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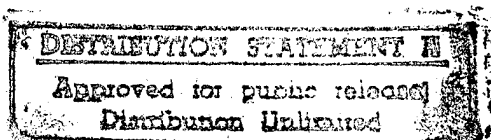
**OPERATIONAL COMMANDER'S NEED
TODAY'S TECHNOLOGY *TODAY***

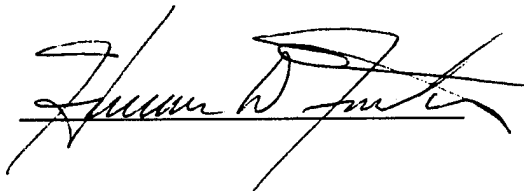
by

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A paper submitted to the faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

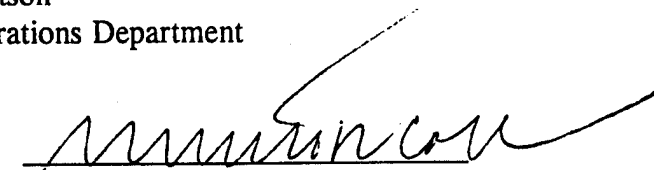
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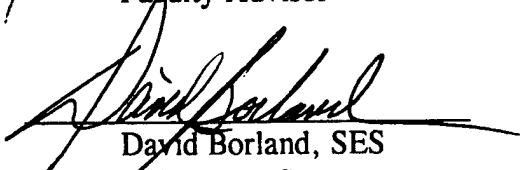


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ABSTRACT

Our Operational Commanders have a legitimate need for today's technology *today* but are prohibited from attaining it. One reason is that our acquisition definitions have not kept pace with the evolution of technology. Another reason is that our acquisition policies, strategies and regulations remain mired in a Cold War "invest in technology" paradigm when our situation requires a strategy of "procurement of technology". Our acquisition cycle remains at 12-15 years while the technology evolution cycle is currently less than two years. DOD's decision to enter into a Dual-Use program with commercial industry, releasing previously prohibited technology, has contributed to the acceleration. This accelerated availability of state of the art technology has allowed potential threats to procure and employ today's technology. Our attempts at reform have been unsuccessful, in terms of getting technology to the warfighter sooner, because they are focused on refining the existing process rather than restructuring it to meet the new needs.

It appears that even though the Operational Commanders have a legitimate need for today's technology, the processes that are designed to facilitate its evolution are preventing responsive production and fielding. This deceleration of fielding may be putting our Operational Commanders and their forces at potential risk to adversaries that can get to the technology *today*. This dilemma must force us to examine our acquisition strategy and ask ourselves whether we truly are **supporting the needs of the warfighter**.

PREFACE

The scope of this paper is limited to the examination of our current acquisition “end state” and strategies from an Operational Commander’s perspective. Included in this examination is the determination of whether our current acquisition “end state” is aligned with the threat environment and the current state of technology evolution. The given constraints do not allow for extensive examination and presentation of possible reform measures to solve the problem facing Operational Commanders today. The author does point out suggested areas where additional research may potentially lead to productive reform measures. Hopefully this paper will motivate others to continue research efforts and develop legitimate acquisition reform measures that will allow our Operational Commanders access to today’s technology *today*.

Although this paper focuses primarily on automation systems, such as C³ (Command and Control and Communication systems), the arguments can be applied in general terms to major weapons systems acquisitions as well.

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I. INTRODUCTION

Army acquisition is a proven, successful force. The proof of the pudding is that it is the world-class leader in providing the most advanced equipment and systems to warfighters. However, in its present state, it has become obsolete. Commanders can no longer afford the cost and time associated with the old system. The environment has changed drastically and so the system must respond. The threat that propelled the system for so many years appears to have disappeared, although many small regional fires keep igniting.¹

Dr. Kenneth Oscar

Our Operational Commanders have a legitimate need for today's technology *today* but are prohibited from attaining it. One reason is that our acquisition definitions have not kept pace with the evolution of technology. Another reason is that our acquisition policies, strategies and regulations remain mired in a "Cold War" paradigm. The idea of getting technology to the warfighter (formerly referred to as user or customer) sooner is hardly a novel concept and numerous attempts at acquisition reforms have been made. One of the explanations for why acquisition reforms continue to address the same problems is that they are made to the existing model without a legitimate review of our acquisition *end state*. *End state* defines what the level of technology will be after the acquisition process is completed. Our acquisition *strategy* is developed as a means of meeting our defined *end state*. Alterations to a *strategy* whose azimuth is oriented on an antiquated *end state* only makes getting to the wrong destination much easier.

