

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

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1. REPORT DATE (DD-MM-YYYY) 04-05-2015		2. REPORT TYPE Master of Military Studies Research Paper		3. DATES COVERED (From - To) September 2014 - April 2015	
4. TITLE AND SUBTITLE DEFENSE ACQUISITION PROCESS: DELAYING CAPABILITY TO THE WARFIGHTER				5a. CONTRACT NUMBER N/A	
				5b. GRANT NUMBER N/A	
				5c. PROGRAM ELEMENT NUMBER N/A	
6. AUTHOR(S) McFarland, Robert J., United States Air Force				5d. PROJECT NUMBER N/A	
				5e. TASK NUMBER N/A	
				5f. WORK UNIT NUMBER N/A	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) USMC Command and Staff College Marine Corps University 2076 South Street Quantico, VA 22134-5068				8. PERFORMING ORGANIZATION REPORT NUMBER N/A	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A				10. SPONSOR/MONITOR'S ACRONYM(S) N/A	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S) N/A	
12. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.					
13. SUPPLEMENTARY NOTES N/A					
14. ABSTRACT If the challenges in the DoD acquisition system are not proactively managed they can lead to long cycle times in the acquisition process that in turn cause programs to overrun established cost estimates, can lead to obsolete parts and decreased capabilities, and create a general mistrust for the DoD and the senior executives. This paper will provide an introduction of the defense acquisition system, analysis of the bureaucracy contributing to the lack of confidence in the acquisition system, the challenges encountered in the acquisition system using the F/A-22 as an example, and discuss some of the initiatives for improvement and the implementation plans of those initiatives. There were numerous program challenges including chasing technology, budget instability, unrealistic expectations, artificial division of the workload, acquisition process timeline, and increased legislation just to name a few. Each of these individually could derail an acquisition program and the F/A-22 encountered all of them. Senior DoD executives have recognized the challenges and are implementing new initiatives including a commitment from the leadership team to change, increasing communication between the government and contractor teams, continuing the feedback mechanism for acquisition process reform, incentivizing productivity and innovation, and promoting real competition in programs. Proactive leadership and management from the senior executives is essential for these new					
15. SUBJECT TERMS DoD Acquisition Reform; F/A-22; Delayed Capability; Challenges; Bureaucracy					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT UU	18. NUMBER OF PAGES 34	19a. NAME OF RESPONSIBLE PERSON Marine Corps University/Command and Staff College
a. REPORT Unclass	b. ABSTRACT Unclass	c. THIS PAGE Unclass			19b. TELEPHONE NUMBER (include area code) (703) 784-3330 (Admin Office)

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MASTER OF MILITARY STUDIES

TITLE:

DEFENSE ACQUISITION PROCESS: DELAYING CAPABILITY TO THE WARFIGHTER

SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF MILITARY STUDIES

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Date: 4 May 2015

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Date: 4 MAY 2015

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Executive Summary

Title: Defense Acquisition Process: Delaying Capability to the Warfighter

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Thesis: The Department of Defense (DoD) acquisition system is challenged by bureaucracy, politics, leadership, budget scrutiny, and resource limitations, which are some of the contributing factors for delays in delivering capability to the warfighter.

Discussion: If the challenges in the DoD acquisition system are not proactively managed they can lead to long cycle times in the acquisition process that in turn cause programs to overrun established cost estimates, can lead to obsolete parts and decreased capabilities, and create a general mistrust for the DoD and the senior executives. This paper will provide an introduction of the defense acquisition system, analysis of the bureaucracy contributing to the lack of confidence in the acquisition system, the challenges encountered in the acquisition system using the F/A-22 as an example, and discuss some of the initiatives for improvement and the implementation plans of those initiatives. Using the acquisition of the F/A-22 as an example, there were numerous program challenges including chasing technology, budget instability, unrealistic expectations, artificial division of the workload, acquisition process timeline, and increased legislation just to name a few. Each of these individually could derail an acquisition program and the F/A-22 encountered all of them.

