Strategy Research Project

Commercial-Off-The-Shelf Acquisition: Their Value in Defense

by

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In an austere fiscal environment, Commercial-Off-The-Shelf Acquisition (COTS) offers an acquisition alternative to support a ready and modern force in the twenty-first century. The decision to use COTS is not always an easy choice; but chosen appropriately, COTS reduces developmental time and costs. It is a quick means of acquiring capabilities from a broad commercial base. Its value has been affirmed in rapid acquisition programs designed to support our Warfighters in the current protracted conflicts and it has proven to be a force multiplier that has enhanced both force lethality and force protections. The acquisition process of design-and-integrate must be analyzed thoroughly to consider all other alternatives before selecting COTS as the best options. Greater use of COTS increases competition, innovation and enables the acquisition community to fill gaps in capability. COTS frequently gives program managers the flexibility to control cost, to minimize schedule, and to gain assured performance. Changing the culture of the acquisition community remains the biggest obstacle for making optional use of COTS. Senior leadership oversight can critically support implementation of a COTS-centric acquisition process.

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In an austere fiscal environment, Commercial-Off-The-Shelf Acquisition (COTS) offers an acquisition alternative to support a ready and modern force in the twenty-first century. The decision to use COTS is not always an easy choice; but chosen appropriately, COTS reduces developmental time and costs. It is a quick means of acquiring capabilities from a broad commercial base. Its value has been affirmed in rapid acquisition programs designed to support our Warfighters in the current protracted conflicts and it has proven to be a force multiplier that has enhanced both force lethality and force protections. The acquisition process of design-and-integrate must be analyzed thoroughly to consider all other alternatives before selecting COTS as the best options. Greater use of COTS increases competition, innovation and enables the acquisition community to fill gaps in capability. COTS frequently gives program managers the flexibility to control cost, to minimize schedule, and to gain assured performance. Changing the culture of the acquisition community remains the biggest obstacle for making optional use of COTS. Senior leadership oversight can critically support implementation of a COTS-centric acquisition process.

Commercial-Off-The-Shelf Acquisition: Their Value in Defense

> Expanding the use of commercial items in DoD systems offers the opportunities for reduced cycle time, faster insertion of new technology, lower life cycle costs, greater reliability and availability, and support from a more robust industrial base.

> —J. S. Gansler[1]

The value of the commercial-off-the shelf (COTS) option as a provider of world-class technology to warfighters in defense acquisition systems cannot be disputed. After more than a decade of war, high-technology warfare, COTS solutions have played an important role in our military operations. In fact COTS has aided in disrupting and defeating our adversary's decision cycle in the Middle East. Combatant commanders have been challenged to frame the strategic direction and conduct full-spectrum operations in theater while combating the enemy with fielded enablers. The COTS has been a decisive tool enabling our warfighters to gain an advantage. Additionally, COTS has also enhanced the Army's training and readiness. Used properly, COTS reduces or eliminates developmental hours, reduces costs, and provide superior performance.[2]

The austere fiscal environment that faces the Armed Forces in the twenty-first century is a constant reminder of the Army's obligation to acquire the best technology at the best price. The challenge is to achieve national security objectives with a ready and capable force. Senior leaders now have the daunting task of determining how to best prioritize limited modernization dollars to sustain readiness, maintained the Department of Defense's (DoD's) technological edge, and meet global commitments with a reduced force structure.[3] As the rate of technological innovations increases in both domestic and international marketplaces, COTS insertions into military weapon systems provide valued commodities and force multipliers. A closer examination of COTS wartime

acquisitions in Iraq and Afghanistan is instructive. The DoD's past practices affirmed that the current readiness strategy should include a robust use of COTS to acquire our military technology. For example, COTS can provide our Soldiers' with intelligence and protection systems, such as up-armored platforms; unmanned aerial and ground robotics; advanced munitions; operational energy items and smartphones.[4] COTS insertions into formations in OPERATION IRAQI FREEDOM/OPERATION ENDURING FREEDOM contributed significantly to operational success. It filled critical capability gaps when not all requirements could be filled by the traditional acquisition processes.

