

AIR COMMAND AND STAFF COLLEGE

AIR UNIVERSITY

**ACQUISITION DOMINANCE:
WHY THE MAKE-BUY DECISION AND DECENTRALIZATION ARE ESSENTIAL
FOR DOD'S INFORMATION TECHNOLOGY ACQUISITIONS AND OPERATIONS**

by

John S. McAfee, Major, USAF

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Advisor: Maj Sean Butler, USAF

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Abstract

This paper argues that if the Department of Defense (DOD) wants to provide the operational adaptability necessary for relevant cyber operations, then it needs decentralized capacity to organically acquire those capabilities. Towards that purpose this paper provides an intellectual basis for a paradigmatic shift in how the DOD acquires its information technology (IT). The proposed shift is to a construct that utilizes more organic means, including DOD personnel and direct contracted support, to develop, test, and sustain its capabilities rather than through intermediaries as is currently the norm. Such shifts must necessarily start small, building upon merit as theory becomes practice. This paper highlights that the DOD does not perform a 'make-buy' decision in its acquisition of capabilities as part of the Defense Acquisition System and that if it did, then the DOD would 'make' much of its information technology based on philosophical, capability, and financial justifications. A broad historical summary of acquisition is provided to highlight how certain macro-environmental factors have driven acquisition to exist in its current form with the implication that many of those environmental factors have paradigmatically changed, warranting a corresponding shift in the DOD acquisition approach. Because no strategy is worthwhile that cannot be implemented, a number of risk and implementation considerations are discussed.

Foreword

The target audiences of this paper are the Program Executive Officers (PEOs), program managers, senior acquisition authorities, and acquisition professionals that have equipped the world's most powerful warfighting force. More importantly, the senior leaders who are in position to make force structure and human resource management changes necessary to enable the approach advocated in this document will benefit from its arguments as an intellectual basis for such changes. In the spirit of continuous improvement, the conclusions and ideas within are offered with the humblest of intentions and are not an indictment of previous decisions, current processes, or the people who make and execute them. While many of the observations of this paper can apply to acquisition at large and are certainly worth exploring further, the purpose of this paper is to justify the case for the "low-hanging fruit," which is to organically acquire DOD software and network-enabled capabilities in limited initial capacity. The proposal to "organically acquire IT" is offered not as a panacea, but as an approach which should be considered on a case by case basis with respect to the intellectual justifications offered in this paper. Usage of the phrase "IT" in this paper applies in a very broad sense to reflect the ubiquitous proliferation of technologies that receive, process, store, and transmit information, encompassing hardware, software, architecture, and associated practices. The author recommends that a make-buy analysis for all IT systems and subsystems be made and anticipates that a make decision will result for development of software intensive applications and systems integration of COTS/GOTS products.

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INTRODUCTION

*Ensure the development of integrated capabilities by working closely with Combatant Commands, Services, Agencies, and the acquisition community to rapidly deliver and deploy innovative capabilities where they are needed the most.*¹

DOD Strategy for Operating in Cyberspace

“...The main skills companies should retain transcend those directly involving product or process, and are in fact the skills that support the very process of choosing which skills to retain.”² Choosing what skills to retain, which is a make-buy decision, is a core competency of any organization.³ While the DOD does choose some skills to retain, there is no make-buy decision in the DOD’s formal acquisition process for materiel solutions. The term ‘make’ in the context of DOD acquisition is an alternative to the Defense Acquisition System (DAS) paradigm of hiring industry to fulfill a materiel need through commissioning. It means that DOD personnel directly—without intermediary—design, build, and manage the full life-cycle of a capability. ‘Make’ in this context means the government taking complete ownership over its development, integration, manufacture, test, and implementation of its systems. In the current paradigm, all DOD-acquired materiel from the DAS is a ‘buy’ because the engineers and technicians who manufacture DOD’s materiel are contracted or commissioned.⁴ While the US government’s exclusive contracting and commissioning through acquisition programs has equipped the world’s most powerful military force, recent factors and trends demand a business paradigm shift.⁵ Due to the nature of cyberspace, the DOD must change its business practices for acquisition of cyber capabilities by conducting make-buy decisions for its information technology (IT).

BACKGROUND OF THE MAKE-BUY DECISION

“We are Congress’s Army,” and therefore our statutory and regulatory acquisition requirements are written such that in order to deliver capability, a constituent needs to profit.⁶ While this view is somewhat cynical and exceptions do exist, it largely represents the structural reality of the DOD’s acquisition practice. While DAS policy does not specifically forbid organic acquisition, in practice most acquisition is commissioned.⁷ For evidence, one need only examine the process. JCIDS is the input into the acquisition process stating, “materiel solution activities are executed in the DAS process, and are guided by validated capability requirement documents from the JCIDS process.”⁸ The JCIDS manual, recognizing the need for more agile information system acquisition, created special rules for IT acquisition, yet still perpetuates the buy-only path saying that efforts in an Information System Initial Capabilities Document may include commercially available previously acquired systems or “development, integration, and acquisition of customized application software.”⁹ DODD 5000.01 and DODD 5000.02 are noticeably devoid of a make-buy decision, and the emphasis on competition and contracting strategy in policy without mentioning organic acquisition drives acquirers to a buy-only strategy. User needs that are materiel in nature in the form of a JCIDS requirement go into the DAS along with funding, and acquirers dutifully outsource the work, ensuring government interests are met to the best of their ability. Thus to deliver materiel capability, private industry is engaged. Even if a program manager wanted to change culture and norms by proposing in-house construction of a materiel solution, the expertise to do so, the means and force structure to design, fabricate, and sustain without buying are, with few exceptions, generally not found within the DOD.

The make-buy decision involves analysis. Technology enters an organization in one of four ways: make in-house, commercially buy (whole, lease, or license), third party commission,

or mine from existing technology.¹⁰ For simplicity's sake, mining is henceforth considered a 'make' mechanism, while commissioning is considered a 'buy'. Some organizations utilize transaction cost theory to aid in the make-buy decision, which is based on the idea that 'vertical integration' of a product line can create an economic gain to the organization by protecting its investment from competitors or by minimizing the overhead and miscommunications associated with administration and dealing with an additional entity such as through requests for proposal, negotiations, and protests.¹¹ Another framework is Decision Theory and Analysis utilized by The Software Engineering Institute of Carnegie Mellon.

For some organizations, all the software assets are developed in-house for proprietary (or political) reasons. For other organizations, all the assets are commissioned because of organizational policy or because of unique requirements and a lack of in-house development resources. (In the U.S., most government organizations, such as the DoD, fit into this category.) If no other organization but yours has the necessary domain expertise in a component's realm, "buying" and "commissioning" are not viable alternatives. Conversely, if you have neither the skill nor the history to build a component, "making" and "mining" are not going to work. More commonly, however, some of the software will be built from scratch, some will be mined, some will be purchased on the open market, and some will be commissioned.

The make/buy/mine/commission decision for software is based on strategic factors such as the cost, schedule, staff availability, and expected quality and fitness of purpose that each alternative offers.¹²

Organizations primarily decide to make or buy based upon philosophical, capability, and cost factors. Organizations ought to make items supporting their core competencies, which by definition, ought to provide competitive advantage.¹³ It follows then that a reason to outsource is because the product or service is not a core competency or does not provide a competitive advantage.

Another reason to outsource is because the cost of buying a finished product over the projected lifecycle of the demand is less than building it organically. Accordingly, a reason to

insource is because you can build it cheaper.¹⁴ A temporary need often does not warrant a large capital expense and carrying cost associated with obtaining and owning the means of production. A business does not build a factory if the investment yields insufficient return. A purchase of a product or service essentially leases that productive capacity from an external entity—the costs of production include that “lease of production capacity” in the purchase price. So when the costs for production capacity can be shared by having multiple customers facilitate efficient utilization of that productive capacity like many independent competing businesses do, it is generally cheaper to buy. The first principles of the make-buy decision can be examined in the context of how capital-intensive is entry into the field. High cost of entry discourages making. For any low capital-intensive field like IT, or if the promises of inexpensive 3D printing-based manufacturing materialize, one can justify making over buying on a cost basis. Furthermore, low capital-intensive fields facilitate greater decentralization of means as well, perhaps even to the unit level, unleashing tremendous agility in design and sustainment opportunities.¹⁵

This leads us to an important question. Is capacity to build weapons of war something the DOD wants shared with US industry? It may be instructive to examine the case of the F-16. Due to the frequency and persistence of F-16 usage, it is cheaper to own F-16s whole than to lease them. Congress applied this logic when it denied the acquisition strategy to lease new tanker aircraft primarily because the relative cost of leasing was outlandishly more expensive than owning over the projected lifecycle.¹⁶ However, because the *capacity to build* F-16s is a temporary Air Force need and because that capacity can be utilized elsewhere through a third party (*i.e.*, selling to foreign customers), it is more cost effective for the Air Force to commission-buy its F-16s, leasing the supplier’s production capacity. Congress recognized that for high-use products or services, it is generally cheaper to own than to rent.¹⁷ Similarly, when

an organization's own demand for a product ensures that capacity to produce it is persistently and efficiently utilized, it is usually cheaper to own organic capacity to meet that demand rather than leasing it through buying a finished product.¹⁸ This is the case with IT.

From an economic standpoint, commercial participation in DOD aircraft acquisition is beneficial because, among other reasons, private companies can achieve efficiencies addressing both military and commercial aircraft demand. The perception is that a DOD manufacturing capability, with its regulatory prohibitions for competing with private industry, would stagnate as many monopolies do.¹⁹ In short, the economic tension between supply and demand varies based on the nature of the suppliers, the customers, and the way goods and services are exchanged in the marketplace. Recognizing the nature of DOD's need for IT ought to inform market participants how best to structure to meet that demand. As will be discussed later, the capacity to build weapons of war is not something the DOD wants to be without, particularly in IT. If the capacity for organic acquisition existed, the DOD would need to differentiate between when to make and when to buy. Specifically, if DOD conducted a make-buy decision and systematically generated organic capacity to make its IT, such action would not and should not preclude commercial participation.

Philosophically, the make-buy decision has tremendous implications. By not taking ownership of its acquisitions by making, the DOD cedes control to another external entity, thereby becoming dependent upon it. Such dependence (and interdependence) can be good when the DOD doesn't know what is in its own interest and needs an external perspective to see or act on it. More often than not, however, ceding ownership increases the risks for ensuring one's interests are being met. This is because when an institution outsources and increases its capacity, the means to directly take action are no longer under its immediate control.

The make-buy decision is a fundamental acquisition question and needs to be made institutionally.²⁰ As noted earlier, while the DOD chooses what to buy, it does not even consider what to make. Generally, institutions should make materiel that are their competitive advantage or that can be made more cheaply in-house. Competitive advantage and direct and accountable cost should not be the only reasons informing a make-buy decision, especially in the DOD. Other factors such as identity and capability enter into the calculus. The DOD's IT satisfies all these criteria. Therefore, in no arena is choosing what to make of more vital import to DOD than in IT.

JUSTIFICATIONS FOR ORGANIC ACQUISITION OF IT

Shifting the paradigm from outsourcing IT acquisition to developing and employing those capabilities organically provides numerous benefits detailed below. There are four main cyberspace mission areas for the DOD: providing IT-enabled capability, cyber defense of that capability, cyber attack, and cyber exploitation. This paper focuses on the primary mission area for cyberspace, which is providing IT-enabled capabilities for all its other mission areas. While each of these mission areas would be enhanced operationally if the DOD truly owned its decision apparatus and organically acquired its IT, the benefits to each of the mission areas may be different, though sharing some similarities.

PHILOSOPHICAL BASIS

IT was created and is used to improve the quality and timeliness of human decision making. Putting networks, logic, and automation characteristics together in dispersed (decentralized) information technology allows for orders of magnitude improvements in human decision making, including better human value judgments and prerogative, and repeatable error-free and large scale computations in terms of size, number, and complexity.²¹ Intelligence

augmentation via IT then synergizes with humans' intuitive pattern recognition and transformative structural thinking, which in IT is hard to program with reliable results.²² Institutions, individuals, and entire processes can automate information exchange and decision making to unleash huge productivity gains and, for the military, unparalleled warfighting capabilities. It follows then that at an aggregated scale, organizations able to effectively utilize information technology achieve a competitive advantage. Societies which effectively balance the dichotomy of security and free-flowing networked IT will achieve a higher quality of life. As testament to the benefits of IT on decision making, we see companies such as Dell, Wal-Mart, and FedEx all tout their organically developed, owned, and operated information systems as key enablers to their competitive advantage.²³ These institutions embrace IT in a way to augment their decision making by decentralizing implementation to customize tailored solutions guided by central principles, practices, and standards for unity of action.²⁴

IT is generally the means by which institutions and individuals make decisions in the information age. Additionally, cyberspace is often the pathway through which those decisions pass. All things otherwise being equal, an organization making decisions without electronic assistance from IT is simply uncompetitive with organizations that are being assisted, due to the greater speed and accuracy of analysis and decision making. A modern institution enjoys exponentially greater productivity through human-machine symbiosis, making IT a defining characteristic of an institution. Other than the people in an organization, IT is the primary repository for corporate knowledge, the very real summation of an institution's total learning. When people move on, the IT is left behind accumulating knowledge in some ways superior to any one person within or without the organization. If war is a learning contest, then IT systems

that facilitate institutional learning are both invaluable resources and lucrative targets that need to be commensurately protected.²⁵

IT is positively correlated with sustainable competitive advantage and in many instances is the means by which an organization achieves competitive advantage, the very essence of its capability and identity.²⁶ IT is directly or indirectly a component of every military member's OODA loop—how decisions are made and acted upon—and therefore must be treated as such.²⁷ Furthermore, since IT-accelerated decision cycles can occur near the speed of light in cyberspace, the OODA loop quickly becomes an OODA point.²⁸ Just look at the high-frequency trading “warfare” that characterizes modern markets, where “this lightning-quick, computer-driven form of trading accounts for half of all of the business transacted on the nation's stock markets.”²⁹ Successful implementation of human values into IT allows such programming to augment decision making to such a degree that it could replace human judgment in some situations. Today, IT is the mechanism through which US strategies are created, communicated, and employed, making it of supreme importance in war.³⁰

One reason IT is correlated with competitive advantage is because IT is the nexus for all other disciplines. Whether science, engineering, business, philosophy, or war, computer aided designs, simulators, and automated programs enhance human endeavor. As Moore's Law builds upon itself, the pace of technological change in the world is enabled by the improved decision making of IT feeding into all other disciplines and enabling cross-pollination of information. There is a time value of technology. Realization of these benefits requires that the IT implementations address typical shortfalls such as security, translation of “wicked problems” into a binary world, and the delicate balance between augmentation and replacement.³¹ Additionally, as a multi-dimensional nexus, the technical competencies of IT are very

transferable to other areas ensuring efficient utilization of capacity if properly managed. The transferability of IT knowledge and skills, how it enables other disciplines and its role in decision making, also contributes to an organization's long term competitiveness.

Organizations which continually outsource their decision making capacity, a core competency, erode their long term competitiveness.³² IT is a form in which this decision making occurs. In other words, "you learn by trying, not by buying. Implicit in this statement is the idea that learning itself has very high value," especially if war is a learning contest.³³ According to make-buy decision analysis, organizations should make capabilities that are proprietary and that constitute their competitive advantage.³⁴ "Proprietary" in DOD parlance means mission critical and, as discussed above, IT is a competitive advantage of the DOD. As information technology becomes more ubiquitous in DOD's internal decision making, the importance of owning and being able to rapidly adapt that decision making also increases. The relative amount of the DOD's reliance on a staff's "manual labor" to aggregate and synthesize data to make informed decisions has and will continue to diminish as network-enabled capabilities expand into every aspect of day-to-day operations and as entities which leverage the network gain competitive advantage. Because insourcing decision making capability is a way to achieve and preserve competitive advantage and because IT is evermore increasing as a means of making those decisions, both the automated aggregation of data and the algorithms by which such data is processed will need to be insourced if competitive advantage is the goal. Because the DOD's IT, both as a symbol and as a literal instantiation, represents the DOD's identity, strategies, decisions, core competencies, and competitive advantages, IT acquisitions for the DOD should be given due consideration before being outsourced.

Another philosophical reason IT should be acquired organically is because of the societal role the military plays in providing security. Government has a role to play “to provide for the common defense” and “secure these blessings of liberty” in cyberspace.³⁵ The value proposition of government is that the nation-state has a monopoly on legitimate violence and that the DOD is uniquely positioned to address the negative externalities in a more efficient, effective, and fair collective fashion than organizations and individuals anarchically pursuing security on their own.³⁶ The time gap between creation of a technology and its employment continues to trend smaller in cyberspace due to technology’s ever increasing rate of genesis. Similarly, as the time gap between creation of a weapon and its employment continues to shrink, those who design systems will necessarily become the ones to employ those systems because it’s the logical progression actors will take to be first-to-market and thereby realize all the benefits of first-mover’s advantage.³⁷ Do we want people who have not sworn a solemn oath to support and defend the constitution to bear responsibility for employing US-sanctioned military power? Balancing the tension between privacy and security, liberty and tyranny will be a continual challenge with which DOD personnel under oath will necessarily struggle, but public servants, in theory, have less conflict of interest than private corporations when it comes to warfare. Not only are incentives for ending conflict better aligned when the profit motive is removed, but some of the legal issues arising from the emerging reality that automated systems conduct war on our behalf become clearer when those systems are both built and employed by service members.

When the IT acquired in automated systems make life and death decisions do engineers become combatants? In the current paradigm, the United States operates with a human in the loop making those “acts of war” decisions and thereby providing clear accountability. However, the ubiquitous proliferation of automated information systems throughout the DOD challenges

this doctrine. So too does the fact that the first actor to remove the human from the loop gains a tactical advantage of being able to decide more quickly and, as shown by the United States' Talon sniper robots, more accurately in some scenarios.³⁸ Take for example missile defense where the decision cycles are so short that reactions necessarily need to be automated. Mischaracterizations of flight signatures designed into the system can execute "acts of war" without a human in the loop.³⁹ So who is responsible?

While the operational commander bears ultimate responsibility in the foreseeable future, in a highly complex and evolving operating environment, such decisions to change the logic of a program or structure of an architecture may necessarily be decentralized. Commanders may want and arguably deserve control commensurate with that responsibility. Such control can be achieved by organic acquisition. One of the benefits of "Real Time Operations and Innovation (RTOI)" from the AF Life Cycle Management Center's cyber acquisition construct is exactly this flexibility and accountability.⁴⁰ So when changes are needed to a system, and such changes satisfy the Tallinn Manual's three criteria defining participation in hostilities through the automated information system as a proxy, then the engineer becomes the combatant.⁴¹ Organic acquisition more cleanly provides accountability for those acts taken on behalf of the US government.

The nature of conflict in cyberspace will be unique. The most likely conflict there is going to be continuous and limited between constantly evolving nation-states, organizations, and individuals.⁴² A continuous conflict justifies a more permanent organic force structure rather than capacity leased from industry. A continuous conflict also justifies a more permanent means for advancing technology. Due to the interplay between individuals, organizations, and nation-

states in politics, differences in who is creating and employing weapons of war may become instrumental in conflicts where the populace is a center of gravity.

On the other hand, the most dangerous scenario in cyberspace is an overwhelming, coordinated, cross-domain assault where cyber is used to utterly paralyze an adversary. Organic acquisition personnel are best positioned to address system and architecture vulnerabilities whether organically developed or modified adaptations because if they build the systems, they will know them better. In either the most dangerous or most likely scenario, the lead-time to develop technology and associated operating concepts, coupled with the rapid tempo of cyberwar, requires a permanent standing force capable of adapting the IT used in such engagements.

The United States as a status quo power will organize, train, equip, and employ a strategy of deterrence by denial and retribution in a cyberspace environment where attacks occur at the speed of light from multiple vectors.⁴³ Understanding this strategic approach informs how the DOD should organize, train, and equip. Firstly, empowered organic personnel are uniquely positioned to address and prevent vulnerabilities without intermediaries, as third parties often have the incentive to hide system failings until something goes wrong. In the most dangerous cyberwar scenario, that may be too late.

Secondly, in order to preserve the United States' status quo preeminence, a deterrence strategy necessarily requires being "first-to-market" with capability to deter aggression while denying and inhibiting in a cost-efficient manner an adversary's ability to emulate.⁴⁴ The challenge arises when the United States is unable to economically achieve continued technological dominance. This is the case in today's environment; therefore, our approach must change. Being "second-to-market" allows one to avoid the high cost of developing from scratch,

“borrowing” that knowledge more cost effectively. Being second abdicates the initiative, but having initiative is only useful if used, like on the attack. Accordingly, in a fiscally constrained environment, adopting a defensive strategy of denial can be more cost effective. The economic realities are shifting, which demands a more cost effective strategy. For leveraging those openly available technologies, organic acquisition facilitates either their rapid operationalization or proactive government intervention to influence those technologies. For instance, proactive government intervention can prevent proliferation of dangerous technologies or creation of enforceable safeguards. Similarly, for those niche developments with little or no legitimate non-military application, having organic personnel able to rapidly operationalize and sustain new technology-enabled capabilities without the time-to-market cost of accessing external third-party suppliers enhances US ability to be first-to-market.