Conclusion: Senior DoD executives have recognized the challenges and are implementing new initiatives including a commitment from the leadership team to change, increasing communication between the government and contractor teams, continuing the feedback mechanism for acquisition process reform, incentivizing productivity and innovation, and promoting real competition in programs. Proactive leadership and management from the senior executives is essential for these new initiatives to make a difference in delivering capability to the warfighter in a timely manner.

Preface

The thesis of this paper was to identify some of the challenges of the DoD acquisition system using the US Air Force acquisition of the F/A-22 as an example. My research identified numerous program challenges including chasing technology, budget instability, unrealistic expectations, artificial division of the workload, acquisition process timeline, and increased legislation just to name a few. Each of these individually could derail an acquisition program and the F/A-22 encountered all of them. As an acquisition officer I wanted to analyze some of the challenges encountered to better educate myself and to learn from the from programs of the past in order to not repeat the mistakes in the future.

I would like to thank my classmates and faculty advisors from Conference Group 13 for their support during this process. I would also like to thank my mentor, Doctor DiNardo, for your focused direction and advice. Lastly, I want to thank my incredible wife, Stacey, for her patience, guidance and assistance.

DEFENSE ACQUISITION PROCESS: DELAYING CAPABILITY TO THE WARFIGHTER

The Department of Defense (DoD) acquisition system is challenged by bureaucracy, politics, leadership, budget scrutiny, and resource limitations, which are some of the contributing factors for delays in delivering capability to the warfighter. These challenges can lead to long cycle times in the acquisition process that in turn cause programs to overrun established cost estimates, can lead to obsolete parts and decreased capabilities, and create a general mistrust for the DoD and the senior executives. This paper will provide an introduction of the defense acquisition system, analysis of the bureaucracy contributing to the lack of confidence in the acquisition system, the challenges encountered in the acquisition system using the F/A-22 as an example, and discuss some of the initiatives for improvement and the implementation plans of those initiatives. Each of these contributes to delays in providing needed capability to the warfighter.

The process bureaucracy in the DoD acquisition system is nothing new to the professionals that work in the acquisition career field on a day-to-day basis. The Under Secretary of Defense for Acquisition, Technology, and Logistics, the senior acquisition leader in the Pentagon, has recognized the challenges these professionals face on a daily basis. The process bureaucracy will be analyzed in the context of the acquisition of the United States Air Force (USAF) F/A-22 program and the challenges the program had from the beginning. The beginning should have been satisfying the requirements of the need, instead, there is an ongoing modernization program that continues to enhance the capabilities of the F/A-22.

The bureaucracy in an acquisition program starts long before there is ever one pencil put to paper on the design of an airplane. This will be addressed using the F/A-22 as an example of

how the USAF develops a new weapon system. Ideally, a new acquisition program begins with a requirement or a need to fill a current or future gap in the capabilities needed to continue the dominance of the USAF against any adversary. A requirement or need can generally be identified within the service, a combatant command or even in the think tanks in the Pentagon that may identify vulnerability in the warfighting capability of the service. The challenges and complexity in the acquisition process begins with identified requirements.

Air Force Instruction (AFI) 10-601, *Operational Capabilities and Requirements Development* defines the requirements generation process and “establishes the guidelines, policies, and procedures for defining, developing, documenting, validating, approving, and managing Air Force operational capability requirements.”¹ This AFI is used in conjunction with more than twelve other AFIs, Chairman of the Joint Chiefs of Staff Instructions, Air Force Policy Directives, and DoD Directives and Instructions in the acquisition process. AFI 10-601 provides an overview of the Joint Capabilities Integration and Development System requirements process, identifies the roles and responsibilities for the organizations involved in the requirements development, identifies the process and organizational oversight of the requirements process, and provides guidance regarding the studies, analysis, and required documentation for the validation and verification of a mission need to enter into the acquisition process. Additionally, AFI 10-601 “highlights the interdependent relationship between the Requirements process and the Defense Acquisition System, Test and Evaluation, and the Planning, Programming, Budgeting and Execution (PPBE) processes.”² Figure 1 below highlights the complex integration of a requirement, the acquisition process, and the test and evaluation process to verify and validate the capability.

