Systems Approach to how DoD Acquires Systems

This paper examines the methods and means that the DoD uses to acquire systems. Specifically, this paper explores how using a systems-approach can better meet the need for joint capabilities than the current practice of optimizing components. As missions evolve, systems need to be more robust, resilient and adaptive to new concepts of operation. We do not have the luxury of designing and deploying systems that cannot evolve over their lifespan. Instead, the Defense Department needs to adopt strategies that enable the reconfiguration of systems to meet changing mission requirements.

by

John M. Scott III

for

Center for Strategic and International Studies

Beyond Goldwater-Nichols: Phase 2 Working Group:

Building a New Defense Acquisitions Process

January 5th, 2005

Version No. 2

Introduction

The conventional Department of Defense (DoD) acquisitions process has so far provided the United States with the best military in the world. Planning, equipment and warfighting within the Services are intended to ensure that this domination continues over the long-term, based largely on today's threats. But there is a gap in the ability of a combatant commander to integrate cross-service capabilities to plan for new, unforeseen threats and take advantage of opportunities in the field. One problem is that the interests of the four services are not properly aligned to fight as an integrated force. Joint coordination between the services fails both in terms of the ability of our technology to integrate and the ability to train our forces to fight jointly.

Currently, the Secretary of Defense has implicitly decided that military resources should continue to be organized and managed along Service lines[1]. We are not able to acquire systems that are born joint; instead systems are acquired separately, slowly and expensively for integration into joint operations. Not being able to acquire systems with joint capabilities wastes resources and more critically wastes valuable time that would otherwise be allocated to better planning or development of new systems. Joint capabilities are primarily viewed as technology purchases or organizational reshuffles, instead an architecture which needs to be flexible, adaptive and robust in response to an unknown future or enemy. Joint capabilities require the ability to interconnect various components of the services. This means that technology and training needs to be more than the sum of the parts.

We need to use a systems approach to how new technologies are acquired for integration into future capabilities coupled with training. Concepts of operations have changed, now what is required is a matching change in how the military plans and acquires systems for future needs.

Implementing a market based approach for acquisition reform will change the operational paradigm from one of process and control to one of accountability and execution, saving time and money over the long run.

---

[1] Beyond Goldwater-Nichols, Phase I, March 2004, CSIS, p. 48

I. Status Quo

The Goldwater-Nichols Department of Defense Reorganization Act (GNA) of 1986 changed the military's organizational paradigm for warfighting, but did not change the resource acquisitions process. By not specifically addressing the acquisitions process, GNA left the military services in charge for how to equip and train the fighting force. This split between commanders' ability to carry out joint missions and the bureaucracy's ability to create the fighting force has lead to a gap between joint concepts and on-the-ground capability.

Resource allocation reform has its roots with Secretary of Defense McNamara who recognized the increased need for cooperation among the services for warfighting. In the 1960s he implemented the Planning Programming Budgeting System (PPBS), as an attempt to coordinate joint capabilities into the resource allocation process. This resulted in service departments exploring the trade-offs between varied service programs, but left unfulfilled the long term goal of ensuring programs were created to be interoperable instead of using scarce resources to build interoperability into them after the fact[2]. A further problem with PPBS is that it did not close the loop by building accountability for execution and implementation into the PPBS[3]. Secretary Rumsfeld has attempted to make up for this shortfall by mandating accountability for performance and execution in the process (PBBE, E for execution), but it is too early to see any effects.

GNA attempted to fix these deficiencies by giving the combatant commanders a voice in the requirements process, which leads to systems acquisitions decisions. GNA codified the chain of command and legislated the responsibility to organize a joint force to meet mission needs. This change in command organizational authority has lead to the force of today - virtually unchallenged in their ability to make war. But GNA left a gap between the people who are responsible for organizing operations and those who are tasked with equipping and training the force.

Presently, systems (both technology and training) acquired by the services are primarily purchased to their address needs with limited coordination with the other services of the military. As an organization, each service optimizes its individual military

[2] Joint Capabilities – The Case for Reform, LTC M. Coss, 2004, p. 2
[3] Ibid CSIS, p. 37

systems (through its own concepts of operations) to meet their anticipated missions needs and requirements.