Smarter modernization investments will require the Pentagon and the acquisition community to gleam lessons from the past to consider COTS acquisition systems in transforming the military for the post-war era. This Strategy Research Project (SRP) elaborates on these advantages that COTS provides in military acquisitions. First, COTS is fast; it greatly reduces the time needed in other acquisition processes. Second, COTS provides needed goods at better prices. As the demands for the goods remain steady, COTS can continue be acquire as needed, while avoiding inventory problems. Finally, COTS products are constantly available, so COTS always gives acquisition personnel the pick-and-choose options. Leaders must now consider the extent to which our military should continue to rely on COTS acquisitions. This SRP argues that the lessons of the past decade of warfighting warrant considerable Secretary and Milestone Decision Authority (MDA) level emphasis on expanding this acquisitions option. It is often a better approach than the old "design and integrate" approach that often proved inadequate to serve our warfighters.[5]

COTS Rationale

The United States (US) is not the only nation to adopt COTS to support their national defense strategy. By levering their economic prosperity and advances in technology other world powers are seeking to modernize their conventional military capabilities by purchasing COTS equipment as well. War is costly; both in terms of national treasure and in human lives. During the wars in Iraq and Afghanistan, more than twenty ad hoc rapid acquisition program offices were opened in the Department of Defense. The Joint Staff, the Service Chiefs and the Component Commanders used a Joint Urgent Operational-Need Statement to generate, validate, and fulfill critical capability gaps across DoD. Many of these offices had little to no oversight, but all were able to rapidly deliver force multipliers to warfighters.[6]

Sustaining US domination over imminent threats in contingency operations remained its highest priority. These operations challenged the world's strongest military force, whose missions included deterrence, drug interdiction, border patrol, humanitarian and building partner capacity. With growing global volatility, the Armed Forces' preparedness mission will require the fielding of superior state-of-the-art technologies–commercial items.[7]

The use of these ad hoc rapid acquisition offices enables the acquisition community to search their websites for good ideas and best practices to improve collaboration for possible weapon enablers. The investments made during the war have set a precedent for fulfilling capabilities and understanding the true value of integrating COTS into the defense acquisition systems.

Past budget legislations, like sequestration, remains law until 2017 and beyond. The Murray-Ryan Budget Control Act of 2011 required ten-years of spending

reductions. Fortunately for the nation, the 2011 Bipartisan Budget Act curtailed the

effect of sequestration for two execution years (2014 and 2015).[8] With the reality of

decreased resources in an uncertain and complex future environment; serious

concessions must be made between both the Executive and Legislative branches.

COTS technology can enable strategic leaders to deliver solutions to acquisition of such

items as the Mine Resistant Ambushed Platforms, the Harris® radios (Melbourne,

Florida), and unmanned vehicles. COTS acquisition of such items improves the lengthy

traditional approach of design and integrate, which will be discussed later in the paper.

The traditional acquisition approach is not always practical.[9]

Strategic leaders in the acquisition community must acknowledge the need to

change the approach to supporting our warfighters. Establishment of a board of

directors can ensure greater understanding of near and long term objectives. A board

could garner the lessons learned in theater as conflicts become more asymmetrical and

non-linear, which required systems to be more lethal than ever. A change in culture is

needed in order for the acquisition community to embrace the value of COTS during the

current construction of alternatives approaches to acquisition. The Kotter's Eight Steps

to Leading Change addresses the economic and social forces driving the need for

change in the community. Changing the culture is complex. COTS have challenged the

previous best acquisition practices. Deciding when to use COTS is now the most

difficult challenge, especially when additional certifications and testing extend schedules

and increases costs.[10]

<center>Acquisition Transformation</center>

The COTS is not new. Early in the 1990s, Secretary of Defense William Perry

offered his *Specification and Standards* memorandum (*Perry Memo*). His alternative

<center>4</center>

would transform the community's thinking, encouraging greater use of commercial state-of-the-art technology in defense programs. Perry's policy shift expanded the defense industrial base and gained efficiencies in the acquisition community. The *Perry Memo* authorized the waiver option, titled *A New Way of Doing Business.* It launched the use of non-governmental contracts based more on performance specifications to achieve the desired weapon system's functionality and capability. Secretary Perry offered a new approach to acquisition; he eliminated mandated use of military standard (MIL-STD) and military specification (MIL-SPEC) requirements in defense weapon systems because it was more practicable to use extensive performance and commercial specifications and standards.[11]

Following a page taken from the Vice President Al Gore's *National Performance Review,* Perry also recommended that the federal government cease awarding government-unique requirement contracts. The Deputy Under Secretary of Defense also formed a Process Action Team to create policies that reduced reliance on MIL-SPECs and MIL-STDs in a report called the *Blueprint for Change,* focused on achieving the Executive branch's objective. Clearly, these actions formed a strong guiding team–a coalition. This ability to build a coalition and push through changes should have been enough to fulfill the vison and strategy to ward off complacency within the acquisition community. It should have strengthened trust and established common goals to create change in the late 1990s.

