No. 20: Integrating COTS: Lessons from Recent Ground Vehicle Acquisitions (01/15/10)

Defense systems are rarely acquired rapidly. Even programs addressing urgent warfighter needs, such as countering Improvised Explosive Devices (IEDs) with Armored Security Vehicles (ASVs), can take years to fulfill. Yet, some orders are being fulfilled remarkably quickly. Most notably, the acquisition of 20,000 Mine Resistant Ambush Protected vehicles (MRAPs) is being completed with a speed and scale unseen since WWII.[1] The same phenomenon appears to be repeating itself in the MRAP-ATV (M-ATV) program. This paper examines the factors in the rapid acquisition of these systems, particularly their use of commercial- and government-off-the-shelf technologies (COTS/GOTS), and whether lessons can be identified for acquisition policy.

Some attention has recently been paid to programs' use of proven technologies to hasten their acquisition. One study, conducted by the Defense Science Board (DSB) in February 2009, suggests that COTS/GOTS tailored to meet military performance standards early on in their acquisition processes may expedite the fielding of defense systems. The DSB measured, on a scale of 1 to 8, the extent to which these systems are militarized, with higher levels indicating technologies undergoing greater modifications from their original commercial incarnations.[2] Technologies used in the systems examined below have been produced for military use for long enough to be considered military-off-the-shelf (MOTS).

Armored Security Vehicles: Problematic MOTS

The Army's initial response to the IED threat, Textron's M1117 "Guardian" ASV was acquired slowly. Scrambling for defenses against IEDs, the Army revived the wheeled patrol vehicle's production line and increased orders from 132 in 2004 to more than 1,000 in late 2005.[3] Yet, despite the urgent need for the ASV, production rates were low. Before Hurricane Katrina swamped Textron's sole ASV plant in 2005, production lagged 30 percent behind the Army's expectation of 48 vehicles per month.[4] After rebuilding its facilities, Textron achieved this minimum monthly requirement, but rarely exceeded it.

To produce the ASV, Textron enhanced and added components to an existing design. Based on the Vietnam-era LAV-150 "Commando" assault vehicle, the ASV features an upgraded version of a proven armored turret, stronger armor and a new independent suspension system.[5] Integrating these advanced systems with an older platform and its components, however, slowed production of the ASV.

MRAP: MOTS and Modularity

The development of the MRAP met the IED threat more swiftly and effectively. Within two years after the Department of Defense awarded production contracts to several competitors, more than 16,000 vehicles were produced at rates sometimes exceeding 1,000 vehicles per month.[6] The rapid pace of MRAP acquisition is widely attributed to its use of proven technologies.

Although many companies produce unique MRAPs, most integrate proven components into modular vehicle designs. MRAP models such as Navistar's widely-used "Maxxpro" use readily available, universally supportable parts, while 95 percent of the components used in BAE Systems' "Caiman" MRAP are compatible with the Family of Medium Tactical

[1] Christopher J. Lamb, et al. "MRAPs, Irregular Warfare, and Pentagon Reform". *Joint Force Quarterly*. (Washington, DC: National Defense University Press, 2009) no. 55, pp.76-85, p. 85.
[2] Defense Science Board [DSB] Task Force on Integrating Commercial Systems into the DOD, Effectively and Efficiently, *Buying Commercial: Gaining the Cost/Schedule Benefits for Defense Systems* (Washington, DC: Department of Defense, February 2009), pp. 2-3.
[3] "Cadillac Gage ASV 150 (M1117) (Guardian)". *Jane's Armour and Artillery*. 17 December, 2008.
[4] Ibid.
[5] Ibid.
[6] Government Accountability Office. "Rapid Acquisition of MRAP Vehicles". (Washington, DC: Government Printing Office, 2009), pp. 6-7

Vehicles.[7] The MRAP's modular design not only protects its crew from IEDs, but also enables rapid production due to the ease of system integration.

M-ATV Acquisition: MOTS and COTS

The strategy of using unaltered, standard MOTS was carried over from the MRAP to the M-ATV program and improved upon. Like the MRAP, the M-ATV has been acquired exceptionally rapidly. The sole-source contract recipient, Oshkosh, exceeded delivery requirements for six consecutive months, surpassing a 150 percent overage of 1,000 M-ATVs in December 2009.[8] MRAP production achieved comparable rates from 2007 to 2008, but required multiple sources to do so.