II. WHAT IS "TODAY'S TECHNOLOGY"?

Prior to determining if there is a legitimate need at the Operational Commanders level, it is important to define what is meant by "today's technology." The American Heritage Dictionary defines technology as "the application of science, especially to industrial or commercial objectives."² Since DOD and industry have amiably joined in the pursuit of the

advancement of technology we are able to add in the term military and not misrepresent the intent of the original author, “the application of science, especially to *military*, industrial or commercial objectives.” This definition is general enough that few would argue with its accuracy. The problem comes when the spectrum of time is applied to the definition.

If we insert time in the modified definition, then the orientation moves toward “state of the art” and “intent of production.” State of the art focuses on the “achievability” of technology. Intent of production focuses on the “availability” of technology. The relationship between these two terms is that if technology is achievable and if intent of production allows, it can be made available. If the technology is not achievable, then it cannot be available.

During the Industrial Revolution, the technology drive was to automate (mechanize) normal tasks or *objectives*. If we add time to the modified definition, we have an accurate description of technology during the Industrial Revolution, “the application of science, especially to *yesterday’s military*, industrial or commercial objectives.” Over many years, the state of the art became achievable, industrialists made it available, and the Industrial Revolution changed our way of living and fighting wars forever.

During the Pre-Cold War period, state of the art moved into the “Jetson Age.” State of the art was defined as future objectives that were beyond the horizon of achievability and therefore availability of the technology was defined in decades. Technology could not keep up with our identified objectives and the term “wish lists” became our means of planning and programming budgets.

During the Cold War period, our philosophy towards intent of production changed. It was during this period that we first saw technology catching up to our “wish lists” making

achievability relate to years rather than decades. The costs of producing and delivering this accelerated technology posed a fiscal dilemma. Administrations could either fully fund the programs for near-term delivery or incrementally fund them for delivery in the next decade. Our administrations rationalized the incremental funding as a means of waging economic warfare against the Soviet Union. If we could convince the Soviets that the technology was achievable and we were committing funding to develop that technology over time, then the Soviets would be forced to commit funding to counter that technology. This lapse in the period between achievability and availability was vital in our strategy. Since the technology was achievable, the Soviet Union was able to counter our proposed technology advancement, accelerate production and field the technology at great costs to itself. In addition to accelerating fielding, the Soviet acquisition strategy also called for mass production. Therefore, the Soviets were not only spending large amounts of near-term funds on technology, they were buying large quantities of it. This economic strategy was arguably one of the main factors in ending the Cold War. So for the Cold War period, our definition of technology was again modified to, "the application of science, especially to *tomorrow's military*, industrial or commercial objectives."

As we recalibrate our National Military Strategy in the post Cold War, we must also recalibrate our definition of technology and determine if we have a new acquisition *end state*. In addition to the two Major Regional Conflict (MRC) scenarios that our military strategy is anchored on, there are also many known and unknown threats to our regional interests from militaries of undeveloped countries and from non-state sponsored threats such as the drug cartels and terrorism. It is the threat of these Lesser Regional Conflicts (LRC) where

technology most affects the Operational Commanders. The technology evolution rate has accelerated from the Cold War period to where the span between achievability and availability is now less than two years. This is primarily due to DOD releasing much of its technology to the commercial sector for Dual-Use purposes. Dual-Use programs have allowed commercial industry to produce and market technology that was previously restricted to military applications. The commercial industry's marketing strategies of beating competitors to fielding have accelerated the availability of the technology. This accelerated availability rate allows our potential adversaries to procure today's technology *today*.