In a similar endeavor, the industrial based formed the Industry Review Panel on MIL-SPECs and MIL-STDs to determine the viability of progressing towards performance and commercial specifications and standard government contracts. The

Perry Memo called for MDA or another authorized designee to personally approve waivers for deviation from commercial specifications and standards as set forth in Department of Defense Instruction (DoDI) 5000.02, Part 2. Additionally, to drive acquisition methodology towards more a COTS-centric process, the Innovative Contract Management team provided further evidence for the Under Secretary of Defense for Acquisition and Technology. He then inserted language in the Defense Federal Acquisition Regulation supplement, encouraging contractors to propose non-government standards while embracing more industry-wide practices in their efforts to meet the intent of his memo. Now after more than twenty years, finding the right balance remains a concern in the aftermath of the last thirteen years of war, during which more ad hoc rapid organizations were created to fill the warfighters' needs.[12]

Through their published guidance and public testimony, our political and DoD leaders make strong cases for greater COTS procurement in DoD acquisition strategy. At the House Armed Services Committee (HASC) session held March 25, 2015, Representative Mac Thornberry, R-Texas openly advocated the imperative of having a ready and avant-garde force equipped with state-of-the-art capabilities in the twenty-first century. The Grand Old Party chair highlighted his thoughts to effectively overhaul the defense acquisition system, making modernization challenges in the Armed Forces his top priority for the next six-years. Representative Thornberry complimented the technological superiority in the industrial base, but complains that the acquisition community has not leverage the many benefits of those capabilities. He further echoed his concerns about the proliferation of other world powers who are acquiring advanced

technology at a faster rate than ever before. He suggests that the US cannot afford to continue business as usual taking years or decades to field a new capability.[13]

During the session, he argues that there are hurdles crippling the existing acquisition system. He cites the arduous reporting cycles and the inordinate oversight imposed by DoD and Congress as culprits. Representative Thornberry also cites the present flaws in the Weapon Systems Acquisition Reform Act (WSARA) 2009. The WSARA makes competitive prototyping mandatory unless waived by the MDA, mandating program managers (PMs) to select competitors to build costly full-size prototypes for an eventual down-select vice using the Federal Acquisition Regulations (FAR) provisions to simply select and award a contract-based proposal to a proven competitor based on required criteria.[14]

His recommended Bill includes the following proposed changes to current acquisition protocols, which reduces unnecessary oversight and gives greater latitude to PMs:

- Removes the WSARA's mandate for competitive prototyping; allowing PM to seek innovative best practices.

- Remove red tape, enabling the PM to manage the program versus simply producing the surplus of more than sixty-eight documents for a Milestone B decision.

- Permits PMs to select the contract strategy best-suited for their program objective, eliminating the lengthy waiver request for cost-plus contracts.

- Change the workforce's modus operandi, eliminate military officers'

  single-tracked career path, enabling freer movement from operational

  and acquisition jobs. As for the civilian workforce, new legislation

  would allow the pilot program Defense Acquisition Workforce

  Development Fund to become permanent, versus ceasing to exist in

  2018.

- Clarifies commercial items determination policy, enabling a once-and-

  for-all policy across DoD.[15]

Representative Thornberry's projected Bill changes support most of the Under the Secretary of Defense procurement reforms requested during the 2015 President budget. Representative Thornberry has communicated his viewpoint on Capitol Hill and plans to add the above provisions in the 2016 National Defense Authorization Act (NDAA) alias "House Bill." The NDAA specifies the views of Congress for DoD budget and expenditure while also taking into consideration how the Chairman's Capstone Concept support the national defense strategy for the employment, safeguard and authorization of military forces.[16]

The Chairman's Capstone Concept of Joint Operation identifies the challenges of an uncertain, complex and chaotic environment where irrational actors will have access to advanced weapon systems and the US Armed Forces will be called to assist. His vision regarding employment of the Joint Force reasserts the need for efficient planning, funding and integration of Geographical Combatant Commanders (GCC) directed forces deployed in support of our allies. With a ready and modern force in the twenty-first century, the chairman's risk assessment forecasts that future military engagements will

require decentralization operations where smaller units perform limited operations in forward basing, projecting force while building partner capacity. For GCCs and regional aligned forces to shape and win the next conflict, these organizations must be agile, utilize smart power with partners and alliance across geographical boundaries, domains, and maintain strong interservice and coalition relationships.[17]

The COTS has continued to effectively provide major weapon systems technology. It continues to offer greater capabilities; a broader supply-base, and price competitiveness. And strategic leaders continue to advocate this kind of acquisition through governance.