Thirdly, those employing a denial strategy related to IT will experience a unique socio-security-technology dilemma, where the societal benefit of a technology demands its dispersal but the societal cost in terms of security restricts its supply. One example of this dynamic in action is nuclear proliferation. Because the capability innovation for IT is occurring to such a large scale external to the DOD and other nation-states, it is critical to exploit these developments responsively, since they are also, in theory, available to the adversary. An organic acquisition construct does not preclude pulling from external sources and in fact encourages and demands it. Having the organic expertise to proactively explore how new technologies can be operationalized and exploited may become an essential element of denying proliferation of potentially game-changing technologies.

Fourthly, having organic acquisition personnel with a solid foundation in first principles of design as well as operational art will enable the United States to develop offensive and

retaliatory capabilities. Understanding how systems are constructed helps in innovating ways to affect them. Identifying the systems and ways they can and should be affected to achieve desired objectives is the essence of operational art. More importantly, when machines fight wars on our behalf, rapid building and tailoring of those machines will be essential in being able to achieve effects, particularly in virtual domains. Organic acquisition will be a vital component to developing such skills and mentality for delivering swift retribution to our foes.

Finally, the best way to predict the future is to invent it. When one buys or borrows, they are not inventing. Rather, they become inherently relegated to following the lead of the person who makes and owns. The DOD must own its future. This is especially the case since the character of warfare in and through cyberspace will be vicarious, in that conflict will largely be machine on machine.⁴⁵ For example, anti-virus software fights malware. Accordingly, the ability to invent machines to execute strategies and achieve effects within the environment becomes analogous to the tactics, techniques, and procedures of conventional conflict. This operational adaptability provides the means to achieve the nation's strategic objectives in future conflict. When autonomous machines fight wars near the speed of light on our behalf, the engineers essentially become the operators.

LEVERAGING TECHNICAL LEADERSHIP

Recently technical leadership in cyberspace has been primarily driven by commercial entities outside of the DOD and its primary contractors.⁴⁶ This dynamic highlights the need for rapid adoption of sustainable and secure commercial off-the-shelf technologies by the DAS just to achieve competitive parity, while technological competitive advantage erodes. This strategy of 'operationalizing' commercially available technologies is the primary mechanism for many nation-states, organizations, and individuals to acquire new IT means. When an adversary, particularly a non-state actor, adapts by applying commercially available technology pushed out

to the masses, not only does the United States need to be able to adapt-in-kind, but it also needs to proactively and aggressively seek to win that technology push game of innovation or be at a disadvantage. This is especially true when IT systems that could benefit DOD subunits are inexpensive or particularly niche and when commercially available technologies exceed the capabilities of those developed by the military. Contractors usually don't propose an open source solution to meet a military requirement because it offers little opportunity for profit and all the liabilities. An organic acquisition construct by DOD subunits directly acquiring and integrating available commercial technologies as an operational function facilitates this rapid adoption by decentralizing and coupling authority, responsibility, and means for systems integration specific to that unit's needs.

ASSERTING TECHNICAL LEADERSHIP THROUGH INNOVATION

While the DOD certainly doesn't have the means to drive technological innovation now as it did during the 1950s, certain niche developments will continue.⁴⁷ For those niche developments that occur in-house, organically innovating sustains competitive advantage. "Technology that can be kept proprietary has been suggested as a source of competitive advantage."⁴⁸ Technology can be kept proprietary either through patents or secrecy. However, it is relatively difficult to keep a firm's proprietary technology secret and diffusion occurs rapidly in most industries. Mechanisms for diffusion include workforce mobility, research publication, informal technical communication, reverse engineering, plant tours," industrial espionage, and outsourcing.⁴⁹ Each additional entity who shares in the knowledge of the technology introduces risk of technology diffusion eroding competitive advantage. International Traffic in Arms Regulations restrictions notwithstanding, when technology is commercially available to the United States, it may be assumed that that technology is also available to the adversary, lessening the competitive advantage of acquiring that capability. The only winners in that game are arms

dealers. While sharing technology with coalition partners can have extremely beneficial diplomatic and military effects which enhance security, the benefits must outweigh the often uncalculated second and third order costs. When this is not the case, the DOD needs to be almost an exclusive consumer of technological innovation, producing its own, and jealously guarding its homegrown capabilities. Such is the only way to benefit from available technologies while not enabling competitors.

Organic acquisition is a vital component in an environment of innovation. When DOD personnel come up with a good idea on how to improve a system, they generally have to go to a third party and pay extra to make the improvement with DOD intellectual property. In-house adaptations could minimize the administrative translation to drive innovation. Operators able to maintain systems organically will have relevant skills and knowledge to adapt and tinker with their systems. While such explorations create configuration management and sustainment issues, the capability and flexibility gains may justify the cost. Additionally, “innovation is an environment, not a process. It cannot be managed as an acquisition program with milestones, schedules, etc. It also cannot be mandated or channeled as part of the requirements process. It can and should be stimulated, focused, encouraged, and energized.”⁵⁰ Tim Harford’s book “Adapt” uses the analogy of an environment wherein variability, survivability, and selection can occur.⁵¹ The legalistic strictures of the acquisitions process inhibit free-flowing ideas and collaboration that provide “variability.” The all or nothing dynamic of contract awards and award fees impinges on “survivability.” The source selection process can stifle “selection” with many sourcing decisions delayed for protests or being based on PowerPoint ® engineering rather than actual technologies. Creating an environment in which innovation and adaptation occurs becomes easier when utilizing organic personnel without the few inhibitions just mentioned.

IMPROVED SECURITY AND MISSION ASSURANCE

Organic acquisition improves security and mission assurance. The US military and its allies are especially dependent on IT, not just for its day-to-day operations, but also to execute various critical warfighting missions—virtually all of which are IT-enabled. Whether for multi-source intelligence fusion, remotely directing an operational air campaign through a CAOC, or in tactical RPA operations, US combat capability requires reliable and secure IT. In support functions such as the design tools used to create advanced weaponry, the data of those designs contains vulnerabilities and capabilities of the weapon system. Even filing commercial patents relating to those designs can create a security risk. If the DOD acquired organically, it would protect those technologies in the same way as other classified information and with the same legal safeguards surrounding intellectual property handling.

IT provides transformative warfighting capabilities that are a competitive advantage and therefore should be made in-house and secured. If IT is acquired organically, the DOD personnel who built it will be in the best possible position to secure it. For the same reasons today's common practice is to hire contractor support for the IT solutions we purchase from them, so too will DOD subunits more rapidly assure mission effectiveness and secure the capabilities directly due to being on-site and having a familiarity with the architecture and logic of the program that only comes from building it. DOD personnel are uniquely tied to the DOD's missions with clear responsibilities, authorities, and resources. Additionally, DOD personnel are unhindered by the contractual, fiscal, and legal constraints of contractors which may impact mission and security. Organic DOD subject matter experts can assure their IT-dependent missions. Utilizing in-house methods and tools inherently protects systems from adversaries unfamiliar with the specific standards and implementations of the technologies involved. This isn't to say obscurity is sufficient for security, but it does help.

Because most of our IT was and is built by commercial suppliers that inherently have lower tolerances and requirements for security than the DOD, those tolerances are inherently passed on to the DOD. Maximizing security of IT requires that it be structurally architected into the system. Organic acquisition facilitates these unique security requirements to be met and protected by having exclusive control over their design, implementation, and sustainment. In the absence of meaningful organic acquisition, the ability to address vulnerabilities of commercial-off-the-shelf (COTS) systems is also limited. The DOD, as a non-profit with “the consent of the governed,” is in a unique position to “hack” on COTS systems for the benefit of both industry and the DOD. Indeed, the 2013 Executive Order on “Improving Critical Infrastructure Cybersecurity” attempts to facilitate this voluntary collaboration.⁵² Industry is less likely to mistrust the motives of organic DOD cyber security assets than those of a potential competitor contracted by the government.

When wars are fought vicariously through the machines which wage them, ability to provide US joint doctrine’s “six joint functions” through those machines necessitates unification of previously compartmented specialties of the operator and the engineer to assure mission success.⁵³ The idea of an operator engineer has utility in that one can not only recognize when something is wrong, but can also, in theory, manipulate the system better than by just being an operator.⁵⁴ Teaming typically achieves these benefits for mission assurance and security. The ways in which organic acquisition improves teaming are discussed separately in detail later.

Because a commercial company has other stakeholders to consider, military priorities might not be met in a timely fashion—or at all—if counter to that private entity’s interests. The vulnerabilities within the supplier’s own IT systems provide information concerning its downstream customer’s vulnerabilities if the supplier is hacked.⁵⁵ Additionally, dependence on

commercial leadership in cyber inherently introduces supply chain vulnerabilities, such as if a chip sold to the United States has malicious firmware out-of-the-box.⁵⁶ In a globalized economy, supply chains can become daisy-chained with numerous degrees of separation, each with administrative and profit overhead, each introducing additional vulnerabilities and risks, and each inhibiting the ability to ascertain root causes and address failures. The ever-challenging tension between cyber security and access in principle is a struggle institutions will continue to deal with, but organic acquisition can be a valuable tool to enhance security.

TAILORED SOLUTIONS

IT enabled capabilities are not being dispersed as rapidly nor effectively as they could because the current acquisition process is centralized, slow, costly, and risk intolerant, inhibiting the institutional potential of the DOD. One facet of DAS centralization, for example, is how acquisition is conducted by program offices, usually located at product centers, which are organizationally segregated from end users. “Major new programs take too long to bring to the field and are too expensive” and smaller acquisitions may never see the light of day.⁵⁷ The DAS is notorious for being slow and costly, though much debate exists as to the cause(s). DAS is risk intolerant because “freedom of risk management has been eliminated as a result of the extensive oversight process” among other issues.⁵⁸ The combined effect of centralized major acquisition programs and partitioned acquisition centers inhibits tailoring of IT to improve operations in a decentralized, nuanced way. Lost are the empowering mission-specific applications of IT to streamline processes in sustainable, secure implementations acquired at lower echelons.

Organic DOD acquisition professionals, permanently assigned or lent to operational organizations, could fill numerous capability gaps that otherwise fail to rise to a “program of record” threshold, but are no less valuable to the DOD’s various responsibilities in aggregate. For example, the Army uses the organically developed Logistics Estimate Worksheet to estimate

resource requirements on the battlefield. Similarly, Air Force Special Operations Command Special Mission Engineering uses “military and government service personnel to develop technical data packages (drawings, schematics, computer aided drafting, etc.) in order to reduce non-recurring engineering costs to the government, perform trial kit installs and flight testing and certifications, and perform installations with ‘Blue Suit’ maintenance support.”⁵⁹ Organic acquisition allows AFSOC to provide tailored solutions to meet warfighters’ continual demand for technological adaptations. With means for organic acquisition readily available, great ideas like embedding acquisition professionals in Air Expeditionary Wings on deployments to pull from the innovations of “lead warfighters” can be pursued.⁶⁰ Such efforts to institutionalize the tailored solutions of an organization’s “change agents” drives the learning and thus capabilities of the organization.

INSTITUTIONAL LEARNING

Distributed cyber acquisition personnel provide a mechanism to drive institutionalized learning enabled by IT at the unit level. Roadmap to Launch (RTL) is an example of institutional learning at the 45th Space Wing, Cape Canaveral, Florida. RTL is a Microsoft SharePoint ® implementation which provides a unified wing-level process that subordinate units follow to coordinate efforts to launch a rocket from the Eastern Range. RTL provides a mechanism by which lessons learned are codified into a repeatable process. Rather than DOD personnel worrying about what needs to be done, they follow the checklist and then can concentrate on how to do tasks and how to improve the process and checklist—the meta-process. Launch campaign progress is easily accessible, providing whole-of-process insight for senior leaders saving countless hours of toil. By this mechanism of continuous improvement and learning, RTL becomes the summation of wisdom of all operations that transpired before it, in an

easy to use, easy to learn tool facilitating institutional learning throughout the whole organization, decreasing errors, decreasing training time, and increasing mission effectiveness.

RTL was originally funded from unit funds allocated for other purposes. Its updates are contracted out to a third party vendor which require administrative overhead, risk as a separate funding item, and fiscal and legal constraints on operational responsiveness. The fact that contractors provided the service inhibited standardization between 30th Space Wing at Vandenberg AFB and 45th Space Wing, to the chagrin of bicoastal launch service providers. RTL is a tool that could and should be organically maintained and evolved. How many units would benefit from an organic IT enabled solution if only there were the means to acquire and sustain it in-house? Do the manpower savings of the tools justify their cost? How many lessons are relearned because job knowledge wasn't structurally instituted into the process? RTL is but one example of how IT can improve institutional learning.

In order to drive innovation, the expertise to design and implement tools and processes tailored for mission effectiveness needs to be at least partially decentralized and organic. Operators and technicians know the solutions to many of the problems they face. How to improve their art can be so specific and so nuanced that only they can address the complexities of finding a materiel solution, optimizing their work, and coding the logic of their job into the systems they use. When a materiel solution is needed, the ways and means by which to acquire it are too often too far removed to be considered or practically obtained. The need to develop and refine tools to maximize human potential in a rapidly evolving environment is vital to competitive advantage; therefore, how to do so becomes a learning imperative.

In a cyber environment, updating the machines literally conducting war on our behalf shifts the contest from not just direct lessons and adaptations, but to a second order "learning-to-

learn” level. Organic acquisition, the application of first principles necessary to create means of war drives not just direct institutional learning and adaptability, but also the very means by which the institution can learn to learn. The more the realm of the possible (engineering) merges with the realm of need and usability (operator), the more agile US forces will be in learning and responding in a complex operating environment. Such coupling requires decentralization of acquisition authority and responsibility to achieve that unified operator and engineer paradigm necessary for operational adaptability.

OPERATIONAL ADAPTABILITY

Organic cyber acquisition can better meet timelines and requirements. Just as organic acquisition capability improves mission assurance and security, so too does it address that holy grail of on-the-fly adaptability. Combining the importance of technology from the Revolution in Military Affairs concept and the means to obtain technology from Philosophy of Technology theory, rapid acquisition is necessary (though not sufficient) to achieve decisiveness on the battlefield.⁶¹ Going through intermediaries, by definition, adds systemic steps to the process of delivering capability adding both time and risk.⁶² Such lead-time handicaps are unacceptable when the need to adapt is so pressing and prevalent. Accessing the additional capacity of a supplier is a necessary step that does not directly achieve the mission and extends response time. While the near-term capacity gains offered by outsourcing are seductive, the loss of responsiveness, flexibility, learning, and effectiveness should give one pause.

In short, operational adaptability can be achieved by:

- streamlined, dedicated, decentralized acquisition authority and oversight;
- handpicked teams with operations, acquisition, and sustainment experience entrusted with authority for requirements, resources, and employment decisions;

- embedded but independent personnel running streamlined test, certification, and accreditation processes;
- embedded science and technology expertise;
- supply-chain relationships;
- pre-existing contract vehicles if necessary;
- infrastructure and facilities for continuous modeling, simulation, experimentation, and test purposes;
- full life-cycle management responsibility, authority, and resourcing;
- mechanisms to collaborate and cooperate with Joint, Coalition, and Interagency partners.⁶³

LEGAL CLARITY

Much of the required but unproductive churn in acquisition involves following the Federal Acquisition Regulation, complying with legal and congressional reviews, and suffering through contractor protests.⁶⁴ Under the ‘buy’ model, there is always the potential for fights between industry and the DOD over intellectual property, data rights, and liabilities. If the DOD is directly responsible for acquisitions, the potential for this unproductive churn is drastically decreased as the role of private industry is reduced, and much of the churn is due to the administrative processes to access their services.

Thus, organic cyber acquisition enhances legal clarity by “mitigating other potential conflicts under incomplete contracting.”⁶⁵ By “owning” the personnel who control the implementation, the legal hurdles or counter-interest reservations that need to be addressed when dealing with third party vendors are diminished. For example, if the DOD wants to implement a common XML data schema for position data or rearrange its architecture, but doing so

undermines a contractor's interests, there is resistance.⁶⁶ Also, if there is a critical failure, the sub-contractors involved typically conduct a ritualistic liability-focused finger-pointing that detracts from solving the mission-impacting problem. Resolving these issues ought to be much easier if the process is organic to the DOD. All things being equal, eliminating the necessary evil of inter-organizational legal arrangements by having organic capacity allows the same level of resourcing to focus on doing the mission instead of arguing.

IMPROVED ACQUISITION ACCOUNTABILITY

Organic acquisition allows Service Chiefs and SOCOM, responsible to equip forces, to actually own the process by which forces are equipped.⁶⁷ Unfortunately, Service Chiefs do not own the process by which they equip as this process is dictated in DAS at the DOD and Congressional levels.⁶⁸ If Service Chiefs organize their forces to fulfill the "equip" mission organically, rather than solely by buying, they will be better able to control the process for which they are held accountable as they direct their personnel in their efforts. Such direction can still comply with the statutory and regulatory requirements levied on acquisition writ large. Organic acquisition of IT provides Service Chiefs the opportunity to increase their control because many cyber capabilities can or should be of limited scope, beneath direct Congressional concern in terms of time and money. As the demarcations between operator and engineer blur, operational needs will drive greater COCOM involvement in acquisition. Service Chiefs providing organic means allows COCOMs to influence acquisition processes according to their needs.

Shifting our acquisition means from outsourced to organic improves acquisition accountability not just at the service level, but also at the acquisition execution level. One of the major themes in the Defense Business Board's Task Group Review of DOD's Program Managers (PMs) in FY11 was that "Military PMs spend too much time managing the politics and the 'process' within DoD rather than managing their specific program."⁶⁹ Politics needs to

be managed because authority for major acquisition decisions lies at highly political levels.⁷⁰

The fact is that PMs are necessarily distracted by decisions that don't directly feed into delivering capability because programs may end due to those political or process needs.

“Program managers need to spend more time managing the business aspects rather than the DOD process.”⁷¹ Doing so will deliver better capabilities, but requires decreasing the political and process requirements. Organic acquisition provides a mechanism to decrease political and process requirements by aligning authority with accountability, responsibility, and means at a lower decentralized level. The degree of trust afforded battlefield commanders to follow commander's intent allows for rapid decision making and can be extended to DOD personnel organically acquiring its systems or adapting those systems when machines wage war on our behalf.

IMPROVED TEAMING

Teaming improves acquisition outcomes. Traditional acquisition processes, regulations, and practice create barriers to trust and thus teaming. One of the largest and most consistent areas for improvement in acquisition reform efforts is the need to team better with industry.⁷²

Despite early and consistent training by Defense Acquisition University on all aspects of the Integrated Product Team, building effective industry and DOD teams can still be a challenge.

Comments by the Program Executive Officer for F-35 Joint Strike Fighter “accusing the prime contractors of trying to ‘squeeze every nickel’ out of the US government” typify this dynamic.⁷³

Business Executives for National Security mention how a business perspective “would open lines of communication between DoD and its suppliers—the defense industrial base in particular as well as the larger commercial sector. The private sector operates as a community of buyers and sellers. In defense acquisition such relationships are at ‘arm's length’ and legally restrained.”⁷⁴ It seems that the regulatory strictures governing acquisition to keep it fair are

obstacles to building trust. The reasons for this restraint are because of “the perceived need by government to protect its interests, to provide safeguards for the proper expenditure of public funds,” and to provide for free and open competition.⁷⁵ In order to provide fair and open competition, the free flow of information and the forthright resolution of differences are restricted. Doing this creates the catch-22 effect of undermining the very elements upon which trust and thus teaming are based resulting in poor acquisitions.⁷⁶

Support contractor personnel can be tasked to build IT systems versus providing acquisition management support. All intellectual property developed by such contractors is treated like any other DOD employee-developed intellectual property. When the DOD owns the means to make its architecture, data rights, and implementations, it removes those “arm’s length” legal restraints and allows the teaming necessary to tackle tomorrow’s technology challenges when partnering with industry is a necessity (as it often will be).

Another small but critical aspect of teaming that an organic acquisition approach improves is the elimination of collaboration-killing rules created to eliminate possibility for constructive contract changes. From the government perspective, this prevents carelessly increasing the scope (and therefore cost) of a contract, and from the view of the contractor, such changes outside of the original contract scope are a welcome source of additional revenue. As a result of these conflicting interests, operator feedback to contracted engineers is often stifled, and even censored by program offices or contractor management with other priorities. For instance, developmental and operational testers conducting an independent assessment of a system are unable to collaborate face-to-face with contracted engineers to provide design inputs.