As we look back at our Cold War definition of technology, which is an accurate reflection of our current acquisition strategy, the question arises as to whether our Operational Commanders can afford to wait for tomorrow's delivery. If the focus of our acquisition process is to meet the needs of our warfighter, then clearly we have a new *end state* that requires another modification to our definition, "the application of science, especially to *today's military*, industrial or commercial objectives."

III. DO OPERATIONAL COMMANDERS HAVE LEGITIMATE NEEDS FOR TODAY'S TECHNOLOGY?

Now that we have defined what today's technology is, the next logical step is to determine if Operational Commanders, particularly our Joint Task Force Commanders (CJTF's), have a legitimate need for today's technology. To determine legitimacy of need, I will examine the threat and the changing focus of the CJTF.

The greatest threat to CJTF's, with respect to technological evolution, is the LRC threats. They not only can procure yesterday's technology (with operators) but are more

recently procuring today's technology as well. An example of the effect of organizations getting today's technology is the success of the drug cartels in Latin America.

The intelligence capabilities of the cartels rival those of most countries. The cartels have an extensive network of informers throughout their area of operations. They have state-of-the-art equipment, including satellite radios, digital encryption devices, and voice privacy mechanisms, that makes it difficult for even the U.S. armed forces to penetrate. General Gorman made this clear when he said, "I have seen equipment used on the aircraft that fly between the United States and Colombia, and I can assure you that it is more sophisticated and more facile than the equipment that I had on my aircraft on the U.S. Air Force in the U.S. Southern Command." He went on to say that the governments communication system is regularly intercepted by the traffickers and that traffickers can track the movements of armed forces units better than the respective commanders.³

Many nations or organizations are procuring low-cost technology to counter some of our technological advantage as a means of leveling the playing field. One of the areas that appears to be the target of such activity is the Global Positioning System (GPS) which not only facilitates navigational capabilities of our forces but is being used in some of our weapons systems to enhance the *precision* of our precision guided munitions. If there is technology today on how to defeat GPS then there is most assuredly an adversary that would procure such technology to decrease our technological advantage.

Critics of this argument can point to the Argentine Navy's use of German Telefunken Torpedoes during the Falklands/Malvinas War to argue that access to technology does not guarantee success. The Argentine Navy had procured the Telefunken Torpedoes to counter the significant advantage that the Royal Navy Task Force had over their Navy.

None of the four Telefunken Torpedoes fired by the San Luis (Argentine) were hot, straight and normal shots. Post-war analysis by German technicians revealed that the Argentine submarine crews did not know that they had to set a compensation device in each torpedo as it was loaded on the submarine to match each torpedo to the fire control system.⁴

Since the Argentines did not possess the technical knowledge to fully employ the new technology the torpedoes were nothing more than a nuisance as they clanked off the sides of the British ships. The major difference between the Argentine experience and the future adversaries that our CJTF's will face is that many of the procurements are coming with technicians and operators to provide the necessary expertise. Our experience with the drug cartels in Latin America highlights this new practice and proves that there is a threat to our CJTF's from procured technology.

The ability to undertake such large-scale projects [Drug Processing Complexes] is a result of the effective coordination of many different components and suborganizations. For ventures such as these, a wide array of highly educated professionals is required, including chemists, engineers, architects and construction management personnel. These types of functions are generally performed by individuals working under contract to the cartel and not full-time members, though undoubtedly they know exactly what they are working on.⁵

One of the biggest criticisms of our commander's need for technology is that they "want it all...yesterday." Since we are using taxpayers funds to attain this technology, we have an obligation to differentiate *want* from *need*. Need was identified as a vision of the future and often that vision was interpreted as nothing more than want. Even during the Cold War period, where availability was deliberately delayed, need was often camouflaged by the perception of want.

Arguably, our forces have deployed more and seen more hostile action as members of JTF's in the past ten years than they did the previous 25 years. During the Cold War period, our Operational Commanders were preparing to fight the great Soviet Military in World War III. The majority of our Operational Commanders during the last 10 years have fought battles far less complex than that envisioned with the Soviets and have done so with decreased preparation time. Today's Operational Commanders are not focused on one single enemy, in

fact, they are attempting to focus on many potential enemies. This focus adjustment plays a large role in how Operational Commanders determine needs today.

