How Commercial Space Spurred DoD Innovation

Michael Schlacter

Photo courtesy of the Missile Defense Agency.

Anyone who has spent an appreciable amount of time in Department of Defense (DoD) procurement knows that the subject of acquisition reform surfaces from time to time. Common critiques are that the process is slow and unresponsive to the demand signal, or that the capabilities are expensive and unaffordable. The corporate process responds to these critiques and implements changes of varying scales with the hope that, this time, the changes will be long lasting.

No mission area seems to be immune from this feedback, and space in particular has been under the microscope in recent years. The Government Accountability Office (GAO) has reviewed major, non-launch space programs more than a dozen times since 2010, comparing them by their relative cost overruns and schedule slips. Space was also featured in the Fiscal Year (FY) 2017 National Defense Authorization Act, Section 1616, in which legislators asked the DoD to look at the management and organization of national security space activities.

On the other end of the spectrum is the coverage of rapid capability organizations such as the U. S. Air Force's Operationally Responsive Space and Rapid Capability Office organizations. By highlighting these organizations, writers seem to say there are places where development can occur quickly and costs can be contained. Are there other places where this can happen? Yes, it's commercial space.

Commercial space has transformed how the DoD looks at the overall space industry. In the past, the DoD relied mostly on large satellite programs with military-specific hardware and software. Today large satellites, small satellites, hosted payloads and managed services all have the ability to fill military niches for which they are uniquely suited, and the explosion in commercial space lift is nothing if not exciting.

Can commercial space encourage the DoD to change? Absolutely—and not just on the surface like the DoD using a commercial products and services contract strategy. Instead, the change can occur at the fundamental management level by suggesting a new, innovative way to lead DoD space projects.

One DoD space program matched the speed of its commercial partners and gained benefits when it achieved that speed. Maybe this is a story of acquisition reform after all—how a single program decided to reform itself.

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Spacebased Kill Assessment

Since the 1980s, experts have known the benefit of having a battle damage sensor observe a national missile defense engagement. That benefit is the ability to answer the question: Did we destroy the lethal object?

To study that question, the Ballistic Missile Defense Organization conducted experiments to study the signature of a high-speed collision in space. The Missile Defense Agency (MDA) continued that work by building models that explained the physics of a high-speed collision and developing a test sensor called the Kill Assessment Sensor Package, or KASP, that supported maritime tests for over a decade.

In 2014, MDA started Spacebased Kill Assessment, or SKA, with an aim to provide a kill assessment capability from space. At its core, SKA has two fundamental tenets in its approach: First, it builds upon the previous physics-based collision modeling and the KASP sensor design heritage to reduce risk. Second, the network of SKA sensors are to be hosted on commercial satellites as MDA's pathfinder for an alternative to the traditional, large satellite space program.

During the SKA design concept phase, it became clear that nearly every technical challenge would pale in comparison to the schedule challenge MDA would accept when it selected the host for the SKA sensors. Compared to a traditional DoD launch schedule, the commercial host's launch schedule is fixed, meaning SKA sensors delivered late would miss their ride into space.

Just as important, the schedule was highly compressed. For example, it forced the sensor development to be accomplished in 15 months and required MDA to deliver flight hardware to the satellite integrator starting at month 19. Ultimately, MDA triumphed over those challenges. This raises two questions: (1) How did SKA become a fast program; (2) and what were the benefits of being a fast program?

How To Be Fast

Programs just starting are in the unique position of being able to establish a business culture more effectively than programs already under way. This is because the programs under way cannot just establish a business culture—instead they have the harder task of changing one already in use. The MDA leadership team exploited the opportunity of starting a program with a clean slate when it crafted the SKA business rules from scratch in 2014 and specifically employed several techniques to proceed rapidly. The techniques listed below were among the most effective and are portable to nonspace programs.

Technique 1: Establish program priorities. Establishing priorities seems like a common-sense approach. However, it came as a surprise to learn how few programs actually do that. Without established priorities, program execution can quickly become focused on delivery of all the desired program performance with little regard to cost or schedule; in other words, an all-access pass to a Nunn-McCurdy breach. To guard against that, on the first day of the program, the leadership team established the following priorities:

- Schedule
- Cost containment
- Performance

Schedule obviously was the highest priority because SKA sensors delivered late would miss their ride into space; the other two priorities were assigned their order because of their alignment with the SKA acquisition strategy and existing MDA acquisition culture, respectively.

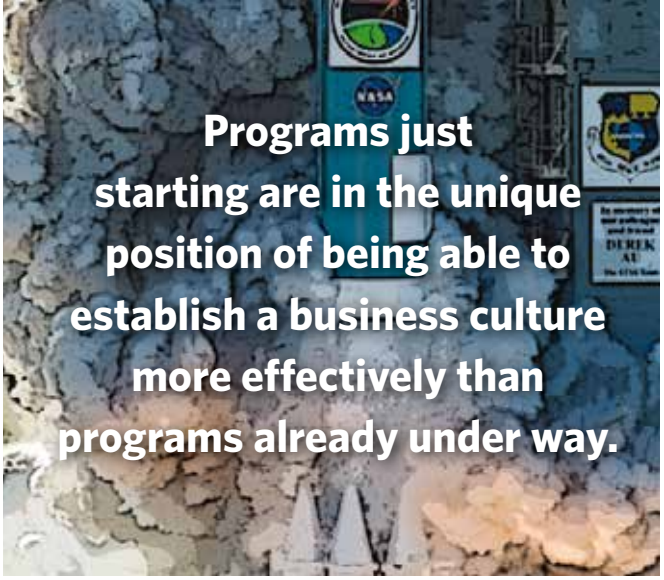
Establishing priorities had the benefit of creating decision-making space for the program to trade cost or performance to ease schedule pressures. Having trade space is absolutely paramount to program managers because the best shape of any program will be on the eve before the program starts. As soon as the program is under way, it cannot avoid the fate predicted by Helmuth von Moltke the Elder that "no plan survives contact with the enemy" and program managers need internal trade space to find resources to apply to challenges.