Further, the process of defending service-centric military systems means that those systems are only capable of incremental improvement within specific acquisition programs. As threats change, these systems need to be re-configurable. This is where the current model of acquisitions breaks down. The obstacles to acquiring joint capabilities fall into the following categories:

- Systems acquired by each service
- Services defending the status quo through concepts of operation
- Military systems optimized along individual service lines

II. Critique of Status Quo

The process of identifying the necessary capabilities for the joint force is a multi-layered process that involves the combatant commands, OSD and the services. The process of defining requirements for joint programs goes back to the early 1980s with the creation of the Joint Requirements and Management Board (JRMB), which was tasked to "monitor the development and acquisition of joint programs"[4] across the services. This panel has was renamed the Joint Requirements Oversight Council (JROC) in 1986[5].

The JROC previously evolved structures to develop joint requirements; among these is the segmentation of requirements definition into eight sub-groups called the Joint Warfighting Capability Assessments (JWCA). Currently the requirements generation systems and JWCA has morphed into an entity called the Joint Capabilities Integration and Development Systems (JCIDS) to foster capabilities that are born joint. The JCIDS process is meant to bridge the gap between the demands of commanders and the service departments by providing guidance to the JROC. JCIDS is linked to the PPBE, which in turn provides the SecDef an outside analytic baseline to judge whether the services are incorporating joint requirements in their programs. The one problem with these processes

[4] JCSM-159-87, Subject: Joint Requirements Oversight Council, Revision of Joint Requirements and Management Board Charter (Appendix), 17 Sep 1987.
[5] Christopher A Waln, LtCol, USAF, "Organization of Joint Chiefs of Staff and Systems Acquisition: What Now/What Next," Program Manager, (July-August 1988): 3

is that they do not explicitly link the desires of the commanders for approval of new acquisitions programs.

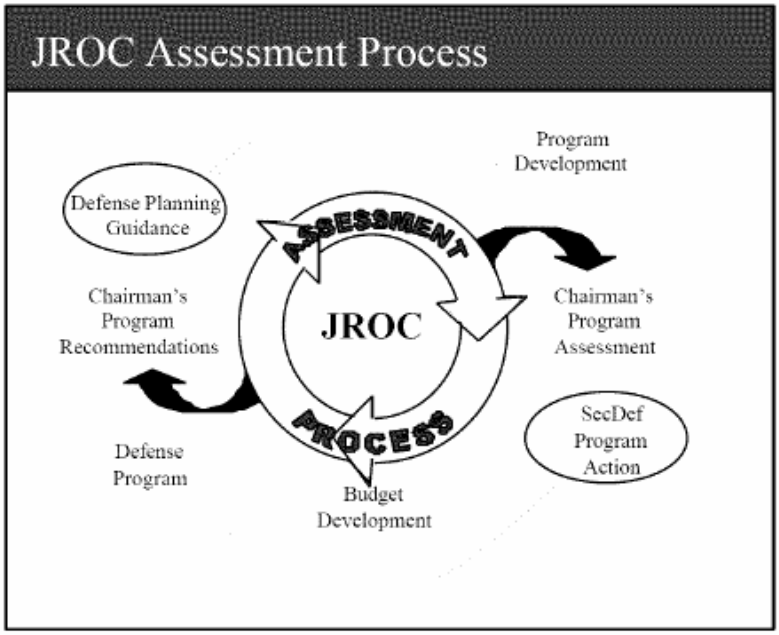

Figure 1 - JROC Assessment Process[6]

Further enhancing the stature of the JROC among the services was that Congress in 1997 provided the JROC explicit authority to assess joint military requirements, consider alternatives to acquisition programs and assign joint priority among military programs reflecting resource levels projects by the Defense Planning Council (DPG)[7].

The Office of Secretary of Defense (OSD) has proposed military budgets be coordinated (via Management Initiative Decision 912) to take into account Joint Capabilities, but the proposed process is encumbered by a top-down design-by-committee hierarchy that will ensure individual services will lobby for their own needs and not for the needs of future missions. Further process has been laid down and has only increased this disjoint and design by committee mentality.