It is interesting to take a look back at how we used to compare technology from generation to generation. One generation had the radio, the next had the television and the next got the computer. We went through a long period where technology advances generally took generations to take effect in our society. Today, technology evolutions are occurring multiple times within a generation and are available to the masses as opposed to just the affluent. A good example is the telephone. Today's youth already have experienced the evolution from the cordless phone to the cellular phone, and the answering machine to the beeper. The result of the rapid evolution of technology is that our needs become more near-term focused rather than orienting on the next generation.

In a sense, I believe that this same phenomenon is affecting our Operational Commanders. The increased activity and the accelerated evolution of technology have forced the Operational Commander to get out of the "Candy Store" mentality of identifying needs and moving more to a "Hardware Store" mentality where functional tools are being sought to meet more near term needs. Operational Commanders are no longer purely focused on preparing to fight another great army. They are also preparing to fight LRC threats who are buying technology to fight *today*, not *decades* from now.

IV. DO OUR ACQUISITION POLICIES, STRATEGIES AND REGULATIONS MEET OUR END STATE?

[As] CJTF, "Why can I talk to a Battalion Commander in the field, but not to the aircraft carrier off the coast?"⁶

CDR Terry McKearney

Now that we have determined that Operational Commanders have a legitimate need for today's technology, then the question becomes: can the commanders get to that technology *today*? Some would argue that this is purely a mathematical problem. With the current acquisition cycle of 12-15 years, the technology and systems in the current plan will for the most part be available in 2010.⁷ The rate of technology turnover is now under two years.⁸ So during this current acquisition cycle, technology evolution will occur six to eight times and we may have experienced five different administrations. This acquisition strategy is still oriented on taking care of the next generation of Operational Commanders instead of the present cadre. Those who claim that this is just a mathematical problem argue that acquisition reforms are needed to shorten the process.

Current methods of determining requirements and setting priorities cannot keep pace, will not allow us to meet the budget challenges, will not allow us to maintain the edge, in the post-industrial era.⁹

General Frederick Franks

Recent efforts at reform focus on refining the current model. The authors of the 1982 reforms to the Federal Procurement System focused on making "Science and Technology a much more important factor in the overall acquisition process - doing more than before to "prove out" new technology and components before programs enter the final acquisition process"¹⁰, "establishing System Standards (specifications) to measure operational effectiveness"¹¹, and introducing "multi-year contracting"¹². But none of these reform measures appear to be oriented on delivering the technology to the Operational Commander sooner, in fact it appears to be achieving just the opposite. These reforms were initiated during the Cold War period and our strategy was not to get the technology to the commander

sooner but to force our adversary to spend near-term dollars to counter our technological advancements.

Later in 1985, a review of Joint Service Acquisition Programs was conducted and the main conclusions were, 1) the requirements process is complex, with no common approach to identifying or documenting service requirements or for cross service review to determine joint program potential, 2) There is no formal process to ensure that each system new start is reviewed by senior management early in the requirements identification process to determine joint program potential, and 3) Joint programs presently have no standard senior management forum in which problems can be addressed jointly (except for the DSARC which meets too infrequently to provide continuing management oversight.¹³

The Joint Requirements Management Board (JRMB) was initiated to correct the noted problem areas. But history teaches us that initiation of management or oversight boards rarely expedites the process and neither did the JRMB. Yet this was consistent with the acquisition strategy of the Cold War period.

Towards the end of the Bush administration and early in the Clinton administration, reform was sweeping government. The Joint Chiefs of Staff and Operational Commanders were lobbying for acquisition reforms that would get technology fielded sooner.

