On January 6, 2011, Secretary of Defense Gates **announced** the termination of the Marine Corps' Expeditionary Fighting Vehicle (EFV). At the time, he said—

The EFV's aggressive requirements list has resulted in an 80,000 pound armored vehicle that skims the surface of the ocean for long distances at high speeds before transitioning to combat operations on land. Meeting these demands has over the years led to significant technology problems, development delays, and cost increases. The EFV, originally conceived during the Reagan Administration, has already consumed more than $3 billion to develop and will cost another $12 billion to build – all for a fleet with the capacity to put 4,000 troops ashore. If fully executed, the EFV – which costs far more to operate and maintain than its predecessor – would essentially swallow the entire Marine vehicle budget and most of its total procurement budget for the foreseeable future. … As with several other high end programs cancelled in recent years, the mounting cost of acquiring this specialized capability must be judged against other priorities and needs.

This article opined as follows—

The cancelled EFV ended up costing over ten times as much as the $2.5 million AAV7 (taking inflation into account). … The EFV has been threatened with cancellation for several years, mainly because the vehicle was too expensive and didn't work. Well, parts of it worked. A year ago, tests revealed that the EFV had similar survivability characteristics to MRAPs, when hit

with roadside bombs or anti-vehicle mines. The EFV needed all the good news it could get, but marines were already using MRAPs in Afghanistan, and are quite happy with them. What they don't really need, and may never need, is a high speed (in the water) armored vehicle that can cross 50 kilometers of open water to assault a defended beach. There has been no need for that since 1950.

For the last three years, the EFV developers have been making changes in the electronics, waterproofing of electrical elements, the gun turret and the stabilizers (for when it is moving in the water), trying to get the vehicle approved for production. … Under the original plan, the EFV was to enter service three years ago, and cost less than half its current price. … Three years ago, existing prototype EFVs had one failure, on average, for every 4.5 hours of operation. The marines insisted they had fixed the reliability and protection issues, and this persuaded Congress to provide money to build seven of the modified EFVs to confirm that. … But in the end, it was the sheer expense of the vehicle. The marines can't afford the EFV, which would cost $16 billion (for 573 of them). That comes to $29 million each, including all the development cost, making each EFV costing more than four times what the most recent model M-1 tank does. …

The EFV has been in development for over a decade, and has been delayed largely because of a complex water-jet propulsion system which, when it works, allows it to travel at 60 kilometers an hour while in the water. This capability was specified to reduce the danger (from enemy fire) when the EFVs were moving from their transports to shore, a distance of 30-50 kilometers. The additional gear required for the water jet system made the vehicle less robust and reliable, and fixing those problems has taken a lot of time. …

So in the end, the EFV was terminated because the Marines couldn’t afford it. But that’s not the only USMC program that’s been in trouble.

And we’re not even talking about the Marines’ version of the F-35 that’s been put on two-year “probation” by the DOD. No, we’re talking about the Sikorsky CH-53K heavy lift helicopter.

An April 2011 **report** by the GAO told Congress that the program “has addressed early difficulties and adopted strategies to address future [program] risks”—which is basically what you want GAO to say when your program has experienced a 3-year schedule delay and a 30 percent cost growth.

We thought the GAO report was interesting, given our periodic focus on program management. (For those who don't know what we're talking about, there is a series of articles on this site that all start with the phrase, "Why Can't *So-and-So* Manage…," by which you may take it that (in our view) not many entities actually can manage.)

Let's take a closer look at the report.

The CH-53K program is important to the Corps, because it needs the heavy lift capability the helicopter will provide. As the GAO reported—

Its major improvements include upgraded engines, redesigned gearboxes, composite rotor blades and rotor system improvements, fly-by-wire flight controls, a fully integrated glass cockpit, improved cargo handling and capacity, and survivability and force protection enhancements. It is expected to be able to transport external loads totaling 27,000 pounds over a range of 110 nautical miles under high-hot conditions without refueling and to fulfill land- and sea-based heavy-lift requirements.

The GAO reported that Sikorsky was given the contract on a sole-source basis in December 2005—meaning that there was no competition. Despite the Obama Administration's official stance disapproving of such non-competitive awards, and despite the DOD's recent efforts to minimize them, there was no hint in the GAO report that the lack of competition had any impact on the program's cost, schedule, or quality.

Instead, the GAO found that the program's reported cost increase—from $18.8 billion to $25.5 billion—was primarily related to the Marine Corps ordering 200 aircraft instead of the 156 it had originally planned to acquire.

The GAO did find certain program-related issues. It noted that the program started development "before determining how to achieve requirements within program constraints, which led to cost growth and schedule delays." In addition, the GAO reported—

Problems with systems engineering began immediately within the program because the program and Sikorsky disagreed on what systems engineering tasks needed to be accomplished. As a result, the bulk of the program's systems engineering problems related to derived requirements.

Importantly, the GAO reported—

While Marine Corps officials commented that requirements are often difficult to define early in the engineering process and changes are expected during design maturation, they noted that in this case the use of a firm fixed-price contract with the subcontractor made it difficult to facilitate changes. As a result, completing this task took longer than the program had estimated and the program's CDR was delayed. … To mitigate the risk of production cost growth, the contractor established long-term production agreements with its subcontractors. According to program officials, in these agreements subcontractors committed in advance to pricing arrangements for the production of parts and spares. While the contractor used this strategy to reduce program risk, it resulted in a delay and the major subcontracts were awarded later than needed to maintain the program's initially planned schedule.

Let's stop and think about the preceding paragraph. Sikorsky's emphasis on awarding long-term fixed-price subcontracts may have mitigated some program risks (which we frankly doubt) but at a price. As a result of Sikorsky's decision to lock-down its suppliers before it had completed its design, the program not only experienced schedule delays, but it also experienced downstream problems implementing the inevitable design changes.

We would assert that Sikorsky awarded the wrong contract types to its suppliers; they should have been under a cost-type development contract (perhaps with incentives) so that the program team operated as…well, a team. We would further assert that Sikorsky may well have incurred more cost managing changes on its fixed-price supplier subcontracts, than it would have spent on managing cost-type subcontracts.

Despite its early missteps, the program has recovered nicely—according to the GAO. It reported—

… the program delayed technical reviews until it was prepared to move forward, thereby

becoming more of an event-driven rather than a schedule-driven program. An event-driven approach enables developers to be reasonably certain that their products are more likely to meet established cost, schedule, and performance baselines. For instance, the program delayed CDR—a vehicle for making the determination that a product's design is stable and capable of meeting its performance requirements—until all subsystem design reviews were held and more than 90 percent of engineering designs had been released. … At the time CDR was held, the program had released 93 percent of its engineering drawings, exceeding the best practice standard for the completion of system integration. According to best practices, a high percentage of design drawings—at least 90 percent—should be completed and released to manufacturing at CDR. Additionally, the program office stated that all 29 major subsystem design reviews were held prior to the start of CDR, and that coded software delivery was ahead of schedule. In the end, the Technical Review Board, the approving authority for CDR, determined that the program was ready to transition to system demonstration—a period when the system as a whole demonstrates its reliability as well as its ability to work in the intended environment—and identified seven action items, none of which were determined by the program office to be critical.

Again, if you can't receive top-marks on your program from the GAO, at least you've got a report saying you've recovered from your early problems. Kudos to Sikorsky and the US Marine Corps!