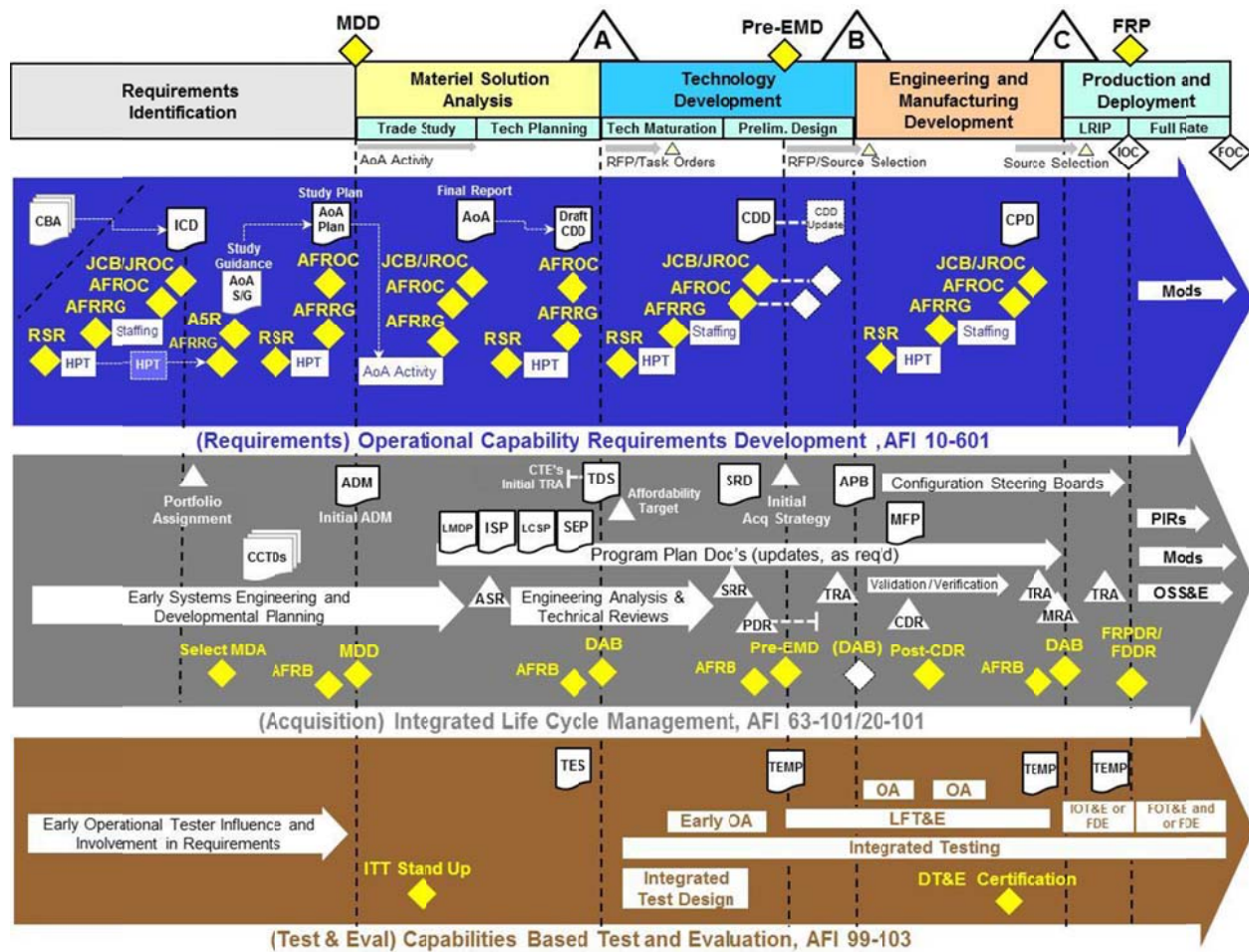


Figure 1.³

The complexity of the acquisition system is exacerbated by the amount of coordination and communication required for execution while in many cases still falling short of achieving the warfighter expectations. Some of the major contributing factors include a lack of warfighter involvement in the process once the requirement is established, the lack of communication necessary across the organizations for the requirements development, acquisition process execution, testing and evaluation for the validation of the requirement, and long cycle times leading to unexpected cost growth for the warfighter.