Cohen-Clingen Act

The 1996 Cohen-Clingen Act (CCA) authorizes the DoD to manage the acquisition and management of information technology (IT) and national security systems with commercial items. The CCA set conditions for modular contracting to ensure backward compatibility with previous increment purchases. This would improve the government's acquisition of IT and national security systems. The DoDI 5000.02 describes IT in Title 10 of US Code as equipment or interconnected systems and subsystems used in the automated acquisition, through computers, software, firmware or similar procedures or services for DoD use directly or used by a contractor under a DoD contract requiring the use of that equipment. Rapid technological changes create growing challenges of obsolescence and cyber vulnerabilities. The FAR should authorize COTS acquisitions of technology to include our militaries to keep pace with this rapidly changing environment.[18]

Federal Acquisition Regulation (FAR)

The FAR and the CCA collectively concentrate on acquisition policies that exploit the commercial marketplace. The FAR, Part 12, 2007 highlights the acquisition of commercial items and components. The FAR directs United States Government agencies to conform to three policies:

1. Perform market research to determine if a commercial or non-developmental item meets the agency requirement.

2. Acquire commercial or non-developmental items when they are available to meet the agency needs.

3. Requires that all contractors (prime and sub) at all tiers incorporate to the maximum extent practicable, commercial and non-developmental items as components supplied to the agency.[19]

DoD Directive and Instructions

Both DoDD 5000.1 and DoDI 5000.02 require the United States Government to consider commercial items in the acquisition program development cycle. The DoD 5000.1 requires DoD agencies to select commercial technologies that could reduce development time and cost.[20] The guidance requires managers to adopt commercial best practices and use performance-based strategies. When utilization of commercial items provides an acceptable solution, especially during the early stages of analysis, the PM is required to assess critical technology and determines its risk in meeting the Warfighters' requirements. Unfortunately, this empowerment of employees for broad-based actions has not really changed DoD acquisitions. The DoD is understaffed for

system engineering and programmatic analysis of alternatives. So the lack of expertise in program offices has prevented analysis of the true costs of modifying commercial items and has limited opportunities for generation of short-term wins.[21]

<p style="text-align:center">Implications of COTS in the Acquisition Life Cycle–5 Phases</p>

Gaining the decisive edge over adversaries requires strategy and technology to deter and deny this aggression in the twenty-first century. The lengthy time line of the congressional (Planning, Programming Budget Exercise) budget cycle to authorize and appropriate money, although well-intended, delays a program's start period. The budget process must provide more flexibility to address rapid, urgent needs that a COTS solution can fill. The challenges that the acquisition community faces when requesting funds outside of the budget cycle may take months for an approval. When the system cannot respond quickly, projects lose momentum and traction. The funding stream is not the only barrier. Others include the complexity of the laws, policies and regulations that have been designed to foster fair and open competition and grow the industrial base. The system is inefficient for rapid responses to urgent requirements. The difficulty of changing an interdependent system makes the acquisition five-phase lifecycle process nonresponsive and difficult.

The COTS systems proliferation in Iraq and Afghanistan has gained enormous momentum. Incorporating those lessons into usable best practices and military acquisitions process—through adaptive technology from both the public and in-house government sector–will offer alternatives to the–protracted *design and integrated* direct-funded research and development (R&D).[22]

COTS Cost Savings

Despite looming budget shortfalls and related readiness challenges. The DoD's ability to execute the national defense strategy that support the national security strategy requires a superlative force. The COTS benefits can transform the organization by providing an effective alternative to the expensive traditional acquisition process. Many advocates of COTS use emphasize the fact that COTS has a myriad of advantages. The COTS impressively reduce costs of manufacturing; it shortens design-to-production cycles; it promotes a broader and more flexible commercial base. It is also seen as a compatible and emerging high-tech enabler.[23]

The decision to *procure and integrate* COTS into weapon systems enables the acquisition community and prime contractors to work in a collaborative environment. The cost and sustainment variation between traditional acquisition *design and integrate* and choosing a COTS solution creates considerable consternation (Table 1). The users; acquisition community's and prime contractor's ability to analyze and implement the acquisition strategy is key for managing the COTS lifecycle to include spares and disposal.