Free collaboration unhindered by fundamentally conflicting interests is key to iterative development of products that most effectively satisfy actual requirements. “If requirements are

tile, such collaboration is the grout.”⁷⁷ This collaboration is not changing the requirements (the tile) but is necessary to turn the ideas of requirements into action and implementation (the grout). In an organic acquisition construct, opportunities for operator and engineers to collaborate and meaningfully iterate face less inhibition. The relative safety of being a government team member and the unfettered teaming it allows facilitates the “survivability” of its members when “varied” ideas are adjudicated and “selected.”⁷⁸

Pursuing this idealized operator engineer concept in a hacker for cyber-attack and exploitation operations, like a Kevin Mitnick with a duty concept, is appealing. The reality is that few individuals have the talent and motivation to perfect such an art.⁷⁹ In absence of such rare talent, teaming becomes a means to achieve greater scale, to specialize, and to flex within a complex environment. Organic acquisition removes the barriers for trust which are necessary to build teams. When the DOD owns the capacity and bears the risk instead of industry, it can select team members and solutions commensurate with its needs based on team dynamics and capabilities. Organic acquisition allows the direct interaction between operator and engineer without contract limitations.

Organic acquisition doesn’t preclude teaming with industry or external organizations. For example, the Tea Pot Committee from Brigadier General Schriever’s story-book acquisition of ICBM technology pulled industry and academic expertise together under strong military leadership.⁸⁰ When the DOD conducts an acquisition organically, it can build teams that transcend the politics of defense industry team formation by outsourcing selected components or hiring personnel directly, enabling the formation of teams essential to solving future acquisition challenges. Such teaming requires the DOD to inherently bear the risk, organically making the tough systems engineering and business decisions.

FINANCIAL JUSTIFICATIONS

Philosophical and capability justifications for the DOD to organically acquire IT should be sufficient to warrant its consideration alone. Military conflicts and thus corresponding military management decisions tend to focus on effectiveness, not efficiency.⁸¹ Yet despite this reality, effectiveness and efficiency are two sides of the same coin.⁸² A preponderance of conventional war outcomes demonstrates a correlation between the side with the larger economy and military victory.⁸³ Since the United States may not always be able to dominate on sheer economic might alone, examining the financial reasons for the DOD to pursue organic acquisition capability must be considered in order to best leverage our limited resources.

As discussed, much of the justification for commissioning or buying major weapon systems is due to its capital intensive nature. Economy of scale and capital utilization arguments justify shared usage of the industrial base between commercial and military needs. IT is generally not as capital intensive as aircraft or submarines, however. IT, in general, and software, in particular, has low cost barriers to entry. Accordingly, low barriers to entry in IT remove the need to rely on the capital resources of a third party provider meaning the DOD can enter into IT acquisition more easily than building tanks, for instance.⁸⁴

According to the Project on Government Oversight, “the federal government approves service contract billing rates that, on average, pay contractors 1.83 times more than the government pays federal employees in total compensation, and more than 2 times the full compensation paid in the private sector for comparable services.”⁸⁵ Military members able to adapt fielded systems don’t get paid overtime, don’t charge extra for extended deployments, and don’t expect award fees for doing their job or implementing a time-critical engineering change proposal. In order to deliver IT capability, much of the cost is labor, not materiel. It follows then that if the DOD were to cultivate its means and personnel for creating its IT, it could do so

more cost effectively than outsourcing. Because of the continuous dynamic nature of the anticipated cyberwarfare environment, capital utilization arguments favor acquiring organically, as the fixed costs associated with obtaining permanent capacity can be recouped, variable costs can be reduced, and full employment ensured by constant need.⁸⁶ Additional surge capacity can still be outsourced. It can be argued that the reason commercial jobs pay so much more for doing the same defense industry work as the military is because the military has created a market for purchasing those services in the first place. If the DOD, as a monopsony, were to diminish that market demand by instituting organic acquisition means, as opposed to private suppliers of services that are inherently within DOD's responsibility, then prices would decrease.

The defense economic landscape could use more competition to decrease costs. "For major acquisition programs (for example, aircraft, tanks, ships, weapon systems), the supplier often holds a monopoly and the purchaser holds a monopsony (i.e., one buyer only)."⁸⁷ Monopolies and monopsonies tend to introduce inefficiencies into the marketplace. For smaller systems, the DOD still maintains the monopsony on the surface but in reality acts as multiple buyers. For instance, the Air Force and the Navy may independently buy the same basic capabilities tailored to their respective requirements such as in tactical data link implementations or even different bull dozers. Similarly the competitive space for suppliers of small programs is also more populated. As we see with the frequent owner lockouts and player strikes in professional sports, a monopoly and monopsony dynamic is usually settled by bargaining.⁸⁸ When bargaining, having even a modicum of credible means to provide capabilities organically provides a powerful negotiating tool. Being able to walk away from a negotiation and to have the option to build organically should decrease costs for solutions anytime additional industry capacity is desired.⁸⁹ Relying solely on organic means creates other problems similar to those

that are the undoing of a monopoly, such as inefficiency, inequities, and stagnation, which will be discussed later. This paper proposes a balance of means, both insourcing and outsourcing, to provide options, discretion, and feedback in utilization of public resources.

Another cost factor more economically borne by organic acquisition arises from how profit is determined. Current practice is “once the contracting parties agree on the estimated costs, profit is negotiated largely as a percentage of these costs. Unfortunately, this method of contracting also provides little incentive for contractors to reduce costs; in fact, it often encourages higher costs.”⁹⁰ Similarly, the purchase of tools and equipment used solely for DOD work typically have double-digit percentage purchasing fees when done through intermediaries that could be eliminated by DOD directly purchasing the items. All else being equal, built-in profit margins for goods and services are unnecessary expenses when the task could be done organically at cost.

Delivering capability organically decreases training costs. The act of creating and delivering a service or product provides a level of learning, that sometimes even the most expensive and realistic training couldn’t emulate. As the speed of warfare increases due to the automated means by which it is conducted, the line between adapting a system and employing a system blurs, creating additional training needs. The shift will be to not only employ systems, but also to adapt them, which typically requires a greater understanding of the system than that offered by typical user training. Such understanding is inherently obtained by organic acquisition.

When intellectual property is solely developed with public funding under the auspices of defense, should a private company own it? “Intellectual property (IP) rights are determined by the terms of the procurement or funding contract. In cases where the contractor retains title to

the patent, the DOD commonly gets a nonexclusive, nontransferable, non-revocable, royalty-free license to use the patented item. The contractor must disclose any such invention to the contracting officer; failure to do so may result in forfeiture of patent title.”⁹¹ These strictures have a common work around for industry. For example, a contractor can develop the critical component of a system using contractor independent research and development funding. Once the company’s business development efforts germinate demand within the DOD, the IP ownership of the component essentially preserves the IP ownership of the system for all practical purposes. This is despite the fact that the DOD pays an overwhelming preponderance of the cost to develop the entire system as the only customer for it. When the system is acquired by using exclusive DOD funding, the criticality of that component effectively grants that company IP ownership of the system as a whole. IP titled by private companies becomes a large source of revenue for DOD contractors in commercializing that technology when allowed, often with other militaries and federal agencies. If title to that patent is necessary, when the DOD wants to shift to a different supplier, large legal battles ensue or the DOD must pay cost-prohibitive prices for rights. Such battles create an environment of anger, frustration, and division within the acquisition community detrimental to teaming.

On the other hand, “when DOD personnel develop intellectual property in the course of their official duties, the patent rights to any patentable creation belong to the government.”⁹² As such, when organic means are insufficient, additional capacity can be accessed from industry without intellectual property transfer costs. By the government owning the intellectual property for organically developed materiel solutions and processes, decisions concerning diminishing manufacturing sources and stockpiling become cheaper. Providing government furnished equipment and information are simplified as well as recourse when goods and services are

insufficient or inadequate. There is an additional benefit with government-developed intellectual property: a government-owned patent released to the public (due to its limited security value for instance) becomes a public good able to be commercialized in a free and open market economy.

A continuously evolving cyber threat demands a permanent, continuously evolving means to address it. Applying make-buy decision theory, organically having some capacity to address a permanently evolving threat is more economical than continually renting temporary capacity to address the threat by commission or buying.

Organic acquisition decreases the number of system-wide management interactions which decreases complexity and therefore costs. By eliminating contracting and administrative overhead, complexity and variability in an exchange are theoretically decreased, thus directly reducing risk and cost. When the DOD is the sole customer paying for a capability, it bears all the risk whether commissioned or acquired organically. While industry often brings a business construct where it can leverage other investments to deliver the capability more cost effectively, the administrative cost of accessing that capacity can diminish, even eliminate this benefit as nearly all government contract protests attest. Another consideration is that the contracting and administrative costs with “preserving the industrial base” or addressing “diminishing manufacturing sources” can be eliminated by organic acquisition. Generally, in a monopoly and monopsony relationship that characterizes many government and industry economies, there are few market competitive forces to drive efficiencies and innovations. That said, when the DOD is sole acquirer, shifting the sources of risks from third party vendors (who can only be influenced) to organic assets (who are directly controlled) is better for risk management and thus cost by decreasing management complexity.

Coupling authority with accountability and responsibility through organic acquisition has the cost benefit of minimizing the non-value-added overhead of bureaucratic or administrative decision making, necessary to harness industry participation in a fair and equitable way. This often manifests itself simply in waiting for a decision or having one overturned, which drives costs. Sometimes not making a decision is worse than making a bad one. The military more directly bears the consequences of failing to acquire systems and capabilities within the means our nation has allocated and therefore may benefit from not having industry or Congress to blame for a failed acquisition, being only able to blame itself. This improved accountability directly incentivizes performance along with all the disincentives inherent in any military failure.

Having organic resources build our IT systems reduces the overhead associated with managing money. The rules governing the DOD's ability to allocate or direct manpower resources are much less restrictive than managing Congressional funding. The consideration for Congressional cuts to manpower allocations—who vote—is generally higher than cutting emotionless, uncomplaining dollars. The delicate ballet of reprogramming funds or adjusting for across-the-board cuts waste countless hours and drive tremendous inefficiencies across the acquisition enterprise. Fluctuating funding allocations or the systemic disincentives for carrying an effective management reserve cause major perturbations in programs which drive cost and also “decreases the probability that contractors will benefit from any attempt to reduce production costs, increase productivity, or both.”⁹³ This is why funding stability is typically a top concern of program managers.⁹⁴ The need to manage money, manpower, and capital resources continues in an organic acquisition paradigm. As mentioned, IT acquisition tends to be less heavily capital-intensive, than acquiring tanks for instance, because IT relies more on manpower. This simplifies the DOD's administrative costs. Another money management factor

is the uncertainty whether or not a contract will be won, which discourages long term cost-saving investments by industry.⁹⁵ However, an organic acquisition paradigm with more stable resourcing means more stable and efficient programs as it encourages and enables DOD to make those capital investments and dominate its competitive space. Organic acquisition provides opportunities for more stable resourcing necessary to improve acquisition execution.

Organic acquisition diminishes lobbying and special interest influences on Congressional and politically appointed officials that drive unnecessary costs to programs and misallocation of resources from priority DOD capability requirements to “priority requirements you can get funding for.” Current campaign finance mechanisms, Congressional earmark practices, and Constitutionally-protected (free speech) lobbying rights alter acquisition outcomes and are legal. The “cost” of these alterations in acquisition outcomes is not well documented, as proving “what would have happened” for comparison is always problematic. Yet, purchasing influence is generally an investment for the private, ideological, and profit-based motivations of the entities desiring such alterations. If a contract award based solely on merit was likely, such purchased influence wouldn’t be necessary. The implication is that the influence is not necessarily also in the best interest of the DOD—if it were, it wouldn’t need to be bought. Organic acquisition, when following current codified ethic policies and regulations, may not accept these forms of external influence, and strict punishments exist for those who do.

When considering cost implications of organic acquisition, one vital question is, “Who bears the risk?” When we worry about liability in defense business decisions, it’s already too late. If we are focused on who to blame when something goes wrong, we are doomed to failure. The profession of arms cannot accept not having the capability due to preserving blaming rights. At the end of the day, the military directly bears the risk and bears it in the only ways that matter.

All efforts need to be focused on making sure things go right or that if things go wrong, sufficient risk management actions have been taken to minimize the impact of failure. The military bears the consequences of outsourcing its core competencies like any other organization. The military bears the cost whether it outsources or not.

HISTORY OF DOD ACQUISITION & CURRENT ACQUISITION ENVIRONMENT

The US government's current acquisition system, despite seemingly perpetual headlines of cost and schedule overruns, has equipped the world's most powerful and flexible military in the world. Coincidence is not causality however. The acquisition system benefited from a free enterprise capitalist system that provided the tax base from the world's most vibrant and largest economy. This system benefited from the tremendous monetary advantages of being the world's reserve currency, an ever expanding monetary base, and deficit spending. This system flourished where the nature of war involved one participant with an asymmetric advantage in high technology. With the emergence of peer and near-peer competitors as well as non-state actors; with the lethality of proliferated WMD in the hands of disenfranchised violent extremist organizations; with the ever decreasing relative cost of weapons of war particularly for IT; with the instability of global financial markets and trade practices, these advantages which helped equip the forces that won the Cold War and the Gulf War may not offer the advantages necessary to win the Vietnams, Eagle Claws, or whatever the next war may be. If the acquisition system can be improved, it should be improved. Before changing anything, as a general rule, one should understand why things are the way they are. So why do we generally only buy and commission our materiel needs? Is buying the cause of our greatness?

SHORT HISTORY OF DOD ACQUISITION—WHY WE ONLY BUY

There is a long tradition of private business providing the materiel means for the United States to conduct war. Prior to WWII, the principle of non-intervention set forth in Washington's Farewell Address characterized a military establishment that rapidly militarized when the need for war arose. The associated large-scale and rapid disarmament post-conflict was not only economical, but also consistent with the political precedent. The ebb and flow of military demand defaulted to private industry providing materiel because it was the only place capacity existed. After WWII, not only did the United States' isolationist norms shift to become more interventionist, but the character of warfare evolved to incorporate more complex systems and indeed to a previously unimaginable tempo and speed à la Blitzkrieg. Both the post-WWII geopolitical shifts and the increasing speed and lethality of war necessitated a standing United States military, as the lead time for the reconstitution of such capabilities in the context of faster warfare required them to be in existence from the outset to be of any use. Even though the need for a standing army changed, the norm of outsourcing its materiel did not. Traditional swings in military demand from peace dividend to large war surges required use of private industrial capacity. But if the nature of conflict changes and becomes numerous, continuous small wars, then the requirement for civilian surge capacity diminishes and allows the DOD to entertain organic acquisition with its more stable acquisition manning levels. If large scale wars will be over in days or even seconds, requiring an adaptive standing force, such a permanent force can justifiably be insourced rather than outsourced based on the consistent demand a high tempo conflict creates. Similarly, if the character of war shifts to be more determined by how forces adapt systems rather than by how forces are employed, then acquisition becomes warfighting and the need for organic acquisitions apparent.

Regardless, when it came time to build up after Korea, when the United States realized or assumed its responsibilities within a new world order, it was built upon the precedent and custom of industry providing the materiel. This was codified in policy “since 1955, when President Eisenhower approved a policy that ‘the Federal government will not start or carry on any commercial activity to provide a service or product for its own use if such product or service can be procured from private enterprise through ordinary business channels.’”⁹⁶ Years later, President Eisenhower would give his military-industrial complex speech warning posterity about the dangers of it and spoke of the “delta of power.”⁹⁷

The acquisition of early information technology in the DOD varies on a case by case basis, but can be characterized by Air Force Communications Command’s acquisition efforts from 1938 to 1990. AFCC’s history reads like an evolution of technology as it was applied operationally. Yet this technologically driven Command only anecdotally built the systems it employed.⁹⁸ There is no evidence of any institutional effort within AFCC to organically acquire systems for its major mission areas despite “managing the acquisition of more than 165 programs whose total life cycle contract value exceeded \$4 billion” at one point.⁹⁹ Mainstream service acquisition efforts follow this similar pattern of buying capability versus building it.

The DOD does acquire systems organically in some instances, however. There are certain classified capabilities and systems that are wholly organic at NSA. Building on the authorities SOCOM possesses for acquisition, AFSOC shifted its approach for certain acquisitions to be more organic.¹⁰⁰ Similarly, the HH-60 sustainment squadron at Warner Robins AFB utilizes government civilians to write software code for the HH-60 navigation system sustainment.¹⁰¹ The 90th Information Operations Squadron at Joint Base San Antonio-Lackland, Texas is an organic development squadron providing offensive and defensive cyber

operations options to operational units based on specific customer requirements.¹⁰² Others exist as well. However, as illustrated by the experience of AFCC, outsourcing acquisitions has historically been the norm, making up the vast majority of DOD IT acquisitions.

MACRO FORCES FOR BUYING

The tradition of commissioning within AFCC and the services writ large occurred beneath larger macro forces that engrained outsourced acquisition as the norm rather than organic development. These forces span a wide variety of sources, ranging across personnel structures, economics, and politics, among others.

First, retaining technically proficient operator engineers is difficult when commercial enterprises compensate better and wars post-WWII such as Korea and Vietnam have been viewed in a much more negative light.¹⁰³ DOD's human resource constraints drive the DOD to outsource its work in order to access the top talent that industry's more flexible incentive structures are able to retain.¹⁰⁴ Second, the structural human resources cliché of "every officer is going to be Chief Naval Officer" necessitates career broadening, moving, and turn-over, despite the fact that technical and managerial specialization might lead to greater organizational effectiveness and personal satisfaction. The transitory nature of the workforce and need for career advancement inhibits formation of a substantial 'make' capacity.

Third, with people living longer and career military professionals still young enough to enjoy a second career after twenty years of honorable service, a revolving door of influential senior military personnel creates pressures that nudge the younger generation of military professionals towards lucrative post-military opportunities external to the DOD.¹⁰⁵ Creating organic capacity to meet military demand leads to fewer private-sector opportunities after a career of honorable service.

Fourth, the general macroeconomic trend of outsourcing to foreign countries has characterized American business since the US dollar became the world's reserve currency. With the atrophy of organic American industrial capacity and the growth of outsourcing in the business world, it seemed inevitable that outsourcing defense would follow.¹⁰⁶ Indeed, the US military now has a global supply chain by proxy through industry suppliers.

Fifth, Congressional influence in the acquisition process favors constituents profiting from provision of materiel. While military professionals have legal restrictions on political support in an official capacity, private enterprises do not. As some jest, "the one thing you can get Congress to agree upon is that we need to build another C-130 because a part of it is made in every state."¹⁰⁷

Sixth, as discussed earlier, technical leadership in information technology and utilization within commercial industry surged past DOD demand and means. So the push for utilization of commercial-off-the-shelf (COTS) utilization in the late 90's and early 2000s was based on solid reasoning and for the most part yielded tremendous benefit. As current policy dictates, acquirers ought to pursue the best value, and COTS provides this in many cases. The DOD necessarily and wisely acquired the best technologies available, which were outside organic means. Doing so, however, created tremendous vulnerabilities.

Another macro reason for outsourcing, if somewhat cynical, is the shameful violation of public trust, government largesse, and graft best characterized by Darlene Druyan, which pushed acquisition decisions to be outsourced.¹⁰⁸ Combined, these are very powerful forces which paradigmatically preclude organic acquisition from consideration in the solution set.

FORCES FOR MAKING INFORMATION TECHNOLOGY

These forces driving outsourcing are in competition with strategic forces that lend themselves to the DOD making its IT in our current acquisition environment. These forces are the

challenges and opportunities that characterize the current and anticipated acquisition and operational environments for cyberspace.

Something often overlooked in technology development expectations largely popularized under Moore's Law, is that technological development follows other power law dynamics. For example, a simple phenomenon attributed to Pareto basically says that approximately 80% of effects come from 20% of causes. For example, Microsoft noted that by fixing the top 20% most reported bugs, 80% of the errors and crashes would be eliminated.¹⁰⁹ At the risk of oversimplification, Pareto's law counters the dynamics of Moore's Law in that optimization is tough. Toaster ovens haven't improved much over the past 80 years as there is a point of diminishing returns for additional effort.

Another power law dynamic affecting acquisition results from the fact that many of the new capabilities being developed for the DOD, particularly in network-based systems, rely on the integration of systems and systems of systems. These new systems tend to be more complex due to the increased number of interactions and integration in the new systems.¹¹⁰ New interactions follow exponential power laws. Any update to one part of system of systems can have unforeseen cascading effects to other systems, particularly in software. Such complexity requires exponentially more effort to deliver relatively smaller improvements in capability. Per Pareto, early technological advances are greater at the outset because optimization tends to create more complexity as the system matures.

The way to deal with complexity, to make an obvious point, is through simplification. As an example, loose couplers utilize standards that minimize dependence between elements thereby allowing simplification, scalability, and modularity.¹¹¹ Decreasing interactions or variables reduces complexity. Such approaches can address both technical and management challenges.

Organic acquisition removes many of the management and legal interactions necessary to solve an already complex technical problem.

Decentralization enables highly complex systems to evolve rapidly and effectively by increasing the diversity and thus likelihood of self-organization within complex systems. Organic acquisition and the rapid iteration that can occur in tightly coupled operator and engineer interaction enables this adaptation to occur. Such adaptation, according to the Palchinsky principles popularized in Tim Harford's book "Adapt," requires variation, survivability, and selection.¹¹² The ability to seek new ideas and try new things, to try on a scale where failure is survivable, and to obtain feedback and learn are more easily achieved in an organic acquisition construct than through the additional intermediate degrees of separation (with associated administrative overhead) in a daisy-chained supply chain.¹¹³ In this adaptation paradigm of highly complex systems, set requirements inherently restrict opportunities for technologies and doctrines by limiting potential in the singular obsessive pursuit of a set objective. Organic acquisition is a solution that decentralizes acquisition and thereby addresses complexity within the DOD.