On several occasions, the program spent funds (priority No. 2) and adjusted performance (priority No. 3) to stay inside the schedule box (The No. 1 priority). In retrospect, it would have been nearly impossible to go as fast as the program did without having a priority-based system in place to support trade studies.

Additionally, establishing priorities gave the program complete alignment—among the staff within the MDA team, among the staff within the development team and between the two teams. Team misalignment creates friction in the gears—decision-making becomes difficult and slows the progress once a decision is made. MDA observed that the government and developer teams worked faster by themselves and with each other once they embraced the prioritization schema. This accelerated pace occurred because there was never a lengthy discussion on what the priority was (schedule) and what resources were candidates for donation (cost and performance).

All in all, MDA saw that once the program became more comfortable with the priority-based trade process, lengthy discussions and program misalignments occurred less and less frequently. Challenges were overcome at the lowest possible level, and it seemed as if the seas of program execution were becoming calmer as the program continued its voyage.

Technique 2: Unrelenting pursuit of decision-making speed. Traditional decision-making routines can be good because they bring regularity to management teams. However, some decision-making routines can be bad if their cadence is too slow and teams have to wait too long before the next session to make a decision, or if the routines themselves generate unnecessary work. To that end, the MDA team threw tradition



out the window and put business rules in place to increase decision making speed, for example:

The MDA developer team increased the frequency of decision-making forums. In lieu of monthly or quarterly program management reviews, the full SKA team met weekly to make decisions. Each meeting was a raw, unvarnished review of progress, and meeting weekly minimized the amount of time issues sat idle.

The government leadership team met twice each week to discuss "What did you learn recently?" This practice is similar to one commonly used in operational units called "stand ups." This session kept issue status up to date and ensured that the management team shared a common operating picture.

SKA avoided practices that robbed speed and employed other practices that increased speed. With government purpose rights in place and easy-to-use online documentation, sharing and storage, the program limited the number of contractual plans and reports to five. In addition, no meetings required read-ahead material nor did any meetings require a "pre-meeting" to get organized. Additionally, the government program manager was onsite at the developer location 1 day per week, with some engineers being onsite up to 3 days per week, effectively creating a badgeless work environment where decisions could be made face-to-face and nearly as quickly as sending an e-mail or text message.

The Benefits of Being Fast

Keeping on schedule while rapidly delivering a capability should be sufficient satisfaction. However, the program also noticed other benefits of being fast—some quantifiable, others intangible.

Cost containment. Early in the program, a cost estimator told the SKA leadership team that the greatest cost driver on development programs is the salary of the "standing army" that must be paid even if the schedule slips to the right. It follows that if a program can stay on schedule, then cost containment is easier to achieve.

That was true in SKA's experience. By staying on schedule, additional costs for salary were contained. In fact, the overall program cost increased less than 5 percent with the major contributor being price increases for electronic parts. The bottom line is that the labor costs for the development team typically will surpass the costs for parts and raw materials, fees for outsourced services, etc., so that priority attention to schedule and mindfulness of the costs of the standing army will contribute greatly to cost control.

Increased credibility. Knowing how to go fast allows programs to create schedule reserve against unforeseen challenges, and judiciously using that reserve allows programs to stay on schedule.

Staying on schedule can be one of the best ways to gain credibility with those who have a role in DoD acquisition programs—the joint warfighters, Congress, the GAO, etc. That credibility can forge solid relationships between stakeholders when things are going well, and can buy the program additional time when things are not going so well.

Benefits to joint and enterprise partners. In today's world of increased interoperability within a joint or enterprise architecture, programs easily can be affected by the performance of their interfacing neighbors. That means a lagging program providing products or services to the enterprise will affect all interfacing programs' ability to meet schedule and therefore affect their cost bottom lines due to the expense of their own standing armies.

In SKA's experience, the speed the program created had a cascading effect: Speed allowed SKA to keep schedule, which provided products and services to interfacing programs on the timeline it promised, therefore minimizing cost impacts to those same programs. In a broader sense beyond SKA, for an agency managing a diverse enterprise, the cost savings are magnified and can be impressive if all interfacing programs are managed to this common goal (i.e., schedule speed).

Conclusion

SKA learned that immediately establishing and sticking to program priorities as well as an insistent pursuit of decision-making speed provide incredible program advantages that went beyond the obvious advantage of maintaining an aggressive program schedule.

Rapid capability organizations are not new in the DoD and there are numerous examples of how military space programs succeeded in going fast. Their stories should be read and scrutinized for what worked and what didn't work. The Spacebased Kill Assessment story is proof that nearly any program can go fast—all it takes is courage, decisiveness and the willingness to try something new or different. Maybe this is what real world acquisition reform looks like after all.

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