Table 1. Summary Difference between Military Specifications and COTS[24]

Military Specifications	Commercial-Off-The-Shelf
Requirement driven	Market driven
Specification focus	Business plan focus
Rigid requirements	Flexible requirements
Unique architecture	Open-system architecture
Owner controls evolution	Market controls evolution
Stable design	Constant changes
Ignore evolution	Design for evolution (Technology refresh)
Cost emphasis	Total ownership cost emphasis
Make custom hardware	Buy from catalogs
Develop software	License software
Obsolescence	Early obsolescence
Waterfall-style development	Spiral development

The Program Management Office (PMO) must include thorough considerations of COTS integration in the initial phase of the acquisition life cycle model. Several questions should surface: Does COTS offer flexible requirements not tied to rigid specifications and what are the unambiguous sustainment cost? For example, it is important to weigh COTS' functionality in meeting the requirements as closely as possible without requiring modification and further costs. Lastly, before the contractor's selection, the PMO must determine at source selection whether the contractors understand the COTS marketplace. Does he have the mechanism in place to assess, integrate, sustain and support a hardware refresh of the COTS product?

Additionally, the PMO must ensure that a fee-type contract provides incentives. With a fee-type contract, does the prime contractor have financial incentives to provide innovative ways of sustaining and supporting the COTS as well as sharing the risks and obligations with the government? The incentives set conditions for the prime contractor to control sustainment costs so they must be set early in the design stage, making this more of a culture change than anything else. The design and integrate linear process dismisses mature technology in the marketplace, assuming that no other alternative exists other than engineering and manufacturing development design.

This dismissal of the marketplace indicates that the system lags behind current technology. The choice to select COTS systems make sense when cost are spread by amortization over a broader customer base.[25] In a rapid acquisition environment as seen in Iraq and Afghanistan, COTS' concurrent or spiral evolution process of procure and integrate enable the government to obtain and field mature technology quickly rather than having the US government invest large amounts of money in R&D and wait

years before the product could be used by Soldiers. Clearly, there are risks to fielding

COTS procure and integrate requirements:

- Do the acquisition community and prime contractor/developers use shared

    commercial standards?

- Are standards communicated with the full understanding of how the product

    will be used and whether standard interfaces and open architecture are the

    norm?

- Can the capability be delivered when the users need it?[26]

Getting the full understanding of the prime contractor's commitment and business

process will eliminate duplicative capabilities.[27] Strategic communications are key (e.g.,

early engagement between the PMO and the industrial base through trade shows and

team arrangements). The acquisition workforce should be trained through the Defense

Acquisition University to broaden their COTS knowledge and perhaps to change the

culture. Culture change is possible, but change requires support from senior leaders

who have a vision for transforming the acquisition community. The following COTS

successes could garner support for change: the Mine Resistant Ambush Protected

Vehicle, the Infantry Brigade Combat Team's Stryker's vehicle, and non-developmental

communication items.

Mine Resistant Ambush Protective Vehicles (MRAP)

The MRAP proved effective for countering roadside improvised explosive devices

(IED's) land mines during OPERATION IRAQ FREEDOM (OIF) in 2007, after countless

ground-force personnel sustained massive injuries and even deaths. This was in fact

due to their reliance on legacy platforms that lacked the appropriate armor to provide protection from the IED blasts and aftershocks. The first MRAP version of the armored platforms came from a foreign-derived source during the Rhodesia Bush civil war in Zimbabwe Rhodesia in 1964 through 1979. The technology was matured by the South African Defence Force in its Casspir® armored fighting vehicle.[28]

The second foreign-derived source was the British's Cougar™ variant vehicle that filled the Marine Corps' requirements in 2004 by lowering the deaths in their formations despite on-going attacks. As death and injuries increased, Secretary of Defense Robert Gates designated the MRAP platform as DOD's highest priority. He set aside $1.1 billion for the program initiation. At the time, only two steel companies qualified to produce the quantities of material required for the DoD.

The initial contractor's run-off included nine commercial vendors that offered designs to build a small fleet of platforms with indefinite delivery and indefinite quantity contracts. Many of the developers failed the Army's operational testing standards and were disqualified for the production contract award. By 2012, the MRAP investment totaled $50 billion, the largest and quickest defense purchase since before the Cold War.[29] The effectiveness of the MRAP was a game-changer. It disrupted the insurgent's decision cycle, causing them to design larger and more sophisticated explosives, thereby creating logistical challenges for the insurgents.