The process of allocating scarce resources through OSD mandated management processes has slowed change and adoption of new capabilities in the military. Given these three trends (monopoly of war fighting by the services, inability to meet the demand of

[6] Ibid, Coss, p. 7
[7] National Defense Authorization Act of 1996. 10 U.S. Code, sec 181 (1996)

combatant commanders and slow, top-down processes) the only way to ensure the DoD is capable of meeting future war fighting requirements through joint operations is the explicit creation of market mechanisms.

III. A Systems Approach Alternative

A systems approach to meeting the need for joint capabilities is rooted in designing underlying rules that enable combatant commanders to acquire goods and services from their suppliers (the Services). A military capability is defined as the combination of military systems, people and a concepts of operation fused together to meet the needs of a mission. The acquisition system should be redesigned to take advantage of market mechanisms, which characteristically are loosely coupled and modular enough to be reconfigured and responsive to rapidly changing environments. The key in creating a market is to align the self-interested behavior of multiple groups with DoD goals.

The reasons for creating a market-based acquisition system are many. Chief among them is that coordinating a large distributed organization by top-down, centralized decision-making has shown itself to be slow and unable to account for the unknowns of rapidly changing future requirements. There are indications that attempts to reform OSD management structures are not working – lack of detail in joint requirements documents[8] and an inability to fill joint staffing requirements[9]. Market forces must be brought to bear on the problem of equipping future missions, and research has shown that markets are much better at meeting needs and reacting to future change than hierarchical systems of resource allocation.[10]

The advantages of a market-driven environment for DoD include:

- Funding allocation is king. An office with control (or approval) over funds determines how those funds are allocated.
- The internal DoD market has become too large to effectively be controlled any other way.
- Current processes of matching joint requirements to Service needs are too slow meet changing mission needs.

[8] Ibid, Coss, p. 13
[9] Ibid, CSIS, p. 47
[10] "How Economists Can Get Alife," Leigh Tefsion, http://www.econ.iastate.edu/tesfatsi/

- DoD is already growing into a heterogeneous marketplace with multiple sets of users and suppliers with operating capabilities.

One key to creating a viable and robust marketplace is the design of the rules that govern how resources are shared, bought, sold and acquired. These rules operate at multiple levels affecting how programs receive funding and govern how commanders make their wishes known through their transactions. The rules need to be designed to take into account how they affect the whole market. One rule may govern how services and products are priced, while other rules may control the allocation of limited resources among participants with competing interests. However, pricing need not be the only driving force. Other rules such as delivery, quality, etc. can be designed into a system to guide behavior. Rules to be included in a marketplace are:

- Standardization of cost data across DoD to allow users to assess delivery of capabilities across services.
- Allocation of funds to buyers
- Rules about how groups are able to invest in capabilities of other groups.
- Interoperability rules

Of course, applying marketplace principles to DoD would not be an simple undertaking. But unless something is done, the current process of centralizing requirements gathering will continue to limit DoD's ability to meet future missions. Other benefits of marketplaces for the DoD would include:

- Long-term adaptability to changing force requirements and mission needs.
- Increased competition among the Services for the delivery of capabilities to the commands and warfighter.
- Increased cooperation and interoperability between the forces.
- Marketplaces allow for faster churn of ideas and more importantly, discard those ideas that have neither a sponsor nor fit into the current operating environment.
- Alignment of OSD core role; lobby congress for funding and set over arching policy for DoD.
- Enables the Services to focus on their core strengths.

- Allowing OSD to act as a customer as well, to fund and develop new capabilities not being met by the market.
- Specialization of suppliers. Within markets, niches develop and allow suppliers to do a few things extremely well.
- Inclusion of small to medium sized companies and their unique ideas.

The military is moving (whether policy-makers know it or not) toward a services-based architecture, in which pieces can be connected in unintended ways to form new solutions to unimagined problems. The challenge is to build a marketplace that allows the Services to advocate their own systems (encourages competition of ideas) while ensuring the joint offices can piece together robust solution sets to counter future threats.

Joint capabilities are a loosely-formed collection of services that meet a defined need. These needs can sometimes be planned out in advance; sometimes they cannot. The ability to hedge with marketplace mechanisms would ensure a larger range of overall capabilities across the DoD, to better meet these unknown needs. In a joint context, a commander may require a capability that his own service does not possess. Creating an acquisition process that allowed the sharing of funds from one service to another would further encourage the Services to solve mission deficiencies jointly versus individually.