The need for decentralization to combat complexity also overshadows the general approach of acquisition in large monolithic programs rather than smaller incremental evolutions. Lt Col Dan Ward humorously summarizes that "a system as enormously complex as a Death Star is more than any program manager or senior architect can handle, no matter how high their midichlorian count is. There is bound to be an overlooked exhaust vent or two that leads directly to the reactor core."¹¹⁴ Smaller, manageable programs are more executable. By decentralizing acquisition means via organic acquisition, these "death star" acquisition efforts won't be pursued; instead, they will be replaced by executable, warfighter opportunities.

Decentralization can still allow the benefits of complex systems to be realized by utilizing technological and management platforms upon which adaptation can occur. For example, a modular, scalable design of a platform utilizing standards to act as loose couplers enables independent entities to adhere to those standards and achieve desired levels of integration, allowing tailored solutions to be introduced. We are seeing this with the approach Special Operations Research and Development Acquisition Center and Air Force Special Operations Command are taking to tailor capabilities onto C-130 platforms. There, the systems integration and engineering are being actively executed by program office, not outsourced.¹¹⁵ Similarly, configuration management boards are powerful mechanisms to realize the benefits of standardization from diverse technology opportunities. Such adaptive mechanisms require intensive operator-engineer collaboration and iteration.¹¹⁶

Another strategic acquisition challenge is related to the evolution of the acquisition process and the decentralized, uncoordinated partition of authority (not to be confused with decentralized execution advocated in this paper). Independent sub organizations within the DOD tend to optimize their elements of a process and often unknowingly sub-optimize the overall process to the detriment of the whole. For example, if operationally testing a system exclusively and autonomously can be done in a week while participating in a combined test takes over a month, an operational test agency has incentive to opt for the narrower week-long test, which may slow down a program by two months. Similarly, the uncoordinated, piecemeal changes and adaptations within sub organizations can create an ineffective and inefficient overall “Franken-process” with no clear design or function, unable to meet the end user needs.¹¹⁷ Authority can be so dispersed as to be ineffective for implementing change or taking action. If the DOD wants to make a structural change to PPBS, it has to partner with Congress. This reality might be the

lesser evil, but organic acquisition consolidates authority and power within the DOD rather than ceding it to an external entity enabling action over indecision.

THE PUSH-PULL DYNAMIC—IMPLICATIONS FOR MAKING IT

The statutory, regulatory, and de facto structural foundation of the DAS is built for warfighter (market) pull of major weapon systems in large, long term, monolithic programs neglecting a more iterative and evolutionary tech push dynamic. The lag between requirement approval and delivery in a pull system without effective feedback loops undermines many of the expected benefits of a pull system. Sometimes DOD's pull system wrongly anticipates future requirements, meaning technology and means are developed for needs that don't materialize or that change, to which many canceled programs can attest. Pull systems are supposed to prevent this from happening. While a DOD requirement from a pull system can spur new technological development and seize technical leadership, waiting for a "requirement" to form before developing a capability for an existing technology undercuts that potential because it introduces unacceptable lead-time. Opportunities to surpass requirements or evolve requirements based on new information are all too often not pursued due to the cumbersome realities of the process to make such changes. Furthermore, by outsourcing the acquisition, technical leadership is ceded to whoever wins that contract. A tech push system, drawing from market innovations is more adaptive and offers the great benefit of leveraging disruptive technologies originating outside the defense industrial complex. The two approaches could coexist and in fact complement one another.

The acquisition system is not built for tech push or rapidly emergent needs, though best efforts are made to deliver these clearly useful capabilities using DAS. While "technology looking for a problem" can be an issue, not solving problems that can be readily addressed with existing technology is arguably worse. Stories emerge from OIF of soldiers using personal funds

to purchase GPS receivers, land-based data link gateways being rapidly acquired, operations centers effectively utilizing shareware mIRC chat software for collaboration, or C-130J units tailoring Falconview mapping capability with unit purchased software. While official policy guidance encourages COTS and best value, the execution can fail in practice because the centralization of decision making (funding) in DOD acquisition, for a number of legitimate reasons, does not provide ways or means to deliver tailored and applicable capabilities to address the nuanced needs of individual units. Many units, due to mission need and an unresponsive acquisition process acquire capabilities organically, without acquisition expertise or regard for rules and use whatever resources are available, such as end-of-year money or a pittance of squadron funding budgeted for something else. The acquisition system sometimes succeeds in spite of the process, not because of it.

HOW THE DOD DOES TECH PUSH

Generally speaking, the DOD doesn't do tech push, but there is precedent. Most cyber capabilities in use by the DOD are created outside of the DOD acquisition process because of commercial technical leadership in IT and policies to leverage that leadership. Numerous policies encouraged use of COTS solutions and the DOD has harnessed industry's leadership from Cisco routers and Microsoft Office to transmission of data over commercial carriers to name a few examples.¹¹⁸ This means the DAS requires "creatively" allocating resources to non-programs of record to operationalize off-the-shelf capabilities, to the detriment of other programs.¹¹⁹ Some legitimate mechanisms exist for this such as the Joint Improvised Explosive Device (JIED) Capability Approval and Acquisition Management Process run by the Joint Improvised Explosive Device Defeat Organization (JIEDDO) which, like an investment bank, set up a working capital fund to allocate resources and rapidly fulfill the statutory and regulatory requirements to deliver capabilities.¹²⁰ Since it is not a program of record, this process bypasses

many statutory and regulatory requirements, but correspondingly creates funding and capability shortfall issues.¹²¹ The construct also drives active collaboration between systems engineering and operators, and the urgency of the need fosters a sense of ownership.

Battlelabs were a concept employed by the Air Force to harness tech push by having operators and engineers collaborate to operationalize off-the-shelf technology addressing not just the technology but the associated doctrine and operating concepts.¹²² Battlelabs generated tremendous capabilities for the warfighter.¹²³ Unfortunately, despite having a small \$5M budget, the Air Force cut the program due to problems with transitioning the technology opportunities, specifically, inability to POM (allocate resources) for a program without an “approved” requirement per the PPBE process.¹²⁴ Taking a somewhat niche solution set devised by a warfighter and technologist team at a battlelab into a highly centralized, high-level POM process competing with major programs, macro problems, and core concerns is a challenge few battlelab initiatives could face.¹²⁵ Even after a successful POM, the transition into the formal acquisition process and thus to industry introduces a self-defeating lead-time for delivery of the solutions which are intended to be inherently responsive. Industry may not be interested in picking up a solution if the business case doesn’t support it. The fact that the technology needed to be transitioned to industry at all may have thus been the problem. As the idea of organic acquisition was apparently never considered, this precluded transition to military units and the force structure allocations necessary to do so. The AF battlelab experience is representative of challenges many research labs face. If you want your technology to succeed outside a lab, you also have to devise a way for industry to profit from it.

Other mechanisms for tech push border on illegality or insanity as characterized by misappropriation of sustainment funding for adaptive, corrective, and perfective efforts that are

clearly developmental or some end-of-year funding shenanigans.¹²⁶ What should be a simple, repeatable, consistent, mature process to develop and acquire technology often requires exceptions achieved through intense hand-carrying, waivers, heroics of zealots, or a reaction to tragedy to get senior leadership to champion the cause. The hallmark of a highly centralized system is the centralization of decision making as characterized by DOD acquisitions and the exceptional efforts necessary to allow tech push to occur.

In essence, tech push is not pursued by an acquisition system that is structurally formed on warfighter pull. While there are dangers in warfighters' pursuing the latest toys with "other people's money" or spending available funds to avoid losing an otherwise steady budget allocation, there is also the risk that warfighters might not be able to get what they need and thus cede competitive advantage in the contest in and through cyberspace. Under the current construct, the DOD will not be able to adapt rapidly enough in a complex operating environment to secure the common defense. In all the ways that the DOD does tech push, there is a higher degree of organic acquisition involved. When tech push failed, like in battlelabs, having permanent organic acquisition capacity is a possible solution to address the shortfalls.

An organic acquisition approach would harness both push and pull dynamics to deliver capability. Organic acquisition can follow the familiar warfighter pull dynamic of the current DAS in developing niche capabilities outside the domain of commercial relevance and outsourcing for development capacity as needed. Additionally, organic acquisition is essentially a prerequisite for tech push. Organic acquisition enables tech push through the decentralized empowered collaboration between operators and engineers. These teams can devise new and creative ways to harness emerging capabilities in operationally suitable, effective, and sustainable ways by providing them the organic means to address a full life-cycle of need.

Having collaborating operators and engineers build systems and concepts removes the many barriers and distractions to tech push, allowing the rapid consideration of new technologies and concepts. Pursuing a future concept, informed by operational, technological, and resourcing realities, in absence of the political, profit, property, credit, and liability maneuvering that is unfortunately inherent in outsourced acquisition, is a relatively clean solution in an otherwise dirty business.

IMPLICATIONS OF DOD ACQUISITION HISTORY ON THE FUTURE

Examining the historical context and strategic environment in which we conduct acquisition highlights how the current paradigm of buying has become a cultural norm—an underlying assumption so fundamental in day-to-day life as an acquisition professional that it is neither questioned nor even considered. This is the way we have always done business. Because the macro-environmental factors for why acquisition exists in its current form have changed, a corresponding shift in the DOD acquisition approach is warranted. In addition to the philosophical, capability, and cost justifications for why the DOD should acquire its IT organically, historical and acquisition environment justifications favor the paradigmatic shift as well. This shift requires organic means for acquisition to not only enable a make-buy decision as part of the DAS, but to also more deliberately harness tech push dynamics in the DAS. The risks, challenges, and opportunities with adapting in this strategic context are noteworthy.

RISKS, CHALLENGES, & OPPORTUNITIES

Fixing one problem can often create many and sometimes worse problems. Examining the risks, challenges, and opportunities for organically acquiring our IT will help mitigate the “unknown unknowns.”

This paper suggests organic cyber acquisition as an option to be considered along with outsourcing, not in exclusion of outsourcing. Organic acquisition of cyber capabilities is not, nor will it be, a panacea. Many of the risks that industry faces will be similar to those that organic acquisition would face, being inherent to acquisition. Challenges that both organic and outsourced acquisition will face are the inherent risks with any development program and the sad instances of incompetence, fraud, waste, and abuse. Additionally, there are numerous benefits industry brings which the DOD inherently could or should not. The following section highlights many of the concerns associated with organic acquisition of IT and commentary to rebut those concerns.

HOW TO HARNESS COMPETITIVE FORCES

The current outsourcing model is intended to harness free-market forces of competition to ensure an efficient marketplace.¹²⁷ Facilitating competition within the DOD continues to be a challenge and the pursuit of this ideological goal has resulted in some unforeseen problems in implementation.

Firstly, there is an inherent inefficiency in the marketplace due to the fact that the DOD and its contractors have many monopoly and monopsony structures already in place.¹²⁸ While efforts to drive competition are valiant, one look at the market for major weapon systems and you can see the structural challenge characterized by the many monopoly to monopsony arrangements. Generally speaking, the capital intensive nature of the systems the DOD requires with respect to its demand precludes multiple suppliers. Additionally, certain contractors “own” the platforms they build and alternating between the major suppliers in increments causes numerous unhealthy legal battles and other inefficiencies to the detriment of many stakeholders. If there is going to be a monopoly devoid of competitive forces, it might as well be the same entity as the monopsony for all the philosophical, capability, and financial justifications

previously discussed. Next, given the capital-intensive nature of designing, building, and sustaining many of the major weapon systems, the competition for contracts is based on ideas and proposals, not on actual performance, and therefore is not the idealized competition of a more pluralistic marketplace. What private entity is going to risk developing a major weapon system through production that is technically cost prohibitive or where its sole customer might not want it?

The economic justification and means for preserving multiple providers can become cost prohibitive with capital intensive platforms. When the government did commission a capital intensive system like NASA's space shuttle program, the competitive landscape within the United States evaporated as private enterprise could not compete with the government in that capital intensive industry because there was only room for one supplier—private industry could not compete with heavily-subsidized programs in servicing private demand. The shuttle acquisition strategy had a profound impact on the market strategy. Who would risk their capital to compete with the government? After all, “competitive private enterprises remain the most productive, efficient, and effective sources of goods and services.”¹²⁹ The shuttle's cancellation, among other factors, has allowed private enterprises such as Space Exploration Technologies, Orbital, and United Launch Alliance to competitively expand as a result of new government subsidies made available in NASA's shift to a new market strategy. But again, IT is not nearly as capital intensive, and the marketplace for utilizing IT to augment an organization's processes is quite mature and healthy. Therefore, competitive forces for IT are more readily accessed and harnessed, and government involvement is less likely to stifle market health.

While monopolies and monopsonies are often inefficient in the marketplace because they tend to not harness competitive forces, competitive forces can still drive behavior in such an

environment. Industry benefits from having profits act as an independent metric. Independent metrics provide an internal measure which the institution can compete against. A fascinating example of an independent metric in the DOD is the internal competition in the 1947 Berlin Airlift when then-Major General William Tunner led his forces to compete against previously set airlift tonnage records, providing the first strategic win of the Cold War.¹³⁰ Units can compete against each other internally, as the National Security Agency for instance could act as a red team to hack into the Air Force network, to the benefit of both organizations.¹³¹ Similar competitive constructs such as independent metrics and internal competitions could be established within an organic acquisition paradigm. Ultimately, such organizational performance is more a function of internal leadership in terms of motivating people and *coup d'oeil* than perceived external market dictates and competitive forces.

A monopoly's efforts to prevent external entities from entering a market harness those external competitive forces. Take for instance Google's domination of Internet search, where strategic underpricing creates difficulty for other companies to enter and compete in the market. In such scenarios, not only does the monopoly benefit, but so too does society as evidenced by the Federal Trade Commission's findings when it dropped its anti-trust litigation of Google.¹³² Strategic underpricing may be both necessary and beneficial to society when barriers to entry are relatively minimal as is the case in IT. In contrast, utility companies tend to enjoy more robust pricing opportunities due to high capital costs to enter a market. By definition, monopolies that create and provide value don't stagnate. The internal drive to continuously prevent market entry through strategic underpricing creates value, prevents stagnation, and can be established within the DOD. Having an organic acquisition option will drive either industry or organic means to strategically underprice thereby harnessing competitive forces.

Additionally, organic acquisition does not necessarily exclude competition. Firstly, competition always exists at some level. For example, the United States military is in competition with other militaries and non-state actors. The problem arises when the military intentionally or unintentionally competes with the companies (constituents) which fund its existence for their protection. Government competition with private enterprise in the commercial space is unfair and unsustainably cannibalistic.¹³³ Accordingly, organic government IT development assets should be devoted to products that are of purely (or nearly so) military purpose. Additionally, by virtue of having DOD personnel compete to provide cyber means, they are competing with goods and services that private industry could provide for military purposes. Taking an extreme ideological stance on the previous statements undercuts the very rationale for why our nation has an all-volunteer force of citizen soldiers in lieu of a mercenary army.¹³⁴ Some things should not be privatized and privatization does not necessarily make things more competitive. Indeed Napoleon's *levée en masse* and logistics construct was a revolution in military affairs marked by large utilization of organic means more competitive than his adversaries.¹³⁵

The DOD could generate more competition by having organic capacity. The challenge arises in finding ways to make such competition equitable and fair so that the competition is effective at sustainably harnessing competitive market forces. If the DOD had the means to organically provide these capabilities it would be the organization's prerogative to determine if it wanted to source within the government or externally, or even to force government units to compete as private industry must compete.¹³⁶ As a monopsony, the government has the power to not just select its suppliers, but to influence virtually every aspect of the marketplace. Most of these aspects are defined by statute and regulation from Congress. In any of these scenarios,

DOD managers benefit from the diversity of sources that is inherent in a competitive marketplace while “suffering” from duplication of effort.¹³⁷

BEYOND ACQUISITION STRATEGY TO MARKET STRATEGY

Being a monopsony, choosing the right market model for a technology, good, or service is a tremendous opportunity for the DOD to create public wealth and affect general security factors. Such decisions need to be based upon the nature of the technology and its current, anticipated, and possible applications as well as demand both within and outside its anticipated applicability. The purpose for pointing out the following market strategies is to highlight the fact that organic acquisition for IT can coexist in a competitive marketplace with industry and therefore ought to be pursued. While these are rough concepts, they can serve as a starting point for brainstorming more fully-realized, practical frameworks.

Certain market models can ensure government does not compete with private industry when a military solution has commercial relevance. This is a concern because of the inevitability that organic acquisition produces goods or services that can arguably be provided by industry or that compete with commercial interests. The GPS model is an interesting scenario. For GPS, the service is provided to not just the nation but the world, for free, as a public good. The nature of the system drives this solution. A hypothetical subscription mechanism for the service that calculated or charged for GPS usage is technically and administratively inefficient making its provision from a non-profit without overhead a truly value-creating enterprise despite not being profitable. If GPS were built by the DOD organically vice its current commission method, this construct wouldn't change. Hypothetically, if industry were already providing a GPS-like service and the DOD wanted to build its own, then the DOD could unfairly drive that business into bankruptcy. Similarly, if industry wanted to move into the space of already functional GPS services and provide a profit-based service, would then the DOD need to pay for that service?

The question is obviously no, but the preposterousness of it challenges the 1955 edict that “DOD buy if it can be bought.” If organic acquisition of IT developed such a ubiquitously applicable solution, a GPS market model could be followed. Another model to preserve a functioning market when government and private entities are in play is franchising.

Franchising involving the government is where the government awards the right to deliver a public service to a private contractor, who then is paid by consumers rather than by the government. Franchising is commonly used for services such as water, electricity, gas, telephone, and cable television.¹³⁸ Adapting this model for acquisitions, a government program office could have the right to provide a military good that is then paid by operational users rather than as part of a budget. Transportation Working Capital Funds and many test centers essentially function per this model. A third model are technology pools where Government-owned intellectual property goes into a technology pool allowing licensed individuals and companies to access and thereby apply the intellectual property for society’s benefit...and profit.¹³⁹

The most common model is for the government to form a partnership with private entities to provide a public good, sometimes known as public-private cooperation (PPC). “PPC is intended to further policy objectives, enhance U.S. operational capabilities, reduce costs, gain access to nonmilitary expertise or assets, or build greater capacity in partners.”¹⁴⁰ PPC characterizes the majority of DOD acquisition.

An offshoot of PPC is the public-private partnership used in DOD sustainment business areas.¹⁴¹ This allows those services and assets otherwise exclusive to government, such as depot level maintenance, to be monetized by industry. Public-private partnerships (PPPs) allow utilization of commercially-relevant but government-owned capital resources under the auspices of industry, so that profit can be generated from government assets. There is an inherent

endorsement of a private company in these models, though steps can be pursued to make such endorsements more fair and competitive.¹⁴² Another potential variant of this model under the current paradigm would be to have DOD personnel literally work for a contractor who is on a cost-plus contract because, in theory, it would defray that portion of the government's cost and allow tremendous insight into contractor activity in the process. PPCs and PPPs are vital mechanisms for the DOD, especially where organic capacity is lacking.

If competition is the goal, perhaps other options exist as well. How are program managers empowered to come up with creative market strategies and acquisition strategies in today's prescriptive DAS?

Anytime new commercial products and services are created from government R&D, whether taking Tang mainstream, utilizing GPS, or unleashing the Internet, the intellectual property development facilitated by the government provides a tremendous societal good that the government is uniquely positioned to introduce into the marketplace. Each of these possible market models can create an environment where competitive forces can be harnessed to drive efficiencies within that market and society as a whole, even if it is driven by a monopsony. The reality is that a preponderance of IT materiel developed by organic acquisition personnel will have application desired only within a military context and therefore default to the monopoly and monopsony relationship that characterizes most of the DOD and industry interaction. Therefore, adopting market strategies in addition to acquisition strategies that facilitate competition are opportunities not yet explored. Organic acquisition provides the DOD vital options in forming a market strategy conducive to its interests.

INDUSTRY DELIVERS BETTER THAN GOVERNMENT... OR DOES IT?

The main argument against DOD insourcing is that private industry, "the fruit of entrepreneurial efforts and capitalism, leads to greater operational efficiency and lower consumer

prices.”¹⁴³ In support of this argument, evidence of government’s failures and free enterprise’s success abound resulting in a “Bureaucratic Rule of Two: Removal of an activity from the private sector to the public sector will double its unit costs of production.”¹⁴⁴ The “Rule of Two” is a testable hypothesis validated in *Better Government at Half the Price*, which highlights numerous examples where free enterprise is better than government in providing services.¹⁴⁵ Outsourcing advocates claim that the “Rule of Two” is applicable for any services that can be provided by a listing “in the yellow pages.”¹⁴⁶ If it is in the Yellow Pages then government should source that service from the private sector.