The MRAP program presented both opportunities and challenges for the sustainers to maintain a logistically authorized spare part stock-level. The developer attempted to standardize vehicle parts for interoperability across the military services.

Although effective in saving lives, the MRAP reinforces the prospect that acquisition personnel cannot accurately estimate the true cost of modifying commercial items.

The fact remains that commercial, high technology system and advanced armored fighting vehicles truly enhanced the protection of the ground forces against land mines, improved the Armed Forces capability, and saved thousands of lives along Baghdad's and Fallujah's roadsides. The production of the MRAP reduced the development lifecycle by 27 months for Iraq's and 16 months for Afghanistan's all-terrain version. The MRAP was fielded through a rapid-tailored acquisition approach that bridged the capability gap in the acquisition life cycle to quickly procure and field a critical product. This success may change leaders' opinions about COTS use as the norm rather than the rapid acquisition solution.[30] The Stryker enjoyed similar success as well.

<center>Strykers</center>

Army Chief of Staff, General Eric Shinseki promulgated his transformation plan to build a lighter transportable force from the old Cold War doctrine. He advocated a lightweight and mobile, and adaptable interim armored vehicle to meet the agility and flexibility requirements for the Army's rapid deployable Brigade Combat Teams.[31] The COTS team from the program office opted for the interim armored vehicle solution. It derived its characteristics from two foreign-derived source variants–the Canadian light-armored vehicle III and the Swiss Motorwagenfabrik (MOWAG) Piranha III 8x8. Those vehicles provided appropriate state-of-the-art technologies.

The interim armored vehicle would allow the Army to leverage the existing commercial development to rapidly satisfy the capability from a heavy to lethal solution until the Future Combat System (FCS) light air-mobile vehicle made its debut.

Unfortunately, the cancellation of the FCS program propelled the production of the

interim armored vehicle, later called the *Stryker*'s vehicle. The Canadian's light-armored

vehicle III and the Swiss MOWAG Piranha 8x8 produced by General Dynamics (Falls

Church, Virginia)-General Dynamics Land System (GDLS) (London, Ontario) team and

General Dynamic European Land Systems (Switzerland), respectively were awarded

the production contract to outfit six Brigade Combat Teams (BCT).[32] The Stryker's rapid

development and fielding to BCTs supported the new paradigm in the acquisition

community, but Stryker came under intense scrutiny. Its flat hull offered no protection

from the IEDs in OIF, and its semi-active suspension failed during normal operations.

The Army proposed to upgrade the Stryker program utilizing Engineering Change

Proposals (ECP) to retrofit and upgrade the flat hull to a V-shaped hull configuration.

They installed additional armor on the sides and redesigned the hatch to decrease the

gap during a blast. They added new non-flammable tires and added a higher-power

amp generator. Later, Army leaders in Afghanistan requested the Army to incorporate

the 450 double V-shape hull and other upgrades into the Stryker's $30 million upgrade

contract that had been awarded to GDLS (Sterling Heights, Michigan). Compiling with

this request, the PM increased their readiness rate to 96 percent, and delivered over

4100 systems to Afghanistan. The Army issued a second ECP to GDLS to upgrade

improvements to the vehicle; the engine power deficiency required an increase in

engine horsepower from 350 to 450. The program office chose a COTS solution to fulfill

the ECP.[33]

Another successful COTS integration from PMO, Defense Communication

Systems-Europe (PM DCS-E (Grafenwoher, Germany)) implemented the Army

enterprise network through the Installation Information Infrastructure Modernization

Program. The PM digitized a Stryker Digital Motorpark (SDM) network with a classified

COTS solution. The SDM provides high-speed data connectivity to Strykers.[34] The PM

DCS-E installed the SDM in seven Stryker motorparks with high ultra-speed data

backbone (10 Gigabit per second) which provides interconnectivity to LandWarNet. This

then provides local area network capability for cross-communication connected to the

Motor Pool Distribution Points (MPDP) at various locations via fiber optics cables. This

particular capability enables planning, training, and simulation in a garrison

environment, so costly and time-consuming travel to a tactical field environment is

unnecessary.[35] The MPDP is key to the SDM's connectivity; it provides links for the

Strykers platform to connect to the brigade network and the LandWarNet. The MPDP

are integrated into two compartments in the motor pool's cement floor: one provides

maintenance personnel with access to the data cable distribution; and the other houses

the COTS Pop-up Communication Data Distribution Point (PCDP).