Once the requirement is identified and validated it is formalized into a requirements document used to socialize the requirement across the warfighting side and the business side of the DoD. This is a vetting process to ensure none of the Services have a similar gap in requirements that may already be in the process of being satisfied and to validate the requirement across the entire DoD. This is truly about the time the bureaucracy begins in an acquisition program. The F/A-22 program is an example of how the bureaucracy in an acquisition program has continued to evolve over the course of the last thirty years.

The vision for the development of the F/A-22 started soon after the production of the first F-15s in the late 1970s and early 1980s. This was a good time for the DoD in terms of the budget and resources available and subsequently allowed for the continued development and innovation within the DoD. This was a time much different than today, a time when innovation was independent of the budget and resources available. In today's environment of budget and resource constraints innovation and capability are generally tied to the amount of budget available, which effectively stifles innovation. In the 1980's, tactical ideas and concepts could enhance the combat capability provided to the services. The beginning of this development concept became known as the Advanced Tactical Fighter that was initiated to replace the F-15 after roughly twenty years of service in the USAF. As time progressed the acquisition system evolution and innovation created many challenges in the F/A-22 program.

The F/A-22 program started much like other programs within the DoD with hopes and aspirations of getting the best combat capability for the men and women protecting the freedoms of democracy across the globe. In doing so, getting this new combat capability in a reasonable amount of time and at the best value for the taxpayer resources made available for the program as the top priority. For the F/A-22 program this began with a risk reduction method of

promoting competition between the biggest airplane defense contractors in the United States, Lockheed Martin teamed with Boeing and General Dynamics; and Northrop Grumman teamed with McDonnell Douglas. In addition to the airframe competition, the DoD promoted an aircraft engine competition between Pratt and Whitney and General Electric. These defense contractors were tasked with developing prototypes for the airframe, engine, and avionics suite that would be used in the prototype airplanes. The DoD provided some initial funding through fixed price contracts to both teams for the development of the prototypes. The USAF used this investment as a cost incentive to the defense contractor teams to come up with the best solution within the constraints identified by the USAF. The objective was to restrict the dollar amount for both teams at what the USAF anticipated the cost should be and not to provide a blank check to the contractors for the development of their prototypes. This also required a commitment from the defense contractor teams, as the companies would burden more than half of the cost of the prototypes. This type of approach forced the contractor teams to have “skin in the game” to help control the cost of the program. The initial thought was if the companies are not willing to invest their own capital funds into a program for the possibility of winning the contract then they would not care as much about controlling the cost when the program is awarded. While this was meant to increase innovation, the complexity of a weapons system acquisition program goes far beyond the scope of restricting the amount of DoD funding made available for the development of prototypes and in the end did not produce the desired effects. In 1991, contracts were awarded to both Lockheed Martin and Pratt and Whitney for the Engineering and Manufacturing Development (EMD) of the F/A-22, then including eleven aircraft for prototype and developmental testing.

Political bureaucracy is inevitable when dealing with large acquisition programs. The defense contractor increase the bureaucracy of the program by using liaisons on Capitol Hill to advocate for their programs in addition to spreading the supplier base across as many states as possible. This strategy gets buy-in from as many political officials as possible by adding dollars for many years of the programs life cycle to the districts in which they represent. This is a guaranteed way to have as many advocates as possible in your corner when it comes time to spread the taxpayer dollars for each year of the budget. If a political official cuts the funding to a very large acquisition program within their own district then they are in effect taking dollars away from their own district. A political strategy of taking dollars away from their district will not be in the best interest of that political official's career.