Current successful markets include everything from energy markets, where energy needs are bought and sold to the automotive market, where suppliers compete to meet the needs of GM, Toyota, etc., to eBay, which enables anyone to be a buyer or seller. Some markets have failed due to poor design: in the energy market, failures occurred when traders found loopholes enabling them to artificially drive prices up, even though there was enough supply. Another example of failure of market design was the near financial disaster of Long Term Capital Management (LTCM)[11]. Through complex financial transactions LTCM was able to use small amounts of money to leverage huge amounts of capital. LTCM utilized loop-holes present within the regulatory and financial frameworks to hide the fund's risk and potential liabilities. The resulting failure of the fund due to external shocks almost caused a worldwide financial crisis. Fortunately the

[11] Risk Institute, http://riskinstitute.ch/146480.htm

rules and frameworks in place allowed the financial markets to absorb the shock, continue functioning and add new rules to minimize this type of behavior.

One method of limiting risk in developing markets is to use computer based modeling and simulation to test combinations of rules and explore buyer/seller behavior. There are many instances where markets have been simulated to understand their underlying rules. Ancient civilizations[12] have been simulated as well as the Nasdaq stock market[13].

Markets are not perfectly efficient, but then neither are the current acquisitions processes throughout DoD. Stories of the same items being acquired, developed or reinvented are constantly circulating throughout the Defense Department.[14]

IV. How to Apply

A proposed architecture for a DoD marketplace would have multiple heterogeneous buyers and sellers, each competing to construct, obtain or coordinate the delivery of services. Buyers would contract with competing sellers for the right to provide a specific set or groups of products or services.

Encouraging specialization across DoD would allow new solutions to emerge to meet future needs. One important niche would be brokers who would act as catalyzing agents between suppliers and buyers by aggregating demand or supply. The Joint Task Forces (JTF) could act in this role; their job would be to aggregate demand and communicate requirements between functional areas, the combatant commands and the Services.

Measuring acquisition effectiveness also must be a central part of any proposed marketplace as would transparency of transactions and reputation. Groups who have budget authority must be able to quickly assess and compare the performance of the Service sub-groups who have been provided funding for projects. Groups that do not compare favorable over the long haul may become better at managing programs or may lose status as a developer of new services and cease to attract funding.

---

[12] "Seeing Around Corners," J. Rauch, The Atlantic Monthly, April 2002
[13] "Sixteenths or Pennies? Observations from a Simulation of the NASDAQ Stock Market," V. Darley, et al, January 7, 2000
[14] Ibid, CSIS, p. 47

LTC Michael Coss in his "Joint Capabilities – The Case for Reform" makes a number of recommendations, all of which support the case for market mechanisms. Possible fixes to joint acquisition include:

- Empowering all combatant commands with greater budget authority
- Allowing the functional commands to develop and fund joint requirements in their areas of influence.
- Establish new joint entities along capability domains.

The first two options are discounted by the amount of time and responsibility they could entail for the commands, but there is a way to achieve the same results by proxy. Instead of the commands running their own acquisition shops, they could be given authority over how and more importantly who to allocate budget to: contract administration could accomplished elsewhere. Combatant commands could also provide a unified front when dealing with the Services and demand certain baselines be followed for developing joint training regimes.

Creating new groups focused around specific issues is extremely important in a marketplace. But how these new groups are shut down is just as important. Allowing the creation of new groups to solve specific deficiencies in capabilities and then allowing them to dissolve away once that capability has become ingrained in the Services architecture would be a value-add of market mechanisms. The group could be shut down when the market no longer provides additional investment or operational funds, eliminating zombie programs that are rendered obsolete but non-the-less fail to die.

Other examples of how marketplace dynamics are creeping into the DoD acquisition processes include programs that have experimental authority to craft solutions to the new problems faced today and tomorrow. For example, Special Forces Command (SOCOM) has purchasing authority to meet its highly specific mission charter and uses that charter to purchase or rapidly develop technologies from the Services or the commercial marketplace. Though SOCOM does not have as much funding as the Services, it is able to purchase technology that maps directly to needed capabilities.