However, warfighting is not in the Yellow Pages. The shift to the private sector due to the “Rule of Two” ignores the fundamental question of whether we want mercenaries to fight wars or citizen soldiers. Cost and efficiency aren’t the only factors in determining how we fight and what that says about us as a nation. The arguments of this paper assume that warfighting is a government function. If this assumption changes, so too would the arguments of this paper. The assertion of this paper is that acquisition of IT, and more specifically its creation and adaptation, is warfighting and therefore needs to be accomplished by the government.

THE WRONG TYPE OF JOBS

Another argument for why the DOD needs to outsource its services is that insourcing is stealing “productive” private sector jobs and creating more government jobs that are a “drain on society.” This is a politicized and misplaced argument. The dislocation of business activity from the private marketplace occurs when taxation or currency debasement happens, not when government spends the money.¹⁴⁷ When the government does spend the money on either DOD employees or contractors, the private economy recoups the same amount regardless. These arguments, therefore, link to the authority exercised by Congress for taxation and to regulate its currency, not how the Congress spends the money—a discussion outside the scope of this paper.

A taxpayer's concern is with how to most cost-effectively receive the service those tax dollars should render, regardless of whether the government outsources or insources.

TOO MANY JOBS—GOVERNMENT INEFFICIENCY

Another major risk with organic acquisition is that it becomes a jobs program devoid of relevant feedback mechanisms such as cost, capability, and other measures of effectiveness and performance. This risk exists in industry as well and is similarly addressed by effective management and leadership. Industry benefits from having profit function as an independent metric to gauge behavior as well as having a pluralistic marketplace allowing creative destruction. Such benefits can exist in government if an effective market strategy is employed. A monopoly can be “too big to fail,” and failure needs to be allowed in government acquisition. Decentralization is necessary because “too big to fail” is “too big to exist” and decentralization facilitates failure at more manageable levels. An effective market strategy should address this risk.

Multiple techniques utilize feedback to address the risk of ineffective management and leadership in both government and industry. Effective incentives at the individual and institutional level must exist so the “right” decisions are made. External checks, such as independent audits, can be utilized to ensure internal management metrics align with desired ends. Unfortunately, the DOD's highly centralized human resources policies hamstring its abilities to incentivize government behavior as flexibly as in industry. The ultimate test of these feedback mechanisms will be in the greatest of contests, where existential questions get asked.

STAGNATION

Stagnation is a risk to organic in-house acquisition of IT from a technical security and functionality standpoint. Unless continually challenged by a diverse set of users, technology won't evolve to keep up with requirements. One approach is to fully leverage available

technologies that benefit from the open source dynamic and operationalizing those technologies iteratively to meet DOD needs as is codified in DOD 5000.01.¹⁴⁸ Additionally, the teaming fostered by organic acquisition enables iterative improvements from penetration tests, experiments, or actual operations to rapidly evolve systems, thus preventing stagnation.

Stagnation also has a management element. Stagnation typically arises in monopolies, such as those of major industrial labor unions, where the need to protect and provide jobs inhibits job-eliminating innovations despite market feedback indicating the need for change. Despite the DOD not having a formal union, human resource practices and culture incentivize “rice bowl” resource hoarding which drives similar stagnation. Finding human resource constructs that address this labor-management dichotomy is a challenge in both realms.¹⁴⁹ Institutions facilitate innovation when they provide the incentives and security for continuous improvement and continual innovation, especially when people lose jobs because of a good idea. To disparage government employees because they work for a non-profit organization that can’t go out of business or because they face phenomena inhibiting their full potential dismisses the same existence of the same phenomenon in the private sector. Focusing on the phenomena of policies and environment that breed stagnation will allow institutions in both realms to add greater value.¹⁵⁰ Despite the United States military being “the most competitive bureaucracy in the world,” it faces the same cognitive biases as individuals, but at an institutional level.¹⁵¹ Typical ways to address these failures in judgment that feed into the policies and environment of stagnation, is by effective leadership and management. Independent reviews and maybe, ironically, just maybe, a better paradigm may be the DOD outsourcing its management to overcome the institutional cognitive bias’s that are characteristic of stagnation. Such biases must be dispassionately and brilliantly addressed.

Some can argue that by sourcing in-house, the DOD will lose the diverse and experienced perspectives industry brings to the solution set, particularly those of small business. In the proposed organic acquisition approach, these outside perspectives can and should still be accessed by either direct DOD hire or utilizing contract support under the same construct that DOD personnel use to obtain direct contract support within DOD units, rather than a commission-based model. The change advocated in this paper is for a rigorous make-buy decision and an IT acquisition approach where the DOD pulls in expertise from universities, labs, and industry utilizing an inclusive decision process executed wholly by the government to drive design and risk reduction activities as necessary. This is similar to how Brigadier General Bernard Schriever actively led the development of intercontinental ballistic missiles.¹⁵² Under his leadership, the Air Force built the team, made the design decisions, owned the data, and bore all the risk. The contracted support from TRW and universities were hired as technical support to an Air Force development much as many support contractors are hired today. This approach is different than the DOD commissioning a system's development and managing the process per the DAS with personnel who all too often have never done the type of work they are being tasked to manage.¹⁵³

GETTING AND RETAINING TECHNICALLY COMPETENT PERSONNEL

The DOD may not have the expertise or means to build its IT now, but it can certainly grow it. The DOD gets some of the most talented individuals in the United States into its ranks with strong recruitment incentives and a service-oriented culture. It has the means and expertise to build its own non-capital-intensive systems, but it must employ personnel in a different way. Seven enlisted software programmers at Gunter AFB, AL, were interviewed for this paper and asked when they last coded software for work. To an Airman, they all said "never" and four of them said they coded as a hobby. Their job was to assess the coding of software built by others.

Similarly, developmental engineers and program managers can become frustrated with managing the engineering and managing the managing of industry, unable to perform their specialties themselves. In the absence of rewarding challenges, some of these highly talented program managers, engineers, and technicians have separated from the service in pursuit of other opportunities.

Maintaining critical skills is a challenge in any organization. The prevailing understanding of this challenge is that top tier DOD personnel will leave the institution because more lucrative and rewarding opportunities exist elsewhere, as historical trends attest.¹⁵⁴ While retention rates for government personnel are at all-time highs, in an improved economy such will not be the case. When such a time comes, the centralized human resource policies of the DOD exacerbate this challenge particularly because these policies aren't optimized in any way for the acquisition profession.¹⁵⁵ Chief among the issues with the current human resource system for the DOD is the transient nature of military DOD professionals, which leads to inexperience, short-term prioritizations, loss of continuity, and thus ineptitude.¹⁵⁶ The fact that the system for military members is closed severely hinders the senior military acquisition professionals from having the "relevant industry experience" so often encouraged by industry.¹⁵⁷ Additionally, the performance rating systems and assignment selection processes seem to be unable "to couple rewards to performance" resulting in misaligned incentives and behavior.¹⁵⁸ These are systemic critiques that have existed for many years and have not changed; either the DOD can't effectively manage its personnel or there are other considerations, and these isolated issues are managed and accepted as a lesser evil. Regardless, there is and always will be opportunity for improvement.

In response, it can be argued that organic acquisition facilitates the DOD getting and retaining top talent. Young and old Americans want to be part of the most respected profession in America.¹⁵⁹ The unique role that the DOD plays in today's civilization, with its awesome responsibilities and unmatched scale provide opportunities to engage in world-impacting work meaningful to patriotic Americans. Very simply, DOD acquisition personnel work on unique projects for unique purposes unavailable to any other institution, particularly if such work was done in-house. There is tremendous value in this for retention.¹⁶⁰ Organic acquisition makes retaining skilled personnel easier by replacing external demand for those skills with internal demand. If the DOD were to insource its work, particularly for niche requirements, the demand for that work diminishes and thereby decreases its value in the marketplace. The individual who provides services to fill those niche requirements would not have a lucrative contract opportunity if the monopsony was the only entity demanding talent and filling that talent organically rather than through commission. Another factor is that organic acquisition will increase job satisfaction of the competent and capable professionals able to meet the demand for their services, addressing the disillusionment that comes from the multi-order degrees of separation from where the "real" work gets done.

THE PROBLEMS OF DECENTRALIZATION

One of the perennial issues with DOD IT acquisition is interoperability, standardization, and versioning. Competing military services decrease "jointness" and interoperability. A "not invented here" mentality towards a sister service solution could thwart any attempts at standardization, just as such a dynamic can exist between companies. Rapid decentralized innovations can rapidly create configuration management and sustainment nightmares of vast proportions. Interoperability, standardization, and versioning at their core are management problems, requiring management solutions. Teaming and employing effective coordination

mechanisms to resolve these interoperability issues become easier in an organic acquisition construct without the many barriers current acquisition regulations and law impose, such as inhibitions to sharing proprietary technologies between contractors. These are largely necessary barriers for the current paradigm. The point is precisely that a shift in paradigm avoids these barriers to collaboration between independent entities and thus interoperability and standardization. In a decentralized network, or any environment where authority is dispersed, the default management setting is purely democratic where anyone can vote, veto, or not participate. When contractors and sub-contractors are involved it becomes exponentially more difficult to achieve consensus, particularly when a “proprietary standard” is involved or one party can say no or walk away. Even if the will to standardize is there, the means aren’t, because programs have difficulty funding unanticipated engineering changes when, for instance, management reserves are plundered during program reviews.¹⁶¹ Regardless, under organic acquisition, the DOD will need to implement the same rigorous configuration management controls for which it now holds industry accountable where appropriate.

Another danger of a highly decentralized organic acquisition construct may be to exacerbate the tendency for military services to do not what the President needs but what the services desire. How will the formation and activities of program efforts be coordinated to prevent services from acquiring the same sort of capability individually? For example, all the services require a bull dozer and each buys one. They buy them differently and they buy different ones. When the Marines redeploy from Iraq and the Army backfills, the Marine bull dozers can’t be left in place because the Army has neither the training to operate nor means to sustain the Marines’ bull dozers—they bought different, incompatible versions. To address this issue in DAS, the Joint Staff integrates and coordinates these requirements. In an organic

acquisition environment where tech push and bottom-up innovations drive materiel solutions, the services and Joint Staff will need a process to integrate and coordinate these solutions. Another possible solution requires Title 10 changes to follow the United Kingdom's example where a central organization equips and sustains its services rather than the services doing so individually.¹⁶² Having a unified acquisition command would give the "born joint" moniker a whole new meaning. A unified acquisition command, however, may perpetuate a highly centralized solution, when decentralized and empowering acquisition is necessary. Accordingly, any such management construct with a unified acquisition command would need to carefully employ a "centralized control, decentralized execution" master tenet.¹⁶³

MAINTAINING AN INDUSTRIAL BASE

Some can argue that a shift to organic acquisition further undermines the industrial base which provides the critical materiel for warfighting. Loss of the industrial base is often cited as a reason for maintaining certain business engagements across the defense acquisition enterprise.¹⁶⁴ The circumstance that the DOD acquisition community (including defense contractors) finds itself in is that when security concerns are sufficient, high technology is not made commercially available. Thus cost increases as only one customer pays for the overhead and carrying cost of the entire industry. The acquisition community forms joint and coalition programs to address this circumstance. Similarly, diminishing manufacturing sources due to obsolescence, for instance, drives highly inefficient acquisition decisions when no alternative exists for the DOD to secure its supply of warfighting materiel. For IT, where the technical leadership largely exists external to the DOD, such a risk is minimal because commercial demand for the capability sustains the industrial base to provide it. When and where the risk of diminishing manufacturer sources or the need to preserve an industrial base does materialize, an organic acquisition construct would allow industrial capacity to transfer to the DOD rather than paying the additional

administrative overhead and profit to a private supplier. At the opposite extreme, the government cannot form a monopoly of IT development because private industry technology development and demand is so robust, far overshadowing that of the government. Therefore the government won't be a barrier to entry such as it arguably was within the space launch industry.

Another factor to consider is that intellectual property doesn't degrade or decay over time. The automated systems are literally the intellectual property, which is easily replicable. What does atrophy and diminish are the brilliant minds and motivations of the engineers who design such valuable innovations. By having DOD personnel within its own organization providing that industrial capacity, the DOD will more directly be able to influence the retention of critical personnel.

While this paper only discusses a few of the risks, challenges, and opportunities in the DOD acquiring its IT organically, others will undoubtedly manifest. Highlighting the major concerns helps to balance the argument and foster a more well-informed approach. The anticipated risks, challenges, and opportunities that come with organic acquisition are addressable. Organic acquisition puts the DOD more directly in a position to address them than through intermediaries. At a minimum, implementation of organic acquisition for IT is a tremendous opportunity for the DOD warranting consideration in its acquisition strategy decisions, resourcing to enable viable consideration, and assessment of its utility relative to other alternatives.

IMPLEMENTATION

What is great in theory can be meaningless without a relevant application. How you do things can often be as vital to success as what you do. There are many different ways which the intellectual justifications and theories proposed in preceding sections could be implemented,

tested, and validated. Some ideas are sprinkled throughout this paper and speak to the complexity inherent in any paradigm shift. Others are implied, but still worth specifying for clarity. While there are an infinite number of ways to increase the organic acquisition capability within the DOD and ultimately acquire IT in a more decentralized fashion, a few implementation thoughts and proposals are provided below. The challenge lies with the top level managers to implement these concepts in such a way that resonates within their organizations and is not rejected, which would be counterproductive. Similarly, operators and acquisition professionals at all levels will need to take action. Some of the implementation suggestions merely highlight problems that need to be addressed. This is because the idea of organic acquisition will act as a loose coupler to achieve unity of effort amongst the multiplicity of acquisition professionals who will make or let organic acquisition happen. Such is the nature of self-organization within complex systems. This section contains ideas, known problems, and high level concepts for implementation, as ultimately the complexities and nuance of implementation cannot be effectively captured in a prescriptive approach.

CONSIDERATION

The foremost recommendation of this paper is for acquisition professionals and force managers to seriously consider “make” as an option in its operational support, force structure, and acquisition decisions, particularly for IT. Mere awareness of the often unconsidered second- and third-order implications of either making or buying will inherently nudge individuals and thereby change outcomes.¹⁶⁵ With a sufficient level of awareness, DOD personnel, from the lowest-ranked enlisted service member to senior civilian executives, will consider organic acquisition and take appropriate actions at their level.

For example, at the highest levels, the critical decision elements of the make-buy analysis can be instituted within corporate processes. Part of the JCIDS could involve make-buy analysis

where the materiel and personnel elements of DOTMLPF-P are more closely linked, not deliberately decoupled as is currently the case. The school houses for professional military education and particularly within Defense Acquisition University (DAU) can teach how to apply this critical concept. As a general statement DAU “trains the process,” so when the process is updated to include a make-buy decision, DAU can deliver personnel capable of acting on it. At lower levels, effective implementation of “consideration” is where a junior military member in an operational unit has a need or an idea and knows how to take that idea to its ultimate fruition, driving improvement within the organization. That said, the processes, organizational structures, culture, or human resources practices that create barriers to implementing organic acquisition won’t be fixed by banners, platitudes, or dictate from above. Targeted communiqués and incentives to first line supervisors, addressing process failures identified through the vigorous investigation of root causes, empowering employees with top cover, inspiration, and resourcing appropriately, will let “consideration” take root. Such deliberate efforts to drive consideration of making are necessary to evolve from a culture where only a buy-option is pursued. Such consideration of whether to make or buy needs to occur within an environment where those conclusions can manifest, mature, and spread.

CREATE AN ENVIRONMENT OF INNOVATION

Organic acquisition and an environment of innovation are interdependent with one another. Organic acquisition contributes to an environment of innovation by providing a readily accessible means for military members to bring innovations to reality. An environment of innovation reinforces the sense of ownership and empowerment that an organic acquisition paradigm must exhibit to be effective. Too often great ideas of military members are stymied due to a lack of means and mode to implement such ideas. Reducing the administrative overhead from acquiring materiel means and empowering those with the ideas to act on them

increases the likelihood these ideas can become innovations. The challenge remains in creating such an environment in the DOD.

The DOD recognizes the need to create an environment of innovation and is taking action. For instance, the USAF issued strategic communication to help create this environment in “A Vision for the United States Air Force” which states:

By recruiting innovative people and making them Airmen, we capitalize on their inherent creativity to find better and smarter ways to approach and solve our Nation’s security challenges. Now, more than ever, we need bold leaders at every level who encourage innovation, embrace new thinking, and take prudent risks to achieve mission success.

Every Airman should constantly look for smarter ways to do business. The person closest to the problem is often the one with the best solution. Leaders should empower Airmen to think creatively, find new solutions, and make decisions. Airmen at all levels must have the courage to take risks and learn from mistakes as we pursue a stronger Air Force. As we do this, all of our actions will be shaped by our warrior ethos, bounded by our core values, and underwritten by common sense.¹⁶⁶

These Airmen need processes and pathways for their innovations to become part of the institutional DNA of the organization. Bold leadership is necessary to break down those cultural vestiges which are barriers to innovation. Organizational resistance to change can be healthy, preventing essential wisdom from being lost and retaining the methods and solutions to overcome previously experienced problems. But more often than not, this is the same characteristic that inhibits progress and the ability to address new problems and opportunities. Problems change; therefore, organizations must. For example, the fact that most of the advancement in remotely piloted aircraft originated outside of the Air Force is attributed to its organizational resistance.¹⁶⁷

Following Change Management theory, to make organic acquisition for IT work, the mindset and means of the acquisition community must allow innovation in order to evolve. Such

changes should be driven by empirical evidence of organic IT acquisition's utility through prior activities or future test cases rather than the largely analytically derived arguments in this paper or top-down policy directives. The service members who conduct the mission everyday are the best personnel, and arguably the only personnel, in a position to innovate and improve their work. Harnessing their innovativeness directly, or their willingness to accept innovation from elsewhere, then becomes essential to organizational progress. This is also why acquisition needs to be organically decentralized. To prevent stagnation in this decentralized construct, providing them the incentives "to work themselves out of a job" is essential to enabling them to share their paradigm shifting innovations.

Most literature on innovation and most history on invention describe the serendipitous emergence of grand ideas, unique concepts, and novel implementations. Organic acquisition and the innovation of service members then isn't something that we make happen; rather, it is something that we let happen. Such passive activity typically emerges from environments that contain variation, survivability, and selection.¹⁶⁸

Within the DOD, variation can be facilitated by decentralizing and breaking down the barriers to collaboration and teaming. For instance, decentralizing acquisition by placing acquisition professionals into wings, brigades, and strike groups, with processes to access additional external resources, rather than highly centralized product centers would tremendously enhance operator and engineer collaboration and thus variation. The operational unit is essentially the lab, the learning organization, and where the fullness of DOTMLPF-P capability evolves.¹⁶⁹ The functional, geographic, and centralized segregation of acquisition from operations creates a sometimes insurmountable barrier to innovating within that lab. Under such a construct, acquisition professionals could have both a functional and an operational

performance rating, to balance what can sometimes be competing interests.¹⁷⁰ Other means to encourage variation is for leadership to reformat processes, incentives, and organizations for this purpose and to both encourage and recognize innovation through strategic messaging.

Organizations can benefit as much from failure as success. However, the independent evolution of materiel capabilities through decentralized variation needs to be centrally coordinated through some sort of selection process if the ecosystem is to stay manageable and all the benefits associated with standardization are to be realized.

Selection refers to the tough decisions of which solutions live and which ones die. The weak will be culled from the herd and culling is necessary; for instance, maintaining both VHS and Betamax does not make sense.¹⁷¹ Within the DOD, selection typically occurs within a chain of command or within boards formed by various stakeholders and often augmented by staffs. In warfighting, authorities and means are specific and delineated per joint doctrine. As mentioned earlier, making acquisition more organic mitigates the issues of authority being dispersed and decoupled from acquisition means. The DOD's ability to make decisions and execute is particularly laudable considering its sheer size and responsibility.

That said, one unique concept for selection that differs from the familiar chain of command and that is worthy of consideration in acquisition is to harness the "wisdom of crowds." To be clear, the suggestion is that leadership creates and utilizes decision mechanisms that harness the selection characteristics of "wise crowds," not the actual "crowds." Wise crowds contain "diversity of opinion (each person should have some private information, even if it is just an eccentric interpretation of the known facts), independence (people's opinions are not determined [or influenced] by the opinions or power of those around them [anonymity, or an overwhelming group bias for example]), decentralization (people are able to specialize and draw

on local knowledge), and aggregation (some mechanism exists for turning private judgments into a collective decision).”¹⁷² Mathematically, a large group of diverse and independent people making a decision and averaging the results corrects for the errors in each of the individual decisions because those errors are canceled along a Gaussian curve. When the error in one person’s decision is canceled by the tendency for a crowd’s errors to evenly distribute, only the information from the decision is left.¹⁷³ Many of these characteristics exist within typical DOD selection constructs such as boards, staffs, and the chain of command. Many times this is not the case. Decentralized organic acquisition of IT would inherently harness this powerful dynamic to a greater degree than currently experienced because it would collectively occur between more independent entities.