Increasing the bureaucracy of a program could have unintended consequences or adverse affects by spreading out too many of the parts to too many suppliers. Having too many suppliers could increase the complexity and create an integration challenge when it comes time to put all of the pieces together to make up a subsystem of the airplane. Overcoming the complexity and integration challenges requires a sound and disciplined system-engineering foundation from the very beginning of the program. A series of reviews between the DoD and the defense contractor to validate the requirements starts the foundation.

The DoD is tasked to generate an Operational Requirements Document (ORD) that provides the necessary requirements for the program. The ORD is the requirements document that is contractually passed to the contractor identifying what must be met to provide the combat capability for the USAF. The defense contractor in turn creates a Contract Specification, which should identify how the contractor will satisfy the requirements provided by the DoD in the ORD. The contract specification is a much more detailed document to outline all the

requirements the contractor will satisfy in order to meet the overall requirements in the ORD. The DoD team will validate the requirements flow down in a contractor led System Requirements Review (SRR). During this review the contractor will walk through all of the requirements necessary to meet the requirements in the ORD for the government team. The SRR is the government's opportunity to ensure the contractor will meet the expectations of the government when the product is delivered. The SRR is one of the most critical reviews in the entire acquisition program because it will lay out exactly what the contractor will be working toward. So why is this critical or relevant in a discussion about capability being delayed to the warfighter? Back to the requirements development discussion, the requirements in the ORD are developed and written by both acquisition professionals and the operational users. Depending on the size and complexity of the program this can be as short as a couple of months or as long as a couple of years. Over that time span people move on to different jobs and or leave the program, especially military personnel. It is inevitable that the team that starts the development of the ORD will not be the same personnel that are able to attend the SRR when it comes time for the contractor to tell the government how the requirements will be satisfied. This leaves the personnel, both civilian and military, available to attend the SRR with the task of completely understanding the ORD requirements as they were developed earlier in the program. This has proven to be an impossible task.

The delay in providing the capability is really driven by when the misunderstanding or misinterpretation is realized in the program. In the F/A-22 program the contractor was tasked with planning all of the activities from contract award and the subsequent design and development to the production of the final airplane that rolls off of the assembly line. For the F/A-22 program this spanned more than twenty years. As the capabilities are built into the plan

some of the requirements will be satisfied initially and some may not be planned for verification until late in the program. If the capability is delayed or does not match the expectation of the user this could drive significant delay to the overall system delivery. The user has to take the risk of accepting the limited capability until sometime later in the program or delay the overall program until the desired capability is ready for delivery. Both scenarios increase the overall cost of the program by either moving the schedule to the right or increasing the manpower to accomplish the work in the allotted time.

There can be many symptoms and reasons for a decrease in the expected capability that continues to haunt DoD acquisition programs. The Government Accountability Office (GAO) determined in an assessment of the 2011 Department of Defense portfolio that the major contributors to these decreases are inefficiencies in production, quantity changes to existing programs, and research and development cost growth.⁴ All of these were major contributors to the delays and cost overruns in the F/A-22 program.

Specifically with the F/A-22, the program office identified three critical technologies including: super-cruise, stealth, and integrated avionics as the fundamental capabilities that make the F/A-22 the superior air-to-air and air-to-ground fighter airplane.⁵ Of these three critical capabilities the USAF identified that two of the three, stealth and integrated avionics, did not achieve an acceptable level of maturity until after the start of development highlighting the integrated avionics as the major contributor.⁶ The immaturity of the system created an environment of continued innovation in the middle of development that drives instability, inefficiency, and increases the overall cost of a program. The Fiscal Year 2005 GAO report stated, “since 1997 the costs of avionics has increased by over \$951 million or 24 percent and problems discovered late in the program were the major contributor.”⁷

The previously identified challenges in a major acquisition program create what acquisition professionals know as the program death spiral. The F/A-22 program was an example of this death spiral. At the beginning of a program when the contract was awarded the DoD, in conjunction with the defense contractor, is tasked to match up the resources or budget with the amount of work that will occur in each year of the program. This is accomplished well ahead of time to ensure the DoD resources are available at the time they are needed to accomplish the projected work. What happened in the case of the F/A-22 program, as previously identified, was a delay in the maturity of the critical technologies of the system.

