



Pete Peterson

Of Space Ships and Bullet Trains

The space shuttle program is a cautionary tale for ambitious infrastructure projects.

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With the final [landing](#) of the space shuttle *Discovery* on March 9, a significant chapter in NASA history came to a close. It's the beginning of the end for the space shuttle program—the final flights of *Endeavour* and *Atlantis* are scheduled for later this year—and thus a fitting occasion to reflect on an effort that dates back to the Nixon administration. As President Obama calls for a new era of “doing big things”—from creating a high-speed rail system to building wind farms—the record of the shuttle program and other “megaprojects” worldwide suggests a simple warning: beware the “unbiased expert.”

[Commenting](#) from Kennedy Space Center before *Discovery*'s final launch, *PBS Newshour*'s Miles O'Brien gave an unsentimental valediction for the shuttle program: “Well, the promise of the space shuttle program, when you look at how they were selling it in the front of Congress, was just pure fancy. There were all these studies which indicated the space shuttle fleet could be flown on the order of once a week, and that it would have airliner-like capability for turning it around once it got on the ground. But it's an incredibly complicated system. And there wasn't a full appreciation at the time for really how difficult it was to fly a reusable spacecraft to and from space.” O'Brien's skepticism has become more common since the October 2003 release of NASA's [final report](#) on the Columbia disaster. Investigating the causes of Columbia's tragic disintegration over Texas on February 3, 2003, the Columbia Accident Investigation Board looked beyond the event itself, concluding that the accident's origins could be found three decades earlier, in the program's first days: “It is the Board's view that, in retrospect, the increased complexity of a shuttle designed to be all things to all people created inherently greater risks than if more realistic technical goals had been set at the start. . . . Throughout the history of the program, a gap has persisted between the rhetoric NASA has used to market the Space Shuttle and operational reality.”

During the Columbia investigation, Robert F. Thompson, the shuttle program's manager from 1970 until just after its first launch in 1981, officially confirmed what many had long suspected: that from their first discussions with Nixon aides, NASA engineers and other interested parties had fudged budget and performance numbers. To gain congressional support for the multibillion-dollar project, NASA had to demonstrate that the shuttle would have a much lower cost “per payload pound” than conventional single-use rockets. As Thompson recounted in his [testimony](#) before the Columbia Accident Investigation Board on April 23, 2003: “At the time that we were *selling the program* [emphasis added] at the start of Phase B, the people in Washington got a company called Mathematica to come in and do an analysis of operating costs. Mathematica discovered that the more you flew, the cheaper it got per flight. Fabulous. . . . So they added as many flights as they could. They got up to 40 or 50 flights a year. Hell, anyone reasonable knew you weren't going to fly 50 times a year.”

Not everyone was fooled. Even before the shuttle's first launch, in a prophetically titled [cover story](#)—BEAM ME OUT OF THIS DEATH TRAP, SCOTTY—for the *Washington Monthly* in 1980, Gregg Easterbrook

compared the project with Howard Hughes's "[Spruce Goose](#)," the largest plane ever built, which managed to get only 70 feet off the ground in its sole flight. The magazine dubbed the shuttle program "Battlestar Bureauctica."

Investigating an agency that had already overspent its original budget and missed its forecasted launch date, Easterbrook found scientists seemingly disconnected from any sense of financial stewardship. Recalling the program's quest for cash in its early days, Jerry Gray, one of the original members of the shuttle technical team, used an equine metaphor: "First you have to get the horse," he told Easterbrook, "then you decide where to ride him." By 1980 the shuttle program had practically doubled its original budget; today, after three decades and almost \$200 billion spent, it has missed almost every budget and performance goal.

Yet the shuttle program is just another entry in the ever-expanding file of large, ostensibly public projects that have lurched past deadlines and beyond financial limits. In their book [Megaprojects and Risk: An Anatomy of Ambition](#), European planning and policy professors Bent Flyvbjerg, Nils Bruzelius, and Werner Rothengatter analyze dozens of public-works projects worldwide—from the "Chunnel" (the British Channel rail tunnel) to a high-speed rail project connecting Berlin and Hamburg to the construction of Denver International Airport. They draw some common lessons.

First, cost overruns are endemic to such massive projects. From the Chunnel, which nearly went bankrupt several times and exceeded original cost estimates by 80 percent, to Boston's "[Big Dig](#)" traffic tunnel upgrade, which ran 200 percent over budget, the impact on state and local coffers can be immense. Overall, the authors report that "the difference between actual and estimated investment cost is often 50-100 percent."

A second common thread in these ventures is that their advocates, eager to get them financed, vastly overstate projected public usage. Interestingly, this seems especially true of rail systems (both high-speed and standard urban rail) in comparison with road, bridge, and tunnel projects. While road infrastructure projects like the UK's Humber Bridge (which has seen just 25 percent of its forecast traffic) have underperformed, public rail projects have an especially poor track record when measured against original cost and usage estimates. Transportation secretary Ray LaHood, pushing ahead with a White House plan to build high-speed rail throughout the country, is either unaware of this research or unconvinced by it.

The *Megaprojects* authors find that blame for these fiascos lies in a toxic pro-project mix of self-seeking "experts," politicians, and private-sector interests—combined with a minimum of public input. "It is easy to find motives for producing deceptive forecasts of costs and benefits," they write. "Politicians may have a 'monument complex,' engineers like to build things, and local officials sometimes have the mentality of empire-builders. In addition, when a project goes forward, it creates work for engineers and construction firms, and many stakeholders make money." So while some might defend the errors as honest mistakes caused by unforeseen circumstances, the authors come to a more prosaic conclusion: "The use of deception and lying as tactics aimed at getting projects started appears to best explain why costs are highly and systematically underestimated and benefits overestimated in transport and infrastructure projects."

The authors' solution to the seemingly intractable problems of complex project construction is fairly straightforward: give taxpayers a say. They call for a "participatory and deliberative approach in including publics and stakeholders," which they argue will result in "decisions about risk that are better informed and more democratic." Encouragingly, more inclusive practices of this kind seem

increasingly common around the world. From “citizen juries” and “public advisory councils” that oversee local- development efforts in Europe and the United States to Stanford professor Jim Fishkin’s “Deliberative Poll” methodology, which has been employed to plan public-construction projects in [China](#), citizens can and should take a larger role in decision-making. Greater public participation will not only result in scuttling some unnecessary projects, but also prioritizing more urgent ones. As Flyvbjerg and his colleagues note, some meritorious projects never see the light of day because they lack the salesmanship and boosterism that have often supported expensive boondoggles.

During World War I, French prime minister Georges Clemenceau famously sniffed that “war is too important to be left to the military.” In the same sense, as President Obama [declares](#) that “within 25 years, our goal is to give 80 percent of Americans access to high speed rail,” citizens should understand that such efforts are too important—and costly—to be left to engineers, politicians, and even rocket scientists.

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