Charette**



Photo: NASA

The U.S. House Committee on Science, Space, and Technology held a hearing last week looking into NASA project costs and schedule overruns. The hearing followed on the heels of a Government Accountability Office (GAO) report released in May that showed that the costs and schedules of NASA's portfolio of major projects (meaning those with a life-cycle cost of more than US \$250 million) have “deteriorated” over the past year.

The GAO reported that the agency's current overall development cost growth for the portfolio of 17 development projects increased to 18.8 percent, up from 15.6 percent in 2017. Further, the average launch delay for the portfolio had reached 12 months, the longest the GAO has seen in the past decade of looking into NASA's major projects.

The GAO identified the culprits as "risky management decisions, unforeseen technical challenges—some avoidable and some not—and workmanship errors." For instance, the launch of the \$8.8 billion [James Webb Space Telescope](#) was [pushed back yet again](#) earlier this year from October 2018 to at least May 2020. NASA attributed the problems to both "[avoidable errors](#)" and testing plans that proved to be "[rather optimistic](#)." The original plan for the telescope was for it to be launched in 2011 at an estimated cost of \$1.6 billion.

The GAO said four projects in particular, the [Space Launch System](#), [Exploration Ground Systems](#), [Space Network Ground Segment Sustainment](#), and [Mars 2020](#), are the primary drivers of the cost increases and schedule delays. All four, the GAO stated, "experienced technical problems compounded by programmatic challenges." These four projects together accounted for \$638 million in overall cost growth and 59 months in aggregate schedule delays.

Further, the GAO goes on to say that, while NASA's portfolio of major project costs and schedules has deteriorated, the "extent of cost performance deterioration is unknown." This is because the cost baseline for the [Orion project](#) is currently being adjusted, most likely upward. The uptick in Orion's cost, which is not included in the 18.8 percent cost-growth figure, could be significant, given that it accounts for some 22 percent of NASA's \$30.1 billion in development costs. Even a small percentage growth could have a major cost impact. How much more Orion will cost and how much longer it should take should be known within the next few weeks.

Also testifying at the House Committee hearing was the [NASA Inspector General Paul Martin](#). Martin listed in his [report](#) [PDF] four underlying causes of NASA project cost and schedule problems that have [plagued the agency](#) for years. First was the issue of NASA project managers' culture of optimism, aka the "[Hubble Syndrome](#)."

NASA managers have come to believe—usually correctly, Martin said—that "projects that fail to meet initial cost and schedule goals will receive additional funding and subsequent scientific and technological success will overshadow budgetary and schedule problems." So, while a project may experience a cost overrun or schedule delay, it is of little real consequence to NASA managers other than perhaps a scolding or two by the GAO, the Inspector General, and Congress.

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This "too big to fail" attitude is coupled with a recurring failure to anticipate the technical complexity involved in projects. This is somewhat understandable, given that NASA projects are often trying to accomplish unprecedented feats, but the complexity involved in integration and testing seem to be systematically underestimated by project managers and their technical teams. This behavior worries the GAO, especially since many of NASA's current major projects that are already driving cost overruns and schedule delays have not yet entered

integration, which is where most projects experience trouble.

Another reason NASA management plays down a project's technical complexity and risk is to get the project sold, Martin noted. Once sold, a project almost immediately becomes too big to fail. So, as former NASA administrator Michael Griffin (and now [Under Secretary of Defense for Research and Engineering](#)) once confessed, the goal of a NASA project manager "[becomes that of getting \[a project\] started, no matter what has to be said or done to accomplish it](#)." The [same approach is true](#) at the U.S. Department of Defense, so Griffin is probably feeling right at home.

A third issue raised by the NASA Inspector General is funding instability, which is caused by decisions made by both Congress and NASA. NASA appropriations have been a political football since 1959; only seven times has the agency ever received its annual appropriation at the start of a fiscal year. However, the IG also noted that NASA hasn't helped itself by its over-optimistic planning and decision making, either.

The last issue the report raised was a problem with developing and retaining experienced project managers. Engineers complained that they had few "hands-on" opportunities to learn engineering management skills, as they spent too much time performing contractor oversight. Going into private industry looks more attractive than working for NASA and being contract monitors for many young engineers, the Inspector General observed.

Both the GAO and Inspector General Martin, however, recounted that NASA has taken numerous steps to improve how it manages its projects, and that cost overruns are not nearly as bad as in the past. For instance, Martin stated that NASA began instituting a Joint Cost and Schedule Confidence Level in 2006 that provides "a percentage likelihood the project will be developed at a particular cost and on a particular schedule, but also identifies associated cost and schedule reserves needed to back-up the plan."

The availability of reserves has helped NASA to address risks early, rather than letting them turn into costly problems. The Joint Cost and Schedule Confidence Level, which was fully implemented in 2009, has helped rein in some of the drivers of project cost and schedule.

That said, both the GAO and IG reports make it very clear that if project costs continue to climb, NASA should not be surprised to see Congress pass legislation capping its funding.

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