The PCDP was also modified from a COTS solution, the Schacht EK 808 electric

and ground connection (power access) similarly used in commercial airports, shopping

center and outdoor activities infrastructure. It provided PM DCS-E with a quick and

accessible data connection alternative. The PM DCS-E was able to leverage the COTS-

proven design of the EK 808 and the industrial Ethernet switch in the PCDP to rapidly

field an Army-wide data network.[36] The industrial Ethernet switch proved reliable with a

mean time before failure rate of over 1 million hours of operations in the temperature

ranges -40C° to +70C°. It met military electrical surge and spike safeguard

requirements. The PM DCS-E choice of these COTS products saved the PMO time and

money during the integration and design phase of the project. The PM DCS-E used COTS to swiftly integrate multiple components and to reduce supportability requirements since these items are delivered through existing supply chain to provide the warfighter with an immediate tactical capability.[37]

Communication Systems

The COTS communication systems in theater provided the Warfighter with a phenomenal situational awareness of the battlefield through the tactical edge network. The Harris AN/PRC 117G 2007, (V) 1 Type-1 and the AN/PRC 152A/C tactical data radios offer wireless, wideband, multi-mission high-bandwidth capabilities, which is readily upgradeable. These systems provided an unparalleled combat capability not seen in other conflicts. More than 100,000 radios were deployed with on-the-move video stream, simultaneous voice and data messaging, and chat in a secure network capability. These capabilities have enhanced the decision-making capacity of field commanders; they enhance mission planning, intelligence, battlefield estimation, maneuvers and logistics.

This real-time battlefield situation has given combatant commanders and warfighters an enhanced ability to gain unprecedented advantages. The lightweight on-the-move man-portable capability provides configurable options, increased processing power for the Type 1 man-pack radio ((10 watts for very-high frequency (VHF) and 20 watts for ultra-high frequency (UHF)). Soldiers lauded these radios as more capable than the legacy systems currently in the Army's inventory. This radio can send and receive voice, data and video tactical communication stream across the battlefield. The Harris radios have received unprecedented accolades from field commanders in theater. Further, the Assistant Secretary of Army Acquisition Logistics and Technology

(ASA (ALT) heralded them during the Network Integration Evaluation (NIE) in which Soldier-led evaluations maximized the use of the integrated Army's tactical communication networks, a critical priority of Force 2020.[38]

The Army-validated Mission Command on-the-move COTS capabilities through connectivity of the network through a Brigade Combat Team at Fort Bliss, Texas. This was accomplished through eight NIEs from 2010 to 2015. During an interview, Bill McCarthy (Communication-Electronic Command Logistician Specialist) noted the importance of these exercises. He envisions a future Army network--simplified, globally responsive, versatile and readily deployable to expeditionary operations. These exercises pave the way for delivering this network and setting the conditions for Force 2020 and beyond.[39] While NIEs continue and their usefulness becomes self-evident, the Army Training and Doctrine Command's (TRADOC's) efforts are focused on Force 2020 Maneuvers. The triad partners–ASA (ALT), TRADOC and the Army Test and Evaluation Command--will continue to use the NIEs as a way to deliver integrated COTS network capabilities to GCC. The exercise helped to validate the return on investments for the Army Warfighter Assessment; it mobilized collective resources to benchmark joint interagency, intergovernmental and multinational involvement. It set priorities on modernization and strengthened readiness while encouraging industry's participation in greater COTS integration and partnerships. The NIEs are the perfect venue for integrating early system engineering and programmatic analysis to influence decisions and trade-offs to ascertain the true Army challenges. They ensure that DoD requirements have been fully addressed across doctrine, organization, training,

materiel, leadership and education, personnel, and facilities across the utilization domains.[40]

<center>Life Cycle Support Maintainability</center>

The COTS products may not be suitable for all environments, but when the selection and implementation make sense, it should drive the acquisition strategy.[41] Aware of the sheer speed of products' availability in the marketplace, consistent using Performance-based logistics (PBL) usage, prime contractors are invested in supporting the Armed Forces. The PBL minimizes the inventory hurdles, reduces repair costs, increases reliability, and lowers the mean-time-to-repair timeline. This innovative logistics approach compliments COTS.[42] The commercial-industrial base is driven by revenue and dividends; which may drive vendors to substitute inferior product lines and/or substitute spares when costs rise.