The Advanced Concepts and Technology Demonstrations (ACTD) program office focuses on acquiring new technologies outside of the Services and has been successful at taking very near-term pieces of technology and integrating them together into a new

whole to provide a missing capability. The ACTD program is successful because it is outside the Services and doesn't interrupt their funding stream and because it provides the commands with new capabilities. Market opportunities that allow for experimentation outside the Services and allow for transition to either the Services or commands will provide much more flexibility in the medium term.

Acquisitions programs should be created to address long-term capability deficiencies where the deficiency is identified across all commandant commands. Joint offices such as the proposed Joint C2 (outside of JFCOM) office with budget authority and responsibility to develop capabilities for the commands could vastly increase the dissemination of technology and joint capabilities within the military. The joint office acts as an agent for the joint commands to acquire a capability developed in concert with the Services.

For all three of these options (capability acquisition for the short, medium and long term) the Services would lose control over some portion of their budgets, but gain autonomy in exploring new ideas. They would keep control over the operations and maintenance of existing or new systems, but the joint commands and joint task forces would gain the ability to directly invest in those capabilities within the Services that meet their needs. Overall the Services' budgets may stay constant, but the decision authority for allocating funds would be distributed and controlled by those who need and actually use the capability.

Recommendations for how to create an internal DoD marketplace include:

- Transactions need to be transparent across DoD so that the market can use that information to set price for capabilities.
- Definition of how joint programs are established and more importantly how they expire after they have met their goals.
- Allocation of responsibility to new joint task forces needs to be clear.
- Transition of technology into larger programs needs to be mapped out.
- Reputation and measurement for delivery of capabilities and services needs to be available for the marketplace to evaluate.

V. Alternative Future

Markets will not solve all of DoD's acquisition issues, but they may help create a military that is better suited to a rapidly changing missions than it is with current acquisitions processes. By designing an acquisitions architecture that can adapt and change to the operating environment, versus focusing on service-specific requirements, DoD may be able to more quickly and effectively meet the needs of the warfighter. By building a marketplace, DoD could also bring to bear modern financial instruments, such as options theory[15], modular design methods[16], etc.

An example of a emerging DoD marketplace is DISA's Network Centric Enterprise Services (NCES) program. NCES is a web services based framework whose goal is to move DoD communications away from the traditionally stove-piped command and control paradigm. By using the Global Information Grid (GIG) and GIG Enterprise Services, NCES function is to provide on demand services that can be created, used and controlled by individual members of the armed forces. This change moves the command and control information architecture from a centralized paradigm to a distributed and decentralized one where users define and meet their needs, instead of unconnected and uniformed users trying to assume and provide services that are of dubious value. Being able to bring decisions about capabilities down to the lowest possible level is the key advantage to this market mechanism.

Ultimately, the future successes of the US military will depend on how quickly we are able to innovate both on and off the battlefield.[17] A marketplace designed to churn through new ideas and kill bad ones can more effectively provide the joint capabilities needed by the commands.

[15] Syndey Howell, et al., Real Options: Evaluating Corporate Investment Opportunities in a Dynamic World, (Prentice Hall, New York, 2001), 1-11
[16] Carliss Baldwin, Kim. Clark, *Design Rules: the Power of Modularity*, (MIT Press, 2000)
[17] T. Pierce, *Warfighting and Disruptive Technologies: Disguising Innovation*, (Frank Cass, NY, 2004)

Conclusion

The gap between a commanders' ability to carry out joint missions and the bureaucracy's ability to acquire the fighting force must be addresses by the use of market mechanisms for the DoD acquisitions process. The fact that needs are not being met on the ground is proof that our joint concepts are out of sync with actual capabilities. Centralizing the acquisitions process has not solved this problem and will not as long as our military continues to grow in size and complexity.

Implementing a market based approach for acquisition reform will change the operational paradigm from one of process and control to one of accountability and execution, saving time and money over the long run.

Markets mechanisms may not solve all of DoD's acquisition issues, but they will help to create joint capabilities that make the military better suited to rapidly changing missions than it is with current acquisitions schemes.