Today's acquisition system is a product of the Cold War. It was designed to give us large numbers of advanced systems... This was costly, but it served us well during a time of great national danger. Over time, however, that acquisition system also became risk-averse. We became so concerned about scandals that we loaded it down with checks and audits. These helped us avoid procurement scandals, but at the price of driving up costs and impeding rapid technological progress. As a result, we have lost much of our technological agility.¹⁴

Admiral David Jeremiah, VCJCS

As we were moving out of the Cold War period, having conducted operations in Latin America, Panama, Kuwait, Somalia, Rowanda and Haiti, surely our leaders could see that our acquisition end state was moving closer to the Operational Commanders sphere of interest. But our focus on reforms again attempted to refine the existing model, as the late former

Deputy Secretary of Defense Donald Atwood and the current Deputy Under Secretary of Defense (Acquisition Reform) Colleen Preston explain.

A problem which has been addressed is the complex rules and regulations associated with the acquisition system. Burdensome, bureaucratic requirements are an unnecessary drag on the procurement process. In an effort to untangle this thicket of unproductive and overly detailed rules and regulations, we are now eliminating over three-fourths of the 500 directives that affect acquisition, and the procurement and contract guidance covered in our regulations has been more than cut in half.¹⁵

Donald Atwood

The basic elements that we thought most critical were that we were attempting to remove impediments to commercial companies selling to the government. And Congress did that.¹⁶

Colleen Preston

Pointing to the forecasted DOD budget for FY96 or 97 that will be one-third (in real dollars) of what it was in FY86¹⁷, Defense Secretary Perry has championed acquisition reforms that transition the industrial base from defense to commercial.

In prior decades, defense produced most of the critical technology we used, and defense was the dominant customer for high technology. This is not true anymore. The new technologies that are most critical to our technological advantage - computers, software, semiconductors, telecommunications - are all being driven by commercial, not defense, markets. ...[W]e have to get on the shoulders of these commercial industries so we can take full advantage of them. To take advantage of what's happening in commercial industry, we have to remove the barriers that isolate us from commercial industry. But to remove these barriers amounts to a major reform of the defense acquisition system. But restructuring this acquisition system will not be easy. It has taken us four decades to build up the barnacles on this acquisition ship, and it's going to take us a number of years to scrape them off. We must do it, though. It is absolutely the key to integrating our defense industrial base into the national industrial base, which in turn will preserve our superior technology and reduce the cost of our acquisition system.¹⁸

William J. Perry

The reforms that these officials report are valid, but only if the intent is to lower acquisition costs or to strengthen the industrial base structure. While they claim that the reforms are "untangling the thicket" or "removing impediments", none of these reform measures address accelerating the delivery of today's technology. The problem is that our

current acquisition strategy is to *invest in technology* but the evolution of technology is requiring a modification of that strategy to *procurement of technology*.

V. HAVE WE OUTGROWN OUR BUDGET PROCESS AS WELL?

While the last section was critical of attempts at recent acquisition reforms, there may be some very legitimate reasons for not being able to do anything more than to refine the existing acquisition process. One possible reason is that the acquisition process is tied so closely to DOD's Planning, Programming, Budgeting System (PPBS) that without modifications to the PPBS, there can be no major modifications to the acquisition process. The acquisition process is aligned to the PPBS for funding of each stage of the process, commitment of different kinds of money (OMA, OPA or RDA) and the period of that commitment. Here again we have what appears to be a simple mathematical problem. As Figure 1 clearly shows, the technology evolution period is currently working inside of the current commitment windows for normal operations and maintenance funding and for procurement funding for projects that were initiated in some cases decades ago.