In typical DOD selection constructs, leadership doesn’t need to make the decision per se, but does need to ensure that a decision is made and establish the framework and environment by which decisions are made. Leadership ought to pick and choose objectives and pursue value-added efforts.¹⁷⁴ Leadership ought to pick and choose objectives and pursue value-added efforts. Leadership should avoid picking solutions as doing so exhibits bias and creates problems. Leadership ought to create a framework of rules that reflect and are consistent with reality as well as ones that are equal and fair in competition. Leadership can provide a mechanism to share best practices by choice, letting or, if necessary, making the marketplace of military units adopt solutions that improve their organizations. Most importantly, leadership is well-positioned to ensure feedback loops exist and are used for continuous organizational learning.

The make-buy decision, budget allocations, source selections, deciding which problems to solve, configuration management, and other decisions could all be made using mechanisms that exhibit the selection characteristics of wise crowds.¹⁷⁵ Efficient markets harness the wisdom

of crowds. These markets can be created when we move beyond the acquisition strategy to a market strategy to facilitate those characteristics which are indicative of effective selection. The make-buy decision and having organic means to build our solutions will require dispassionate and just selection whether by crowd, committee, or chain of command.

In tension with the concept of selection is the concept of survivability. Survivability is the idea that an entity can fail in a small manner, but still survive to produce in the future. Survivability doesn't mean wrapping institutions or people in bubble-wrap; failure is essential to an environment of innovation. Survivability means that while some are culled from a herd in selection, doing so causes the herd to thrive. Too much survivability or too much selection prevents the full potential from being realized. Repeated failure without variation, as has been so eloquently said, is "insanity."¹⁷⁶ Fundamentally, there is a balance between risk and reward that individuals and organizations weigh when deciding to act on an innovative idea. By carefully considering the environment and tone set within an organization and community, leadership can create an environment where members take chances and espouse new ideas that endanger the status quo.

Balancing the competing forces of survivability and selection is a value-judgment that leadership needs to ensure is made. Favoring one aspect too much disrupts the equilibrium with deleterious effect on the whole. Because innovation requires proactive behavior, leadership ought to limit risks and maximize potential rewards to stimulate innovation and increase survivability.¹⁷⁷ When tough choices must be made, when profound risks must be taken, such endeavors ought to insulate decision-makers from catastrophic consequences as long as they act in good faith. People need to feel secure in order to take these sorts of risks, particularly leaders taking risk on behalf of those under their care. Of course, not taking any risks or not striving for

value in an environment created to deliver innovation should be the ultimate threat to one's survivability. What corner of the DOD is not chartered to improve? Which employee does not have a responsibility to innovate or increase productivity? By creating an environment of innovation, the essential elements for organic acquisition can take root and mature.

MAKING WITHOUT MEANS

A fair and rigorous make-buy decision analysis will consider the means by which to do so. The DOD can estimate costs to make and adjust those estimates as knowledge is gained through experience. Regardless, let us assume that DOD personnel have the expertise, training, and education to build its own IT systems. With this assumption, the DOD can issue guidance, encouragement, and resourcing for organic acquisition nonetheless. Services can build upon nascent organic acquisition efforts, expanding that culture of innovation and responsibility in a sustainable way, much like Southwest Airlines governed its growth for so many years by the rate at which its culture expanded.¹⁷⁸ Force managers can collaborate with finance and acquisition professionals to reallocate resources to give services the means to fulfill their responsibility by organic acquisition. Rather than spend money commissioning contractors to build materiel solutions, the services can hire proficient personnel directly, educate and train DOD personnel for building systems, and contract support to augment its organic capacity to acquire its systems and thereby take control of its destiny. Ultimately, changing the current acquisition model from a culture of consumption to one of production will require bold leadership and acceptance of the risk concerning the competence of DOD personnel since accountability in organic acquisition is much higher. While failure is inevitable, it is also a necessary component to get to success. That is why starting small, in a survivable way, is recommended.

TAKE CONTROL

Authority exists within the current framework of the greater DAS to begin organically acquiring the DOD's IT, if the given statutory and regulatory requirements are interpreted and applied within this paradigm. Indeed, this paper provides many examples. If those charged with equipping our nation's military were to take a clean slate approach to design a new DAS utilizing first principles of business and economic theory in the context of the statutory and regulatory requirements for acquisition and the nature of the technologies, then it would include a make-buy decision. Applying a perspective unfettered by custom, prescription, or layers of bureaucracy, would encourage acquisition professionals to consider making the materiel to meet warfighter demand. Organic acquisition of IT can be validated in low technical risk environments where the nature of the acquisition is in line with both push and pull dynamics. Once the concept for making is validated, then it can be replicated or scaled as long as central assumptions still hold true, means are available, and costs and risks are acceptable. One idea is to expand from the innovations emerging from various DOD labs taking the proof of concept to its next logical conclusion. Instead of throwing a technology over the fence to the next step in the process (or product center or a third party vendor), encourage a segment of the development team to continue with the acquisition effort in the next phase locally. Already, the Responsive Cyber Division Cyber Solutions Cell Concept of Operations is implementing organic acquisition within the Real-Time Operations Innovations construct for government-off-the-shelf materiel as an operational necessity.¹⁷⁹ Institutionally embracing organic acquisition in IT bolsters this operating concept.

Centrally managed project teams can be tasked to support headquarters or unit level acquisition efforts following the types of relationships (OPCON, TACON, etc.) provided in joint doctrine. Because assigning developmental resources to each unit would likely result in under-

and mis-utilization (much as the historical record for decentralized control of airpower attests), literally and figuratively deploying these resources on an as-needed basis in response to emergent needs would bring both effectiveness and efficiency.¹⁸⁰ Rather than decentralizing funding to units for wing, brigade, or strike group level development and implementation efforts, centrally managed acquisition teams of people can be tasked for decentralized acquisition efforts. Whereas funding has no voice for whether it is being misused or wasted, personnel can communicate and often will when their talents are being underutilized.

As discussed earlier, highly decentralized development efforts amongst competing organizations requires a mechanism for selection. The leadership within the Joint Staff and the services must ensure this function exists. They can ensure acquisition professionals coordinate their efforts at the appropriate level (while ensuring the independence necessary for variability) to identify efficiencies and capitalize on innovation opportunities. Configuration management boards are powerful mechanisms to drive standardization and render selection. When standardization is the issue, often what decision is made doesn't matter as much as the fact that a decision is made because any standard would be better than no standard.¹⁸¹

Industry has been and will continue to be an essential partner in IT acquisition, particularly when technical leadership exists in industry. Preserving those partnerships with industry then becomes of preeminent importance as acquisition work shifts to become more organic. Organic acquisition needs to be implemented in such a way as to avoid systemic "poaching" of industry expertise by the DOD as IT system development is insourced. Additionally, the DOD will need to honor its current commitments, while altering future business opportunities, much like how a downsizing organization scales back new hires. The

same phenomenon of creating a bulge or shortfall in workforce demographics can occur in industrial capacity if policy shifts in insourcing and outsourcing are too disproportionate.

Another element that must be addressed to enable organic acquisition is the DOD's human resource practices. The DOD's human resource practices are highly centralized to the point that the DOD tends to make process and force structure decisions assuming human resource factors are an immovable constraint. This reality, whether intended or not, nudges process and manning decisions to perpetuate the current paradigm rather than making those decisions based on the mission or the taxpayer. For instance, eliminating the common practice of senior military program managers moving after one to two years for career progression is consistently highlighted as a factor that would increase program execution success.¹⁸² In the opposite scenario, personnel with profound technical or subject matter expertise become a victim of their own success and can get pigeonholed into jobs with minimal career advancement opportunities causing them to seek opportunities elsewhere like in industry doing the same job but at a higher salary.¹⁸³ The fact that junior enlisted Army personnel with no college fly RPAs in combat just as field grade Air Force officers with multiple master degrees, years of flight experience, and flight pay could be seen to indicate a disconnect between the value of work performed and compensation.¹⁸⁴ These human resource issues are difficult to address in a highly centralized and largely static human resources model, heavily influenced by tradition.

The DOD's human resource tools and processes for low level managers are insufficient for effectively managing and executing decentralized acquisition by organic acquisition personnel. Hiring, firing, and rewarding personnel are accomplished in such a centralized manner, with such demanding administrative requirements, as to be unresponsive to the rapid acquisition or real-time operations innovation needs. Because lead times in cyberspace need to

be significantly shorter to stay competitive, commanders need corresponding means to adjust personnel resourcing.

IT operates under a knowledge economy.¹⁸⁵ A knowledge economy relies on knowledge as the means of production and creates value by productivity and innovation through its application to work rather than the primary resource being capital, land, or labor.¹⁸⁶

Accordingly, the DOD will rely on and thus value its engineers and technicians relatively more so than it currently values its managers. This has profound implications for the current human resource policies currently in place within DOD's hierarchy as the knowledge workers in acquisitions with their close tie to continuous operations will drive human resource policies that retain those vital contributors. Flexible retention options are needed. This paper won't propose specific human resources changes other than to say that human resource considerations need to be addressed when transitioning to organic acquisition.

BUILD THE FUTURE

Organic acquisition for information technology within the DOD lays the foundation for coming technological revolutions in military affairs (RMA).¹⁸⁷ One anticipated RMA will be the full and terrible realization of information technology to its extreme, when machines fight wars on our behalf.¹⁸⁸ IT directly feeds into semi-autonomous and autonomous systems and robotics. Ability to rapidly adopt and adapt the IT which composes higher level robotic systems provides the DOD means to achieve and maintain competitive advantage in that space. If the future of war is robots, then controlling and owning the means to create and adapt robots necessitates a solid foundation in IT.

Decentralized IT acquisition capacity lays a foundation for other technological revolutions as well. For example, 3D printing is IT based. 3D printing will shift manufacturing away from highly centralized, capital-intensive constructs to more decentralized, less capital-

intensive means, particularly for replacement parts in sustainment activities. This dispersal of production capability weakens the rationale for utilizing highly-centralized, capital-intensive means, heretofore provided by private industry. Additionally, because the intellectual property for design becomes a more prominent cost factor when an object can be built from a 3D printing platform, the value of owning that IP and the means to generate further defense-related IP, due to being developed organically, becomes infinitely more economical.

Creating organic acquisition for the DOD's IT provides a springboard with which to build and thus control the future of warfare in robotics, 3D printing, and other areas. By concentrating resources on this vital nexus in IT, the DOD can push management and technical revolutions that can drive the operational concepts to assure victory in future conflict and build the future it wants to see. No matter how prominently the role of IT is in in future conflict, the inescapable reality is conflict will still (always) have an essential human element. Not only is there tremendous promise in future expressions of human-machine symbiosis, but such integrations will become the only means to stay competitive. Operator engineers help translate the gap between technology and application, between idea and innovation, and between the machines of war and how they are used in war.

OPERATOR ENGINEERS—AN IDEALIZED CONCEPT

The pinnacle of effectiveness and efficiency in acquisition is idealized in the operator engineer concept. Organic acquisition is a necessary step to realize this concept. In the current paradigm, operators employ systems to achieve commanders' intent while engineers build the systems that operators employ. The basis for this concept comes from the historical success of aligned doctrine and operational concepts enabled by technology. General Hugh Shelton, former Chairman of the Joint Chiefs of Staff, highlights this concept referencing the Germans in World War II when they entered France with fewer men and inferior technology to that of the allies:

“But, they had revolutionary operational concepts for employing their systems to achieve battlefield effects far greater than the sum of the parts. ...and the allies learned the hard lesson that how you employ technology is even more important than the technology itself.”¹⁸⁹

Germany’s Heinz Guderian was a brilliant military tactician who not only shaped the technological development of Germany’s WWII tanks, but also the operational concept of Blitzkrieg in his *Achtung—Panzer!*¹⁹⁰ Military technology comes from users applying technology to achieve desired effects and from developer solutions to communicated or anticipated problems and capability needs. In either of these modes, applied technology (capability) comes from the careful iteration and combination of engineer and operator perspectives via collaboration and in teams. The operator engineer concept helps ensure that doctrine and technology evolve in tandem because without doctrine, technology can become a weakness and vice versa. The lead time on technology tends to be longer, but cognitive biases can have their own lead time to overcome.

The paradigm where operators and engineers are two different people in two different locations who may never talk with one another will change in the cyber domain and in the future. Whereas a pilot wouldn’t redesign his aircraft on the fly, such could be the norm in cyberspace. Whereas a tank commander couldn’t contact the engineer to find out what is wrong with a component beyond rudimentary training, such will change in the highly connected realm of cyberspace. As automation made possible by IT increasingly characterizes future warfare, the ability to adapt that logic to express operational art becomes essential. As near-instantaneous communication allows collaboration in new ways, the ability to rapidly form effective teams and improve those mechanisms of collaboration will make the difference between success and failure. As a fully ubiquitous and networked world allows access to the sum of all knowledge,

the ability to use IT to sift through large sums of data and to ask the right questions may become more important than knowing. Just as the OODA loop is becoming an OODA point, so too will the operator and engineer perspectives merge. In such an environment, the teams that necessarily formed to deliver capabilities coalesce, blurring functional roles. Eventually, the hacker becomes the weapon system to achieve decision dominance, able to manipulate automated systems for attack, exploitation, and defense in pursuit of our nation's objectives. Accordingly, hackers need to be recruited, educated, trained, retained, promoted, resourced, et cetera in an environment where their full potential can be realized.

ACQUISITION POLICY

This paper makes many observations concerning “acquisitions” that can be acted upon. Firstly, the DOD could make a concerted effort to create and execute market strategies, not just acquisition strategies. Having an organic means for production provides a critical option that will positively influence the efficiency in these markets as it gives the DOD the ability to walk away from a negotiation.¹⁹¹ Secondly, the nature of the technology (and its potential mission) should affect the acquisition strategy. For instance, space system hardware can't be cost effectively upgraded while in orbit, while software versioning can be continuous, driving each to follow a distinct acquisition process. Robotics and IEDs on the battlefield in Iraq rapidly evolved almost completely outside of the acquisitions framework with tremendous collaboration directly between warfighter and industry (operator and engineer) to great success.¹⁹² The Responsive Cyber Division Cyber Solutions Cell Concept of Operations masterfully lays out acquisitions approaches based on the nature of the technology in Real Time Operations Innovations, Rapid Acquisition, and Foundational Acquisition, and is constructed under the traditional paradigm.¹⁹³ Accordingly, “the acquisitions process” needs to be taught and perceived as a buffet of choices where acquisition professionals choose the strategies they

implement based on the nature of the technology and first principles of business. Thirdly, traditional acquisition follows a mostly capabilities-based, linear requirements process that lacks effective requirements feedback or trade space mechanisms to make most efficient use of available acquisition means. The DOD could implement policy mechanisms and processes that allow acquisition professionals to more rapidly reconcile what is required and what is feasible. Adjusting JCIDS and budgeting processes to enable tech push and warfighter pull dynamics would improve acquisition outcomes. Next, decentralizing acquisitions via organic capacity will allow both tech push and warfighter pull dynamics to drive capability development and delivery.

CONCLUSION

Organic acquisition is a solution to the many problems that plague the acquisition enterprise. It is a solution set that transcends the structural inefficiencies of the DAS processes and practices. This process starts with acquisition professionals and force managers conducting a make-buy decision. Organically acquiring IT provides an executable field in which to experiment, learn, and adapt, laying a foundation for further organizational potential to be realized.

A paradigm shift is necessary. Rather than defaulting to a commissioned or contracted solution for a materiel need, the DOD ought to conduct a make-buy analysis for its IT. When constructing an acquisition strategy and making force structure decisions, market strategy and decentralized organic means ought to be considered. If technical expertise is needed from outside sources, get it in such a way that retains responsibility and ownership within the DOD. As former Secretary of Defense Donald Rumsfeld said, “You go to war with the Army you have. They're not the Army you might want or wish to have at a later time.”¹⁹⁴ In a rapidly changing and complex future operating environment, that “army” will need to be able to rapidly

manipulate and understand technology to achieve superiority. This ability to adapt must be faster than that of the adversary, especially when much of this technology will be publicly available, given commercial leadership in technology. OIF is the latest demonstration of the United States inaccurately preparing for the nature of future conflict. Despite the rhetoric, the DAS is largely focused on certain solution sets or programs to the detriment of other “less important” needs. Why else was Rumsfeld’s DOD pursuing Future Combat Systems when simple armor for HMMWVs was what was needed? Perhaps the solution to better prepare for future conflict is to build up organic infrastructure capable of rapid development and integration of materiel solutions. Decentralized but coordinated acquisition that is unified by objective facilitates this adaptability. While an organic acquisition construct may not work for acquiring major weapon systems due to lead time and capital requirements, in a world with instantaneous cyber-attacks and zero-day exploits, operational adaptability is the prime imperative necessitating organic cyber acquisition capacity. The coming contested environment belongs to those who own the means of production.

Notes

(Some notes appear in shortened form. For full details, see the appropriate entry in the bibliography.)

¹Department of Defense Strategy for Operating in Cyberspace, July 2011, 5.

²Fine, Charles H. & Whitney, Daniel E. "IS THE MAKE-BUY DECISION PROCESS A CORE COMPETENCE?" MIT Center for Technology, Policy, and Industrial Development, February 1996, 2.

³Ibid.

Prahalad, C.K. and Hamel, G. "The core competence of the corporation," Harvard Business Review (v. 68, no. 3), 1990, 79–91.

A core competency fulfills 3 criteria 1.It is not easy for competitors to imitate. 2.It can be re-used widely for many products and markets. 3.It must contribute to the end consumer's experienced benefits

⁴Fox, *Defense Acquisition Reform*, 5

Software Engineering Institute of Carnegie Mellon available at

http://www.sei.cmu.edu/productlines/frame_report/MBMC.htm (Accessed 30 March 2013). "For other organizations, all the assets are commissioned because of organizational policy or because of unique requirements and a lack of in-house development resources. (In the U.S., most government organizations, such as the DoD, fit into this category.)"

⁵Allen, Ryan P. "The 600-pound Gorilla: Why We Need a Smaller Defense Department" National Defense University JFQ-68 issue 68, 1st quarter 2013 available at <http://www.ndu.edu/press/smaller-defense-department.html> accessed 31 March 2013.

⁶A Colonel (to remain anonymous) once related this sentiment to the author to explain the reasoning behind some of the acquisition processes at the Electronic Systems Center.

⁷The DAS process identifies capability requirements, analyzes alternatives, designs an acquisition strategy, prepares a contract statement of work, and then issues requests for proposals (RFPs) for contractors to bid against. This process does not include a make-buy decision.

Leonard Sullivan, "Characterizing the Acquisition Process," Defense Acquisition Study, Center for Strategic and International Studies, Georgetown University, Jan 1986, E–6.

⁸Chairman of the Joint Chiefs of Staff Instruction 3170. Joint Capabilities Integration and Development System. 17 Mar 2011., 11 Enclosure A section E Line 3 available at https://dap.dau.mil/policy/Documents/2012/3170_01.pdf (Accessed 7 Dec 2012)

⁹Chairman of the Joint Chiefs of Staff. Joint Capabilities Integration and Development System Manual. 19 Jan 2012., B-15, Enclosure B available at

<https://dap.dau.mil/policy/Documents/2012/JCIDS%20Manual%2019%20Jan%202012.pdf>. Accessed 7 Dec 2012

¹⁰Software Engineering Institute of Carnegie Mellon available at

http://www.sei.cmu.edu/productlines/frame_report/MBMC.htm (Accessed 7 Dec 2012) Adapted from "In "A Note on Terminology", we pointed out that software enters an organization in one of three ways: it can be built in-house, purchased from a commercial vendor—either whole (as in a commercial off-the-shelf [COTS] component) or as licensed rights to use the software (as in open source software or a Web-based service), commissioned through a third party to be built especially for the organization. Software that is built in-house can actually be constructed anew or mined from software already in the organization for use in a new effort. Every piece of software that is part of a development effort arrived as the result of an all-encompassing four-way choice that we call "make/buy/mine/commission."

¹¹Klein, Peter G., "The Make-or-Buy Decision: Lessons from Empirical Studies", 435. Available at

<http://web.missouri.edu/~kleinp/papers/KI140-17-433-464--KLEIN-x.pdf>

"vertical coordination can be an efficient means of protecting relationship-specific investments or mitigating other potential conflicts under incomplete contracting."

"Vertical relations are often subtle and complex. While early empirical work on transaction cost determinations of vertical integration tended to focus on black-and-white distinctions between 'make' or 'buy,' researchers

increasingly recognize that a wide variety of contractual and organizational options are available; there are many shades of gray. The literature on hybrids has grown dramatically in the last ten years, while there are fewer studies of mundane issues such as outsourcing versus in-house production per se. Third, while we know much about the transaction cost determinants of vertical relations, we know relatively little about the relation between the costs of contracting and organization and the wider legal, political, and social environments.”

¹² Software Engineering Institute of Carnegie Mellon available at http://www.sei.cmu.edu/productlines/frame_report/MBMC.htm (Accessed 7 Dec 2012)

¹³ Prahalad, C.K. and Hamel, G. “The core competence of the corporation,” Harvard Business Review (v. 68, no. 3), 1990, 79–91.

¹⁴ Most cost-based business decisions are based on reasonable risk-based projections that consider the consistency and fluidity of demand, the recurring and non-recurring, direct and indirect, real, perceived, opportunity, and externality costs over the projected life cycle of ability to meet that demand.