The COTS also has inherent vulnerabilities; they must meet commercial regulatory requirements for compliance and compatibility; they must eliminate hazardous substances from electronic products. Cultural change in the acquisition community must occur in the both the private and government sectors in order to sustain COTS as a long term acquisition strategy. The examination of total ownership cost criteria is critical for determining COTS suitability verse a design and integration path early in the acquisition life cycle. Education and training enable DOD acquisition personnel and commercial contractors to weigh COTS obsolescence (hardware refresh) and interoperability issues.[43]

<center>COTS Obsolescence (License and Intellectual Property and Data Rights)</center>

The program management staff's decision to implement a COTS solution changes the dynamic of government contracting. For example, the PM must consider

<center>21</center>

the decision to purchase intellectual property and data rights. The PM must determine whether DoD maintained baseline configuration or used the innovative escrow account. As with real estate, the source code is place in escrow with an impartial agency that releases the code to the US Government in the event that the vendor goes out of business, triggering the need for configuration management.[44]

The COTS vendor's proprietary technology often becomes a discussion point for PMs. Locking users to a particular vendor is costly, especially if the prime and sub-contractor's relationship changes. But the capability requirement persist. The inherent risk of COTS is further complicated when it is necessary to transfer to another developer for ancillary support in licensing. Research has shown that single licensing costs over the program lifecycle can escalate, requiring every system to be licensed, rather than using a DoD bulk license. The acquisition community must continue to negotiate bulk licensing, making it the rule for government systems rather than the exception.

Conclusion

In short, the defense acquisition systems should continue to benefit from COTS. Preservation of high-technology COTS capabilities ensures that the U.S. Armed Forces remain dominant. The COTS also supports a broader industrial base. Additionally, COTS offers a favorable alternative of a rapid acquisition capability; it works much better than the traditional linear process of design and integrate. Sometimes COTS acquisition are not successful executed. The chance of using COTS product is not always an easy choice. But chosen appropriately, COTS can offer reduced acquisition time and lifecycle management costs, quicker insertion of technology, and maximum performance for DoD dollars. The protracted war has demonstrated that COTS

solutions work in the joint operating environment. This was evident in the MRAP program, which provided protection for the force. It was evident in the Stryker's development and upgrades, especially when filling urgent operational needs.

The acquisition community must consider all options to support full and open competition for the commercial industrial base that is driven by revenues and dividends. The COTS creates a substantial marketplace for DoD. Integrating the opportunity and challenges of COTS into the Armed Forces remains imperative as heralded by Representative Thornberry during the HASC session.

Culturally, resistance to COTS from the acquisition community still exists. Establishing a Board of Directors, partnering and collaboration with the commercial sector will provide additional oversight to COTS acquisitions. The right selection depends on the fragile market and the right prime contractor who understands and has the right experience-level regarding COTS insertions–planning, assessment, integration and sustainment (technology refresh).

The deliberate acquisition linear process *design and integrate* is effective, but it must be scrutinized carefully during the analysis of alternatives phase. For materiel design, system engineering, interoperability and sustainment tasks internal and external stakeholders' examination is important. From trade-offs, life cycle estimations, and requirements adjudication, the final selection for a COTS solution, as discussed in the example in this SRP, give a PM the ability to leverage cost, stay on schedule, and assure performance. Greater communication becomes essential between the acquisition community and the commercial developers before acquisition requirement

documents are approved and finalized by the Milestone Decision Authority, pre-milestone.

Innovative contract strategy considerations minimize requirement portfolio supportability and sustainability costs, especially if open architecture (common interface and standards) production development are used. A ready and capable Force 2020 and beyond as outlined in the Chairman's Capstone Concept for Joint Operations will be equipped, trained and sustained to deter aggression of rogue non-state actors, insurgents, or lone-wolf terrorists.

Many challenges come with the utilization of COTS--the diminishing industrial base, difficult interface protocols, component specifications, and speed, and lastly training. Although, COTS insertion is not new, a culture change will require strategic leaders to anchor new practices and establish a vision for the acquisition community that support greater consideration of COTS. Leaders like Representative Thornberry are vital to COTS transformation. He clearly created and communicated his vison during the HASC session proposing provisions be placed in the 2016 NDAA (House Bills). Which will further invigorate support for COTS solutions acquisition. The acquisition community must grow leaders that use mission command, who will decentralize and flatten organizations that encourage risk-taking. Strategic leadership is critical for COTS implementation and success.

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