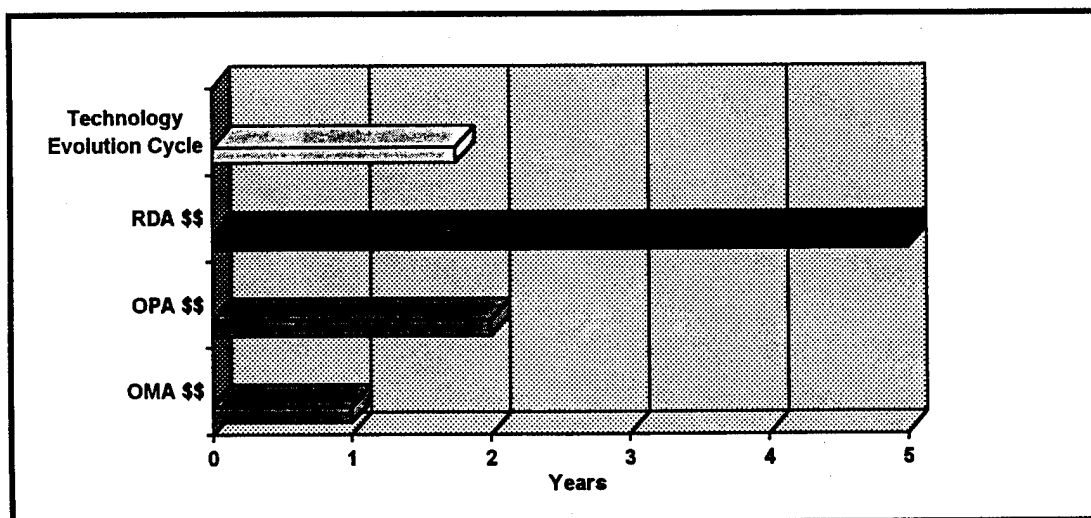


Figure 1. Budgetary Funding Cycle Comparison with Technology Evolution Cycle

From a cursory examination, it appears that our budgeting process is out of alignment with our acquisition *end state*. The budget system is not flexible enough to allow for commitment of OMA/OPA funds or for reprogramming of out-year incremental funding for the procurement of today's technology. A detailed examination of the budgeting process is out of the scope of this paper but future research may lead to some recommended reforms in PPBS that will free up the current reticence towards developing a new acquisition process.

VI. DESERT STORM TECHNOLOGY

Operational Commanders could view the battlefield as never before. US and coalition forces could observe Iraqi elements in near real-time via Joint Surveillance and Target Attack Radar System, AWACS (Airborne Warning and Control System) and advanced unmanned aerial vehicles. Intelligence systems denied, for the most part, the Iraqis the advantage of operational surprise and the use of their homeland to cloak preparations.¹⁹

MAJOR Michael Macedonia

It is hard to convince some critics that our Operational Commanders can't get at today's technology when they witnessed the technical advantage that we employed over the Iraqi military during Operation Desert Storm. Granted, our Operational Commanders held a technological advantage over the Iraqis, but was it with today's technology or yesterday's?

"An abysmal lack of accurate intelligence" is an accurate description, for example, of rather absurd fact that on at least two occasions, Scud launches tracked by battle group ships were confirmed by CNN reports relayed to us by aircraft monitoring the broadcast before the theater intelligence apparatus could process and distribute the information through its channels.²⁰

General H. Norman Schwarzkopf

If we accept the assumption that the last post-Vietnam administration to devote significant resources to advancing the technological state of the military was the Reagan Administration (1980-88) and assume that the procurement programs to advance military technology began within the first year of that administration, then according to our acquisition cycle timeline, that technology should have been available in 1992 (at the low end). Iraq

invaded Kuwait in 1990 and we executed Operation Desert Storm in 1991. That would imply that yesterday's technology, initiated primarily during the Reagan Administration, was made available one-two years ahead of schedule. Does this imply that our acquisition cycle is improving?

Much of the technology was employed for the first time... Major innovations occurred in adapting commercial systems to fill immediate information requirements of commanders, because military technology in this area had not kept up with the computer revolution of the past decade. For example, personal computers with modems sent enormous amounts of record traffic over phone lines far faster than the military message system, which was based on 1960's technology. Staffs scrambled to purchase fax machines, which became mandatory to send graphics such as maps and charts to tactical units. There were just not enough couriers and aircraft to do otherwise.²¹

The use of Commercial-Off-The-Shelf (COTS) products to fill the technology void in the military equipment during Operation Desert Storm was significant. There are provisions in the Federal Acquisition Regulation (FAR) that allow for accelerated procurement during periods of hostilities. Those provisions and the extensive build-up time during Operation Desert Shield enabled our Operational Commanders to establish their technological advantage. But that technology was far in excess of the two year evolution cycle and therefore we should conclude that the technology was in fact yesterday's and not today's.