¹⁵ Mizell, Grant Maj, USAF “YOUR NEXT AIRPLANE: JUST HIT PRINT” Blue Horizon, Maxwell Air Force Base, Alabama April 2013., 8.

¹⁶ Congressional Record: November 19, 2004 (Senate) Senator John McCain. “Investigation Into Air Force Leasing of Boeing Aerial Refueling Tankers” [[Page S11537]] Available at <http://www.fas.org/sgp/congress/2004/s111904.html> “The Air Force embarked on negotiating with Boeing a lease that would have cost the taxpayers around \$6 billion more than an outright purchase of these aircraft would have.”

¹⁷ High use in this context refers to usage of the product relative to its serviceable life.

¹⁸ “efficiently utilized” in a return-on-capital sense of the word.

¹⁹ Arguably the best example of this is NASA’s shuttle program. With the end of government subsidized monopolies (civil and defense) on space launch, though the verdict is still out, we are seeing the precipitous drop in costs for access to space.

“Space Transportation Costs: Trends in Price Per Pound to Orbit 1990-2000” September 6, 2002 available at http://www.futron.com/upload/wysiwyg/Resources/Whitepapers/Space_Transportation_Costs_Trends_0902.pdf
Pricing from <http://www.spacex.com/falcon9.php>

²⁰ Fine and Whitney, “The Make-Buy Decision,” 2.

²¹ Sanker, Shyam “The Rise of Human-Computer Cooperation” TED video, 12 min. Available at http://www.ted.com/talks/shyam_sankar_the_rise_of_human_computer_cooperation.html (accessed 23 October 2012).

²² Ibid.

²³ FEDEX competitive advantage through IT.
<http://www.icmrindia.org/casestudies/catalogue/Business%20Strategy3/BSTA063.htm>

“A major part of FedEx’s success is directly attributed to its committed use of information technology (IT). IT has not only facilitated its business processes like operations, customer service and employee training but also integrated its information network with that of its clients to provide them with seamless logistic and supply chain solutions. This case study traces the evolution of FedEx’s IT strategy”

<http://www.prenhall.com/divisions/bp/app/alter/student/useful/ch1walmart.html> “The use of information technology has been an essential part of Wal-Mart’s growth”

<http://www.cisco.com/warp/public/779/ibs/vertical/retail/Wal-Mart.PDF>

Yung, Alex “Introducing the Dell Supply Chain Management Institute in China” 21 Feb 2012 Available at <http://en.community.dell.com/dell-blogs/direct2dell/b/direct2dell/archive/2012/02/21/introducing-the-dell-supply-chain-management-institute-in-china.aspx> (Accessed 30 Mar 2013)

“Supply chain management is Dell’s core competency and our entire value chain is built on information technology.”

²⁴ Here a strong case can be made for wing, brigade, strike group, or corporate level plans staff functions having trained acquisitions officers to facilitate tailored acquisition for unit needs, particularly utilizing IT opportunities. Of course, units should collaborate with sister units to share best practices and lessons learned.

²⁵ Nagl, John. Learning to Eat Soup with a Knife: Counterinsurgency Lessons from Malaya and Vietnam, 223.

²⁶ Byrd, Terry Anthony "Information Technology, Core Competencies, and Sustained Competitive Advantage" *Information Resources Management Journal* April-June 2001, 27. "The core competencies enabled by IT are mass customization and time to market. By showing that IT infrastructure flexibility acts as an enabler of these competencies, the relationship to sustained competitive advantage is demonstrated."

²⁷ Applying Sun Tzu's maxim, "know the enemy and know yourself [capability and identity]; in a hundred battles you will never be in peril [survival]" provides a perspective from which the correlation between IT, capability, identity, and survival becomes apparent. For the US military, IT is so vital and integrated into day-to-day and wartime operations, it is Clausewitz's "hub of all power and movement, on which everything depends," a center of gravity.

Carl von Clausewitz. *On War*. Edited and translated by Michael Howard and Peter Paret. New Jersey, Princeton University Press, 1989., 596. Center of Gravity is "the hub of all power and movement, on which everything depends. That is the point against which all our energies should be directed."

²⁸ Geis II, John P. and others, *Blue Horizons II: future capabilities and technologies for the Air Force in 2030*, Occasional paper / Center for Strategy and Technology; no. 65, July 2009. executive summary & 23. Available at <http://csat.au.af.mil> (Accessed 30 March 2017).

²⁹ New York Times Topic: High Frequency Trading. December 4, 2012

http://topics.nytimes.com/topics/reference/timestopics/subjects/h/high_frequency_algorithmic_trading/index.html accessed 7 December 2012.

³⁰ Sun Tzu, *The Art of War*, 77. "what is of supreme importance in war is to attack the enemy's strategy"

³¹ Rittel, *Dilemmas in a General Theory of Planning*, 155

³² Bushell E.J. "The Widespread Consequences of Outsourcing" *Air Power Australia Analysis* 2010-03, 31 December 2010. Available at <http://www.auseairpower.net/APA-2010-03.html>. (Accessed 30 March 2013).

³³ Whitney, D. E., "State of the Art in Japanese CAD Methodologies for Mechanical Products - Industrial Practice and University Research," *Office of Naval Research Asian Office Scientific Information Bulletin*, vol 17 no 1 Jan-Mar 1992, 89-111.

Nagl, John. *Learning to Eat Soup with a Knife: Counterinsurgency Lessons from Malaya and Vietnam*, 223.

³⁴ Software Engineering Institute of Carnegie Mellon available at

http://www.sei.cmu.edu/productlines/frame_report/MBMC.htm

³⁵ Constitution of the United States of America, Preamble, <http://www.law.cornell.edu/constitution/preamble>.

³⁶ Weber, Max "Politics as a Vocation" p.1 (1919). Available at <http://www.sscnet.ucla.edu/polisci/ethos/Weber-vocation.pdf> (Accessed 30 March 2013)

³⁷ Advantages of being a first mover are discussed in:

Lieberman, M. B. and Montgomery, D. B. 1988. "First-Mover Advantages", *Strategic Management Journal*, 9(S1), 41-58. Available at <http://www.anderson.ucla.edu/faculty/marvin.lieberman/publications/FMA1-SMJ1988.pdf> (Accessed 30 March 2013).

³⁸ Global Security.org "TALON Small Mobile Robot" available at

<http://www.globalsecurity.org/military/systems/ground/talon.htm> (accessed 17 March 2012)

"Different weapons can be interchanged on the system - the M16, the 240, 249 or 50-caliber machine guns, or the M202 -A1 with a 6mm rocket launcher. Soldiers operate the SWORDS by remote control, from up to 1,000 meters away. In testing, it's hit bulls eyes from as far as 2,000 meters away. The only margin of error has been in sighting. It can engage while on the move, but it's not as accurate."

³⁹ Defense Science Board "Report of the Defense Science Board Task Force on Patriot System Performance" January 2005 for Office of the Under Secretary of Defense For Acquisition, Technology, and Logistics. Available at <http://www.acq.osd.mil/dsb/reports/ADA435837.pdf> (Accessed 17 March 2013)

⁴⁰ AF LCMC DRAFT "Responsive Cyber Division Cyber Solutions Cell Concept of Operations" February 2013

⁴¹ Col Arlen Bee (US Air Force, 24th AF Judge Advocate General), interview by author, 7 March 2013.

"The Tallinn Manual, is the product of a three-year project by twenty renowned international law scholars and practitioners. It identifies the international law applicable to cyber warfare and sets out 'black-letter rules' governing such conflicts.

The Tallinn Manual addresses civilians and direct participation.

According to the writers of the manual, there are three cumulative criteria for qualification of an act as direct participation that are set forth in the ICRC Interpretive Guidance. First the act (or closely related series of acts) must have the intended or actual effect of negatively affecting the adversary's military operations or capabilities or inflicting death, physical harm, or material destruction on persons or objects protected against direct attack (threshold of harm). There is no requirement for physical damage to objects or harm to individuals. In other words, actions that do not qualify as a cyber attack will satisfy this criterion so long as they negatively affect the enemy military. Second a direct causal link between the act in question and the harm intended or inflicted must exist (causal link). Finally, the acts must be directly related to the hostilities (belligerent nexus)."

⁴² Healey, Jason "The Five Futures of Cyber Conflict and Cooperation" The Atlantic Council of the United States 2011. Available at http://acus.org/files/publication_pdfs/403/121311_ACUS_FiveCyberFutures.pdf (Accessed 30 March 2013)

⁴³ Brodie, Bernard. *Strategy in the Missile Age*. Reprint. Santa Monica, CA: RAND, 1999. Rationale for why US is a status quo power hasn't changed being a hegemonic power post-Cold War. 185, 200.

⁴⁴ Lieberman, M. B. and Montgomery, D. B. 1988. "First-Mover Advantages", *Strategic Management Journal*, 9(S1), 41–58.

Geis II, John P. and others, *Blue Horizons II: future capabilities and technologies for the Air Force in 2030*, Occasional paper / Center for Strategy and Technology; no. 65, July 2009, 27. Available at <http://csat.au.af.mil> (Accessed 30 March 2017).

⁴⁵ Geis II, John P. and others, *Blue Horizons II: future capabilities and technologies for the Air Force in 2030*, Occasional paper / Center for Strategy and Technology; no. 65, July 2009. executive summary & p. 23. Available at <http://csat.au.af.mil> (Accessed 30 March 2017).

⁴⁶ Ibid.

⁴⁷ Ibid.

⁴⁸ Porter, M. 1980. *Competitive Strategy: Techniques for Analyzing Industries and Competitors*. New York, NY: Free Press.

⁴⁹ Lieberman, M. B. and Montgomery, D. B. 1988. "First-Mover Advantages", *Strategic Management Journal*, 9(S1), pp. 41–58.

Antonicic, Bostjan, "Proprietary Technology Development and Firm Growth: Evidence from Turkey" *Middle Eastern Finance and Economics - Issue 11* (2011) p. 70 http://www.eurojournals.com/MEFE_11_06.pdf

⁵⁰ "Quick Look Report on USAF Battlelabs," ed. Department of the Air Force (Air Force Scientific Advisory Board, 2000). P. 11

⁵¹ Harford, Tim. *Adapt: Why Success Always Starts with Failure*. New York: Farrar, Straus and Giroux, 2011.

⁵² The White House, Office of the Press Secretary "Executive Order -- Improving Critical Infrastructure Cybersecurity" 12 February 2013 <http://www.whitehouse.gov/the-press-office/2013/02/12/executive-order-improving-critical-infrastructure-cybersecurity> (Accessed 23 March 2013)

⁵³ According to joint doctrine, the "functions that are common to joint operations at all levels of war fall into six basic groups—C2, intelligence, fires, movement and maneuver, protection, and sustainment." Joint Publication 3-0. Joint Operations 11 August 2011 p.III-1.

Available at http://www.dtic.mil/doctrine/new_pubs/jp3_0.pdf (Accessed 7 December 2012).

⁵⁴ I use the phrase operator engineer rather than operator acquirer despite my parochial proclivities because "to acquire" implies "to buy," while the intention of this paper is to get the DOD to build, which the word engineer uniquely implies.

⁵⁵ Mitnick, Kevin, *Ghost in the Wires: My Adventures as the World's Most Wanted Hacker*, 252. He would find source code from former employees of out-of-business companies to hack into current companies using that software.

⁵⁶ Kirk, Jeremy "Microsoft finds new PCs in China preinstalled with malware" 14 September 2012 available at: http://www.pcworld.com/article/262308/microsoft_finds_new_computers_in_china_preinstalled_with_malware.html

⁵⁷ Defense Business Board, "Report to the SECDEF: Review of DOD's Program Managers," April 2011 available at http://dbb.defense.gov/pdf/FY11-03_Program_Manager_Final_Report.pdf,⁴

⁵⁸ Defense Business Board, "Report to the SECDEF: Review of DOD's Program Managers," April 2011 available at http://dbb.defense.gov/pdf/FY11-03_Program_Manager_Final_Report.pdf, 4

⁵⁹ Casteel, Curtis Capt, USAF AFSOC/CSF/SCPE interview "Digital Dagger_SCPE Engineering_Acq Process.pdf" 4 March 2013

⁶⁰ Sean M. Frisbee, Major, USAF "LEAD WARFIGHTERS AND INNOVATIONS: COLLABORATIVE METHODS OF FILLING CAPABILITY GAPS" AIR COMMAND AND STAFF COLLEGE, AIR UNIVERSITY Maxwell Air Force Base, Alabama April 2003p. 38

⁶¹ Erwin Marquit, School of Physics and Astronomy, University of Minnesota, Minneapolis, Minnesota, Published in vol. 13 of the Encyclopedia of Applied Physics (entry "Technology, Philosophy of"), pp. 417–29. VCH Publishers, Weinheim, Germany, 1995.

Metz, Steven; Kievit, James "STRATEGY AND THE REVOLUTION IN MILITARY AFFAIRS: FROM THEORY TO POLICY" June 27, 1995 Available at <http://www.au.af.mil/au/awc/awcgate/ssi/stratma.pdf>
Technology is insufficient without doctrine and operating concepts for instance.

⁶² Back to make-buy decision analysis: Generally speaking an intermediary brings additional capacity. To access that additional capacity there is additional administrative/contract cost. While there is a direct cost in an organization to access that additional capacity, as a system including the intermediary's process costs, is it more economically effective, efficient, capable, capacity?

⁶³ Guetlein, Michael, "Agile Attributes" presentation 9 Feb 2012.

⁶⁴ Business Executives for National Security Task Force on Defense Acquisition Law and Oversight "Getting to Best: Reforming the Defense Acquisition Enterprise A Business Imperative for Change," 2. Available at www.bens.org/document.doc?id=44 (Accessed 7 December 2012)

⁶⁵ Klein, Peter G., "The Make-or-Buy Decision: Lessons from Empirical Studies", 435. Available at <http://web.missouri.edu/~kleinp/papers/KI140-17-433-464--KLEIN-x.pdf> (Accessed 30 March 2013)

⁶⁶ References to personnel experiences where the ability to deliver capability was impeded or thwarted
XML schema reference is Cursor on Target.

Shulstad, Dr. Raymond A., "Cursor on Target: Inspiring Innovation to Revolutionize Air Force Command and Control" Available at http://www.airpower.au.af.mil/airchronicles/apj/2011/2011-4/2011_4_02_shulstad.pdf
Rerouting architecture referenced taking experimental contractor box out of architecture because it was unable to process certain Tactical Data Link messages inhibiting operational objectives at Joint Expeditionary Force Experiment 2004 Nellis AFB, NV

Voiding warranty maintenance refers to the sustainment plan limitations for Roll on Beyond Line of Sight Enhancement on K-135 aircraft and Joint Air Defense Systems Integrator circa 2003

⁶⁷ Joint Publication 1 (JP1), Doctrine for the Armed Forces of the United States, 02 May 2007, Incorporating Change 1, 20 March 2009. XVI, (italicized verbiage added), III-10

⁶⁸ DODD 5000.02

⁶⁹ Defense Business Board "Report to the SECDEF: Review of DOD's Program Managers" April 2011 available at http://dbb.defense.gov/pdf/FY11-03_Program_Manager_Final_Report.pdf p.3

⁷⁰ DODD 5000.02 Milestone decision authorities are often at political appointed levels.

⁷¹ Defense Business Board "Report to the SECDEF: Review of DOD's Program Managers" April 2011 available at http://dbb.defense.gov/pdf/FY11-03_Program_Manager_Final_Report.pdf p.3

⁷² Bens, "Getting to Best", 2

⁷³ Wardell, Jane "UPDATE 2-Pentagon F-35 program chief lashes Lockheed, Pratt" 27 February 2013. Available at <http://www.reuters.com/article/2013/02/28/lockheed-fighter-australia-idUSL4N0BR9K120130228> (accessed 17 March 2013)

⁷⁴ BENS, "Getting to Best", 2-3

⁷⁵ Fox, *Defense Acquisition Reform*, 32 "One of the most common complaints from defense contractors has been that doing business with the government is difficult, time consuming, and costly, particularly when compared to commercial practices. Indeed, there is no doubt that government procurement practices are complex, time consuming, and costly. Two factors contributing to these results are the perceived need by government to protect its interests and to provide safeguards for the proper expenditure of public funds."

- ⁷⁶ BENS, "Getting to Best", 3-4
- ⁷⁷ Voneida, Ryan Maj, USAF interview HH-60 Operational Tester
- ⁷⁸ Harford p. 27 The three elements of adaptation
- ⁷⁹ Mitnick, Kevin D. "Ghost in the Wires: My Adventures as the World's Most Wanted Hacker" New York : Little, Brown and Company, 2011
- ⁸⁰ Neufeld, Jacob "Bernard A. Schriever: Challenging the unknown" Office of Air Force History Washington, D.C. 2005. P. 10 Available at <http://www.afhso.af.mil/shared/media/document/AFD-100929-007.pdf> (accessed 17 March 2013). "Schriever agreed[to run the ICBM acquisitions], but only on condition that he be granted sweeping authority to get the job done."
- ⁸¹ Weiss, Geoffrey F. Lt Col USAF "The Efficiency Paradox: How Hyperefficiency Can Become the Enemy of Victory in War" Air & Space Power Journal Volume: 26, Issue: 1. Air University Press. Available at <http://www.airpower.au.af.mil/article.asp?id=43> (Accessed 29 March 2013)
- ⁸² Without effectiveness, efficiency would drop to industry. Something can't be efficient unless it is effective.
- ⁸³ Athens & Sparta; Union & Confederacy; The rest of the world & Germany, Japan, Italy; Even in Vietnam one can argue that the US won militarily but lost due to its Grand Strategy
- ⁸⁴ Ironically, it is this low barrier to entry that enables a large proportion of the cyber threat to asymmetrically engage us—a threat which DOD personnel are directly responsible for defending against.
- ⁸⁵ Project on Government Oversight "Bad Business: Billions of Taxpayer Dollars Wasted on Hiring Contractors" 13 September 2011 available at <http://www.pogo.org/pogo-files/reports/contract-oversight/bad-business/co-gp-20110913.html>
- ⁸⁶ Variable costs such as labor and consumables, just like in industry can be optimized for maximum effectiveness and efficiency.
- ⁸⁷ Fox, *Defense Acquisition Reform*, 13
- ⁸⁸ Berri, David, "The Economic Battlefield of the NBA Lockout" <http://www.freakonomics.com/2011/11/21/monopsony-vs-monopoly-the-economic-battlefield-of-the-nba-lockout/> (Accessed 18 February 2013)
- ⁸⁹ Practical Guide to Negotiating in the Military (2nd edition) USAF Negotiation Center of Excellence 26 October 2012. Available at <http://Culture.af.mil/NCE/>.
- ⁹⁰ Fox, *Defense Acquisition Reform*, 31
- ⁹¹ Intellectual Property and Data Rights Available at <https://dap.dau.mil/acquipedia/Pages/ArticleDetails.aspx?aid=7bfcfeee-b24b-4fdd-ad7b-046437729519> (Accessed 18 February 2013)
- ⁹² Ibid "The government is not required to take title if it would be inequitable or if it has insufficient interest in the invention. In such cases, the government may waive its patent right and the employee may seek a private patent. Even in such cases, however, the government retains a nonexclusive, irrevocable, royalty- free license with the power to grant licenses to others for all government purposes."
- ⁹³ Fox, *Defense Acquisition Reform*, 31 "In particular, funding uncertainty makes long-term production planning extremely difficult and decreases the probability that contractors will benefit from any attempt to reduce production costs, increase productivity, or both. Because increasing and decreasing labor resources is easier than acquiring and disposing of capital investments to cope with fluctuating business volume, defense contractors may elect not to invest in labor-saving equipment. As a result, production costs remain high."
- ⁹⁴ Fox, *Defense Acquisition Reform*, 15
- ⁹⁵ Fox, *Defense Acquisition Reform*, 31
- ⁹⁶ Linowes, David F. "Privatization: Toward More Effective Government, Report of the President's Commission on Privatization" P. 1 Available at http://governmentcompetition.org/uploads/Reagan_Privatization_Report_1988.pdf (Accessed 17 March 2013).
- ⁹⁷ Alex Roland, "The Military-Industrial Complex" Washington, DC: American Historical Association, 2001, 5.
- ⁹⁸ Snyder, Thomas S., *Air Force Communications Command 1938-1991: An Illustrated History*, 3rd ed. AFCC Office of History Scott AFB, IL 1991p.12, 47-48, 70, 71, 72, 79, 89, 93, 99, 122, 160.

Interview with USAF Senior Airman (1965-1969) from Air Force Communication Command predecessor organization, 17 March 2013 (unattributed interview).

Interview with USAF CMSGT (ret) USAF 30yr veteran from Air Force Communication Command, 18 April 2013.

Interview with 7 enlisted USAF Software Programmers from AFMC AFLCMC/HIZC on 16 October 2013.

All interviews confirmed that no systemic organic acquisition occurred.

⁹⁹ Snyder, *Air Force Communications Command*, 197

¹⁰⁰ Capt Curtis Casteel, USAF AFSOC/CSF/SCPE, Interview by author 4 March 2013

"SOCOM Title 10 Authorities" available at <http://www.socom.mil/Pages/AboutUSSOCOM.aspx> (Accessed 17 March 2013).