Both MOTS and COTS are integrated in the M-ATV design with little additional modification. Not only is its chassis based on a common military truck used in Afghanistan and Iraq, but the M-ATV uses the TAK-4 suspension system common in tractor-trailers.[9] Thus, like the MRAP, the M-ATV embodies proven military and commercial components in a new program.

Lessons for Future Acquisitions

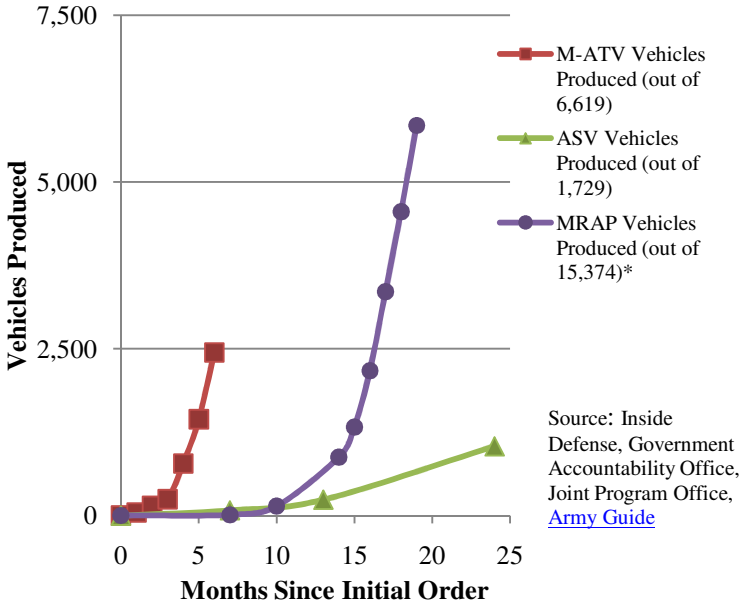
Applying the DSB's COTS scale to MOTS and comparing the usage of both across the above systems, it appears that the acquisitions of higher-level MOTS systems built from the bottom up are faster than those of derivative systems. However, the reverse is true for their subsystems. Considering that the ASV was an existing platform that had been gutted and modified, the DSB would rate it as a "Level 5" program. However, the MRAP and M-ATV rate a "Level 7", as they were new designs assembled from a collection of MOTS and COTS. The adjacent graph illustrates the different production schedules of these programs.

Integrating low-level COTS and MOTS subsystems appears to shorten the overall system's acquisition schedule. Rather than modifying their subsystems to meet additional requirements or developing new technologies, the MRAP and M-ATV integrated the available components as they were. By contrast, the slower-moving ASV program revamped existing systems, especially its turret, to meet evolving needs. New or highly modified components thus appear to cause difficulties for subsystems integration.

Factors other than use of proven technologies may accelerate the acquisition of certain programs. First, and most obviously, priority designations matter. Receiving DoD's highest "DX" priority rating kicked off the MRAP's production about 10 months into the program, and the M-ATV started production with the same rating. It is unclear whether the ASV was rated or not. Secondly, using multiple sources helps control for risk on the production line. This was not done in the ASV's case, and the program was set back.

New acquisition programs may achieve rapid production schedules if they integrate existing COTS and MOTS to meet new requirements, though doing so requires creativity on the part of their subsystem integrators. However, as investments in new or improved technologies increase, advances in subsystems will pose new challenges.

Production of MRAPs, M-ATVs, ASVs Over Time



Source: Inside Defense, Government Accountability Office, Joint Program Office, Army Guide

—David Morrow

[7] "Maxxpro", *Army Guide*. http://www.army-guide.com/eng/product4033.html. and "Caiman", *Army Guide*, http://www.army-guide.com/eng/product4067.html

[8], *Inside Defense* "Oshkosh Surpasses 1,000 Vehicles per Month", December 22, 2009.

[9] *Inside Defense*, "Oshkosh Exceeds M-ATV Delivery Schedule for Third Consecutive Month". October 1, 2009.

[*] Quantity ordered as of the end of this series in February 2008. The Joint Requirements Oversight Council increased acquisition of MRAPS by an additional 4,000 units in the first week of January 2010 from 22,882 to 26,882.