Most Americans who followed the Gulf War, if asked what was the most significant technological (non-weapon system) piece of equipment that was employed in Operation Desert Storm, would probably point to the Global Positioning System.

Use of the Global Positioning System (GPS) reduced the uncertainty of Army commanders in controlling operations in the vast desert west of Kuwait. GPS made up for the lack of accurate maps and absence of terrain features in the Saudi desert and permitted precise coordination of tactical ground forces and aircraft. Most of the GPS receivers were commercial systems bought specifically to support Desert Storm. There were 4,500 receivers used during the war. The systems were essential to the famous left hook by the coalition, providing the means for maneuvering the huge force through an uncharted desert. The move surprised the Iraqi, who had thought that the area was unnavigable.²²

There is no doubt that the GPS was a technological advantage to our forces but was it the COTS success story that it is being billed as? Is this really an example of today's technology?

The idea of launching satellites as dedicated nav aids is not new. The US Navy launched its first transit navigation satellite in the early 1960's and had an operational network of five spacecraft in place by 1964. Useful as this system was, it could provide fixes only for slow moving platforms such as surface ships and the US Navy's fleet of Polaris-armed submarines, while the limited number of satellites meant that fixes were only available at intervals of between 35 and 100 minutes, depending on latitude. The US Navy and US Air Force then each embarked on new navigation satellite programmes known as Timation and 621B respectively; in 1973, these were combined into a single programme known as NAVSTAR GPS.²³

The NAVSTAR GPS was delivered in 1987 at a cost of \$10 billion dollars in Research and Development funds from the Department of Defense.²⁴ Although we did buy the GPS receivers primarily through commercial businesses for use in Desert Storm, in 1983 DOD had entered into a joint effort to develop the receivers for Dual-Use purposes. It is unclear whether the costs for the development of the receivers is included in the \$10 billion DOD investment. After that much of an investment from DOD, it is hard to categorize the GPS receivers as a model of COTS technology and it most definitely wasn't today's technology.

VII. IS THIS THE REVOLUTION OF MILITARY AFFAIRS?

The debate within military circles in our post-Desert Storm period is whether or not the military is undergoing a Revolution of Military Affairs (RMA). To continue the debate is outside of the scope of this effort, so for brevity I will assume that we are undergoing a RMA. Then is the Operational Commanders problem of not having access to today's technology part of this RMA? History suggests that there are three common preconditions to the full realization of an RMA: technological development, doctrinal innovation and organizational adaptation.²⁵ If we apply the Operational Commander's problem to these three preconditions, it appears that our acquisition strategy is blocking access to timely technological development

and therefore postponing the implementation of doctrinal innovation or organizational adaptation. But that only applies for *today* since we have established that this technology will be available in 12-15 years. The conclusion based on this brief analysis is that the Operational Commander's problem is a subset of the current RMA (probably the front end of the RMA) and more importantly is keeping the full realization of that RMA from maturing much sooner. This deceleration of the RMA is consistent with our acquisition strategy that has been discussed so far in this paper.

VIII. CONCLUSION

The inability of our Operational Commanders to get today's technology *today* potentially puts them and their forces at risk in both current and future hostile threat environments. Our acquisition strategy, to **invest in technology**, continues to be mired in the Cold War paradigm even though the acceleration of the evolution of technology is demanding a new strategy of **procurement of technology**. Attempts at acquisition reforms have been oriented on maintaining the status quo by refining the current process to lower acquisition costs and to strengthen the commercial industrial technology base. None of these reforms legitimately target getting today's technology to our Operational Commanders *today*. Critics of this argument will claim that there are very good fiscal reasons for maintaining the Cold War strategy. But if our administration and DOD are going to put our Operational Commanders at risk by decelerating production and fielding, then we should be truthful and replace our creed of *meeting the needs of the warfighter* with *meeting the needs of the budget*.

The acquisition process is not an end in and of itself.

It is there to support the warfighter.²⁶

NOTES

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