¹⁰¹ Maj Ryan Voneida, USAF HH-60 Operational Tester at Air Command and Staff College, interview by author 12 March 2013.

¹⁰² McNabb, Tech. Sgt. Scott 24th Air Force Public Affairs "90th IOS keeps AFNet, GIG operating freely in cyberspace" 9 February 2012 Available at <http://www.24af.af.mil/news/story.asp?id=123289449> (Accessed 30 March 2013)

¹⁰³ Snyder, *Air Force Communications Command*, 47

¹⁰⁴ There is a fascinating discussion about the human resource challenges facing non-profits at http://www.ted.com/talks/dan_pallotta_the_way_we_think_about_charity_is_dead_wrong.html

¹⁰⁵ CREW Citizens for Responsibility and Ethics in Washington, "Strategic Maneuvers: The Revolving Door from the Pentagon to the Private Sector" 2012. Available at <http://www.citizensforethics.org/pages/strategic-maneuvers-generals-defense-department-revolving-door> (Accessed 30 March 2013)

¹⁰⁶ The implied theory is that the world's reserve currency necessarily has to run a deficit because otherwise there is no way to distribute that standard medium of exchange to fulfill the role of being the reserve currency.

¹⁰⁷ All 50 states is an exaggeration to make a point. The reality is closer to 11 direct suppliers. The economic impact of C-130s including operations is widespread across the nation generating consensus within Congress.

"Case Overview, C-130 Procurement" Available at

http://lobby.la.psu.edu/107th/092_C_130_Procurement/frameset_c_130.html (Accessed 30 March 2013).

"So Lockheed identifies and lobbies those members of Congress who represent the districts and states in which the bases are located."

¹⁰⁸ Former Secretary of the Air Force Wynne said that some initiatives such as buying commercial-off-the-shelf (COTS) gear as a means to reduce costs "clearly began to get a little bit overused" under Darlene Druryan Tirpak, John A. "Washington Watch" Air Force Magazine Vol 88 no. 1. January 2005 available at <http://www.airforce-magazine.com/MagazineArchive/Pages/2005/January%202005/0105watch.aspx> (Accessed 18 February 2013)

¹⁰⁹ Rooney, Paula (October 3, 2002), Microsoft's CEO: 80-20 Rule Applies To Bugs, Not Just Features,

¹¹⁰ Dietrik, Impact of Weapon System Complexity, 6.

¹¹¹ Rouse, Margaret "What is Loose coupling" February 2011. Available at

<http://searchnetworking.techtarget.com/definition/loose-coupling> (Accessed 17 March 2013)

¹¹² Harford, *Adapt*, 27

¹¹³ *ibid.*

¹¹⁴ Ward, *Don't Come to the Dark Side*, 68.

¹¹⁵ Casteel, Curtis Capt, USAF AFSOC/CSF/SCPE interview by author and presentation "Digital Dagger_SCPE Engineering_Acq Process.pdf" 4 March 2013

¹¹⁶ Such an approach is more difficult for satellites for instance where hardware isn't cost effectively replaced or modified.

¹¹⁷ Richards, *Certain to Win*, 166. "A kluge of partial fixes, You won't get there by trying to do the same stuff, only faster. What you'll get is a mess."

¹¹⁸ Oberndorf, Patricia and David Carney "A Summary of DoD COTS-Related Policies" Carnegie Mellon Software Engineering Institute. September 1998. Available at <http://www.sei.cmu.edu/library/assets/dodcotspolicies.pdf> (Accessed 30 March 2013)

¹¹⁹ Other programs take funding from currently allocated budgets and provide that funding to meet these emergent requirements which obviously impacts that program's execution.

¹²⁰ Jason M. Golaboski, Major, "DOD WEAPONS SYSTEMS ACQUISITION: A CYBER DISCONNECT" 14 December 2011 Air Command and Staff College, 18.

¹²¹ Government Accountability Office GAO-10-95, "Warfighter Support: Actions Needed to Improve Visibility and Coordination of DOD's Counter- Improvised Explosive Device Efforts" Oct 2009 available at <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA508708>

¹²² Patrick, Major William T., Maj, "Idea to Industry: Tackling the Disruptive Challenge Through Policy, Planning, and Programming Transformation" April 2007, Air Command and Staff College, 26. "The battlelabs, in close coordination with operational users, excelled in identifying existing, mature technology that could be used in radical, disruptive ways in battle. History has shown that technology alone does not constitute disruptive capability, and the battlelabs fused the necessary operational perspective with the technology perspective"

¹²³ Jackowski, Michael et al. "Battlelab success stories" available at <http://www.au.af.mil/au/awc/awcgate/batlabs/batlabsuccess1.htm>

¹²⁴ "Quick Look Report on USAF Battlelabs," ed. Department of the Air Force (Air Force Scientific Advisory Board, 2000).

¹²⁵ "Quick Look Report on USAF Battlelabs," ed. Department of the Air Force (Air Force Scientific Advisory Board, 2000).p. 8. "Only three initiatives out of the 50 completed have been successful in the POM."

¹²⁶ Misappropriation from Acquipedia

<https://dap.dau.mil/acquipedia/Pages/ArticleDetails.aspx?aid=7c811aac-4799-4b38-adf2-88a53699d142>

Butcher, David R. "Cash in on Federal Year-End Spending" Industry Market Trends. 4 September, 2008 Available at <http://news.thomasnet.com/IMT/2008/09/04/federal-fiscal-year-end-buying-spree-a-boon-for-businesses-vendors/> (Accessed 17 March 2013).

¹²⁷ Assad, Shay, Director, Defense Procurement and Acquisitions Policy "Competition in Department of Defense Acquisition" OUSD/ATL 14 September 2009 Available at <http://www.acq.osd.mil/dpap/policy/policyvault/USA005009-09-DPAP.pdf> (Accessed 17 March 2013)

¹²⁸ Fox, *Defense Acquisition Reform*, 13

¹²⁹ Business Coalition for Fair Competition "About BCFC" available at http://www.governmentcompetition.org/About_BCFC.html (Accessed 18 March 2013)

"BCFC is working to elevate the issue of unfair government competition, promoting legislation and policies to eliminate unfair competition, and opposing efforts to mandate government monopoly performance of commercially available goods and services."

¹³⁰ Tunner, William H. *Over the Hump*. Washington, D.C.: Office of Air Force History, United States Air Force, 1985. P.129

¹³¹ Lt Col Paul D. Williams, 26 Network Operations Squadron Commander interview by author 10 November 2012

¹³² Wyatt, Edward "Critics of Google Antitrust Ruling Fault the Focus" NY Times. 6 January 2013. Available at http://www.nytimes.com/2013/01/07/technology/googles-rivals-say-ftc-antitrust-ruling-missed-the-point.html?_r=0 (Accessed 30 March 2013) "One of the more surprising conclusions drawn by the Federal Trade Commission when it dropped its nearly two-year antitrust investigation into Google last week was that Google, far from harming consumers, had actually helped them"

¹³³ Unfair because certain conflicts of interest arise without an independent check to balance the aggregation of power, government exists to serve the People so competing with them is cannibalistic.

¹³⁴ Some argue that the current structure of military human resource management (without a draft) and the offense oriented employment of armed services over the past decade are worrisomely akin to mercenary activity and not citizen soldiers

¹³⁵ Knox, MacGregor and Murray, Williamson, *The Dynamics of a Military Revolution 1300-2050*, Cambridge University Press, 61. Available at <http://www.polsci.wvu.edu/faculty/hauser/ps461/knoxmurray.pdf> (Accessed 30 March 2013)

¹³⁶ I use the word “force” not because it is advocated or should be done in this way but to illustrate that it could be done when organic acquisition is performed to illustrate the options available when the acquisition is controlled directly

¹³⁷ Forgive the sarcasm. Competitive marketplaces are efficient over time due to the variation and selection of its goods and services, which ironically is wasteful (on a short term basis) and is often characterized by the maligned phrase “duplication of effort”

¹³⁸ Linowes, David F. “Privatization: Toward More Effective Government, Report of the President's Commission on Privatization” P. 2 Available at http://governmentcompetition.org/uploads/Reagan_Privatization_Report_1988.pdf (Accessed 17 March 2013).

¹³⁹ Lavine, Michael A. “Ripples in the patent pool: The impact and implications of the evolving essentiality analysis” 8 July 2008. Available at http://www.nyujlb.org/wp-content/uploads/JLBv4n2_6.pdf (Accessed 18 March 2013) “The establishment of a technology pool shared among public sector organizations from which components are available for public sector technology developers will provide a source of technology that will reduce their dependence on the private sector and the associated transaction costs of obtaining permission to use their intellectual property rights.”

McDermott, Will, & Emory, “European Commission Proposes Changes to the Rules Applicable to Technology Licensing” Available at <http://www.mwe.com/European-Commission-Proposes-changes-to-the-Rules-applicable-to-Technology-Licensing-02-01-2013/?PublicationTypes=0c37aff3-0fa4-487b-ae40-09ee0164a996> (Accessed 30 March 2013)

¹⁴⁰ Wells, Linton II, Public-Private Cooperation in the Department of Defense: A Framework for Analysis and Recommendations for Action” Available at <http://www.ndu.edu/CTNSP/docUploaded/Defense%20Horizons%2074.pdf> (Accessed 30 March 2013)

¹⁴¹ “the Department of Defense (DOD) and Congress have encouraged the defense logistics support community to pursue partnerships with the private sector to combine the best commercial processes and practices with DOD's extensive maintenance capabilities. These public-private partnerships can combine the resources, risks, and rewards of public agencies and private companies and are intended to provide greater efficiency, better access to capital, and improved compliance with a range of government regulations.”

Government Accountability Office GAO-08-902R “DOD's Report to Congress on Its Public-Private Partnerships at Its Centers of Industrial and Technical Excellence” (CITEs), 1 July 2008 Available at <http://www.gao.gov/products/GAO-08-902R> (Accessed 30 March 2012)

¹⁴² Wells, *PPC in DOD*, 1

¹⁴³ Pociask, Steve “Private vs. the Public Option: The ‘Rule of Two’” 29 September 2009. Available at <http://www.theamericanconsumer.org/2009/09/29/private-vs-the-public-option-the-%e2%80%9crule-of-two-%e2%80%9d/> (Accessed 19 March 2013)

¹⁴⁴ Borchering, Thomas, “The Sources of Growth in Public Expenditures in the U.S., 1902-1970, Duke University Press, 1977.

¹⁴⁵ Pociask, *Private vs. the Public Option*

“Bennett and Johnson evaluated a wide range of services and found the following examples:

Private refuse collection firms provided twice the service at half the cost; Private fire service firms operated at half the costs of public fire departments; Private debt collectors could operate at 40% of the cost of a government agency; It costs the government three times more to repair a similar sized ship than a commercial ship repair enterprise; Federal hydroelectric plants were significantly higher cost to operate and had nearly 50% more employees; Private airlines consistently outperformed government-owned airlines, leading to sweeping trend of deregulation across the globe; Weather forecasting costs were cut in half when a portion of the costs were outsourced to a private firm; Policing services, and more commonly, private ambulance services, undercut the cost of publicly provided services; and Amid the falling quality of public schools and calls for vouchers, there is evidence that public institutions employ 40% more labor than private institutions.” While excellent anecdotes highly relevant to numerous aspects of government activity, none of these examples are representative of the unique nature of warfighting.

¹⁴⁶ Business Coalition for Fair Competition “Federal Insourcing Policy Issue Paper” Available at http://www.governmentcompetition.org/uploads/BCFC_Issue_Paper-Insourcing-Updated.pdf (accessed 19 March 2013)

Georgia Tech, The Contracting Academy “Defense insourcing decisions based on flimsy analysis, according to think tank” 20 May 2011 <http://contractingacademy.gatech.edu/2011/05/defense-insourcing-decisions-based-on-flimsy-analysis-according-to-think-tank/> (Accessed 30 March 2013).

¹⁴⁷ Rothbard, Murray “The Myth of Neutral Taxation” The Cato Journal, Fall, 1981, pp. 519-564; available at <http://library.mises.org/books/Murray%20N%20Rothbard/The%20Myth%20of%20Neutral%20Taxation.pdf> (Accessed 20 March 2013)

“the paper argues that all government activities necessarily divert incomes, resources, and assets from the market, and therefore that the quest for a neutral tax or expenditure policy is an impossible one and the concept a myth”

¹⁴⁸ DOD 5000.01 E1.1.18.

Lt Col Andrew M. Nicklas, USAF SAF/AQI, Interview by author 11 March 2013.

¹⁴⁹ One of the best ways the author has seen this issue addressed is by a company committing to its employees’ full employment for a time coupled with an “ownership” stake in the company and the improvements generated by the employee. Under this incentive structure, employees could innovate their way out of the job and then be encouraged to grow top-line wealth creating ventures. Such flexibility does not exist in the DOD’s Human Resources policies.

¹⁵⁰ Attacking the people, while probably warranted, will elicit a defensive response that impedes dealing with the problem.

¹⁵¹ Lt Col John H. McAfee, USAF (Ret), often praised the US military as the most competitive bureaucracy in the world, an observation shared by his son.

View a list of authoritatively linked cognitive biases at http://en.wikipedia.org/wiki/List_of_cognitive_biases

¹⁵² Neil Sheehan. *A Fiery Peace in a Cold War: Bernard Schriever and the Ultimate Weapon*. New York: Random House, 2009.

¹⁵³ BENS, “Getting to Best”, 31. “Today the government too often finds itself with minimally experienced and transient individuals leading major acquisition programs, able to attract new people only after long delays, unable to couple rewards to performance, and with many senior positions simply unoccupied. Talented and dedicated people can often overcome a poor organizational structure, but a good organizational structure cannot overcome inadequate performance. When qualified people are combined with sound organizations and practices, success is virtually assured. The acquisition process, unlike most government pursuits, is a business function. It demands skills and talents that are far more common to the business world than to government and military operations”

¹⁵⁴ Snyder, Air Force Communications Command, 47. For example, AFCC suffered from the inability to retain technically proficient personnel due to the tremendous commercial opportunities that existed in industry. Additionally, the military often offers monetary bonuses to career fields where large numbers of personnel have separated from military service.

¹⁵⁵ BENS, “Getting to Best”, 31.

¹⁵⁶ Ibid.

DBB, “Review of DOD’s Program Managers,” 4. “Reemphasize and enforce PM tenure provisions. Increase tenure requirements for the most important programs.”

¹⁵⁷ A closed system in the sense that only individuals from within the organization are hired (only Colonels can become Generals)

¹⁵⁸ BENS, “Getting to Best”, 31.

DBB, “Review of DOD’s Program Managers,” 4. “Establish separate boards for the promotion to field grade and general/flag rank.”

“Extend the one-year ban between PM retirement and employment by prime contractors to two years.”

¹⁵⁹ Bowman, Karlyn “A U.S. military worth saluting: The U.S. military is the most respected institution in American life, according to several polls.” 30 May 2011. Available at <http://articles.latimes.com/2011/may/30/opinion/la-oe-bowman-military-20110530> (Accessed 19 March 2013)

¹⁶⁰ If outsourced, acquisition personnel can work in the institution to which the work was outsourced .

¹⁶¹ Fox, *Defense Acquisition Reform*, 19

¹⁶² Wing Commander Jefferson Seddon, Great Britain Royal Air Force interview by author 17 March 2013.
Cassell Bryan-Low "U.K. Weighs Military-Spending Shift: Aiming to Cut Costs, Government Considers Outsourcing All Equipment Purchases to Contractors" Wall Street Journal May 14, 2013 Pg. 9
Defense Management Journal "GOCO announcement 'due in 2013'" 22 November 2013 available at http://www.defencemanagement.com/news_story.asp?id=21535 (accessed 19 March 2013)

¹⁶³ The writings of Lt Col Clint Hinote provide some excellent discussion on ensuring that decisions are made at the right time, by the right entity, with the right information and authority.
Hinote, Clint Lt Col, USAF, "Centralized Control and Decentralized Execution: A Catchphrase in Crisis," Air Force Research Institute papers 2009-1.

¹⁶⁴ Higgins, Peter J. "When the Industrial Base Goes Cold" Available at <http://www.almc.army.mil/alog/issues/MARAPR99/MS343.htm> (Accessed 30 March 2013).

¹⁶⁵ Thaler, Richard H. "Nudge: Improving Decisions About Health, Wealth, and Happiness" 24 February 2009.
"Nudge is about choices—how we make them and how we can make better ones."

¹⁶⁶ Welsh, Mark, USAF, General, Chief of Staff, "A Vision For The United States Air Force," 10 January 2013
Available at <http://www.kunsan.af.mil/news/story.asp?id=123332146> (Accessed 18 March 2013)

¹⁶⁷ Singer, *Wired for War*, 252

¹⁶⁸ Harford, *Adapt*, 27

¹⁶⁹ DOTMLPF-P stands for Doctrine, Organization, Training, Materiel, Leadership, Personnel, Facilities, Policy. It categorizes the factors necessary to deliver capability. See CJCSI 3170 for additional info.

¹⁷⁰ Lt Col John Matus, USAF Air Command and Staff College Faculty, interview by author 23 September 2013.

¹⁷¹ When standardization is the issue, often what decision is made doesn't matter as much as the fact that a decision is made.

¹⁷² Surowiecki, *Wisdom of Crowds*, 10.

¹⁷³ *ibid*

¹⁷⁴ Paragraph is based on recommendations from Tim Harford's *Adapt*

¹⁷⁵ Selection characteristics are diversity of opinion, independence, decentralization, and aggregation

¹⁷⁶ Quote often attributed to Albert Einstein "Insanity: doing the same thing over and over again and expecting different results."

Available at <http://www.brainyquote.com/quotes/quotes/a/alberteins133991.html#ee7u7OJDRTtiEoe.99>
(Accessed 30 March 2013).

¹⁷⁷ Crant, J. Michael, "Proactive Behavior in Organizations" Journal of Management June 2000 vol. 26 no. 3 435-462.

Harford, *Adapt*, 27

¹⁷⁸ Southwest Airlines essentially limited its corporate growth, refusing buyouts and mergers on the basis that the culture of Southwest was what made it great. The ability to propagate its culture then became the constraint by which the company expanded.

McGlade, Desmond, "Information Systems Strategy in Air Transport" Naval Post Graduate School, September, 1993, 35. Available at <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA273125> (Accessed 30 March 2013)

"The airline's growth must now be prudently managed to assure the spirit and positioning isn't wrecked by building too far, too fast."

¹⁷⁹ AF LCMC DRAFT "Responsive Cyber Division Cyber Solutions Cell Concept of Operations" February 2013, 7

¹⁸⁰ Hinote, Clint Lt Col, USAF "Centralized Control and Decentralized Execution: A Catchphrase in Crisis" Air Force Research Institute papers 2009-1.

¹⁸¹ The Pacific Railway act of 1862 provides an interesting case study on how the standardization of railroad specifications in America allowed the full potential of the technology to be realized.

¹⁸² BENS, "Getting to Best," 15. "Today, the government too often finds itself with minimally experienced and transient individuals leading major acquisition programs, able to attract new people only after long delays, unable to couple rewards to performance, and with many senior positions simply unoccupied."

p.63 “As the short tenures typical of high-level DOD acquisition executives make it difficult for them to change the system of incentives, other participants can wait out reforms they oppose.”

¹⁸³ Snyder, *Air Force Communications Command*, 47. For example, AFCC suffered from the inability to retain technically proficient personnel due to the tremendous commercial opportunities that existed in industry.

¹⁸⁴ Singer, *Wired for War*, 363

¹⁸⁵ Walter W. Powell and Kaisa Snellman “The Knowledge Economy” *Annu. Rev. Sociol.* 2004.30:199-220.

¹⁸⁶ Drucker, Peter F. *Post-Capitalist Society*, HarperBusiness; Reprint edition, 13 April 1994, 8.

¹⁸⁷ Organic acquisition may be likened to a management RMA

¹⁸⁸ The author assumes this will happen, not that it should happen—which is another debate.

Singer, *Wired for War*, chap 10

¹⁸⁹ Shelton, Hugh General, USA “OPERATIONALIZING JOINT VISION 2010*” *Airpower Journal* Fall 1998. Available at <http://www.airpower.maxwell.af.mil/airchronicles/apj/apj98/fal98/shelton.htm> (Accessed 23 March 2013)

¹⁹⁰ Guderian, Heinz. *Panzer Leader*. New York: Da Capo Press. 1996, 13, 20, 46.

¹⁹¹ Practical Guide to Negotiating in the Military (2nd edition) USAF Negotiation Center of Excellence 26 October 2012. Available at <http://Culture.af.mil/NCE/>.

¹⁹² Singer, *Wired for War*, 31. “bootstrap development process”

¹⁹³ AF LCMC DRAFT “Responsive Cyber Division Cyber Solutions Cell Concept of Operations” February 2013

¹⁹⁴ Kristol, William, “The Defense Secretary We Have” *Washington Post*. Wednesday, December 15, 2004; Page A33 <http://www.washingtonpost.com/wp-dyn/articles/A132-2004Dec14.html>

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