In the March 2006 report the GAO reported that most of the fifty-two programs reviewed “proceeded with lower levels of knowledge than suggested by best practices.”⁸ A GAO analysis showed, “programs that began with immature technologies have experienced average research and development cost growth of 34.9 percent; programs that began with mature technologies have only experienced cost growth of 4.8 percent.”⁹ This creates the significant challenge of managing a program. The DoD has to balance the risk of proceeding with immature programs against the delay in getting some of the capability versus none of the capability. The subsequent delays in a program will increase both the cost and the schedule. When the cost and schedule increase the DoD is faced with accepting and funding the increased cost, reducing some of the program requirements to cover the increased cost, or reducing the quantity that will be delivered to the warfighter. This starts the proverbial death spiral. If the decision is to reduce the requirements, which in turn reduces the capability, or if the quantity delivered is reduced then it is inevitable that the unit price of the aircraft will increase. Once the unit price increases the program will be forced to reevaluate the funding profile to determine if the program can be

executed with the remaining budget. If it cannot then the cycle continues. This was proven true in the F/A-22 program.

The initial estimates of the F/A-22 program were to build 750 aircraft. Although the F/A-22 program was envisioned to include 750 aircraft, by the time the contract was awarded in 1991 the number was already reduced to 648 with an initial price tag of about \$88 billion.¹⁰ The quantity of aircraft continued to be reduced to: 442 aircraft in 1993, 341 aircraft in 1998, 339 aircraft in 1999, 333 aircraft in 2001, 270 aircraft in 2004, 172 aircraft in 2006, and back up to 175 aircraft in 2010.¹¹ These numbers do not include four aircraft funded through a 2009 supplemental appropriations act, six Production Representative Test Vehicle aircraft and two EMD aircraft. Including these twelve aircraft would bring the total number of F/A-22s to 187.¹² In 2010, it was estimated that the 183 aircraft would cost the taxpayer more than \$73 billion.¹³ To put this in perspective the average unit cost of the F/A-22 in 1991, including the research and development cost was estimated at \$135.8 million. In an apples-to-apples comparison the average unit cost in 2010 was \$398.9 million or about three times the original estimates.

The program schedule was also a significant concern for the F/A-22. Looking at the overall schedule, the EMD phase of the F/A-22 program took more than seventy-six percent longer than was initially planned, the time scheduled to reach the first production aircraft took fifty-seven percent longer, and it took an estimated nineteen percent longer for the USAF to reach Initial Operational Capability.¹⁴ A few of the challenges identified that contributed to the significant schedule slip during EMD were the Presidential Blue Ribbon Commission on Defense Management in 1986, the artificial division of the workload amongst the contractors, and the instability of the industrial base for the F/A-22.¹⁵

The Presidential Blue Ribbon Commission on Defense Management, also known as the Packard Commission, was an initiative to review the DoD acquisition and management processes and to assist the Executive and Legislative Branches, in addition to the DoD industry partners, identify and implement areas of improvement.¹⁶ This one hundred and eleven page report provided numerous recommendations for implementation across the national planning and the roles and responsibilities in the budgeting process, the civilian and military organizational structure including the establishment of many senior leader civilian positions including the Under Secretary of Defense for Acquisition, the acquisition processes and organization including a culture change of using commercial application and innovation to improve technological maturity and reduce cost, and finally the accountability of both the DoD and contractors for vigilant enforcement of a code of ethics, self auditing, and governance.¹⁷

The initiatives from the Packard Commission recommendations that had the most impact on the F/A-22 program were the requirements to have two competing contractors, place greater emphasis on the performance of the prototypes instead of on detailed technical specifications, and have the contractor share in the development cost.¹⁸ The implementation of these recommendations for the F/A-22 program were intended to reduce the technological risk on the program because two different companies would have demonstrated the technology and to promote competition, which in turn would drive the cost of the development down while emphasizing greater innovation.¹⁹ Despite competition generally always being good for the health and cost of a program and the contractor sharing in the development cost to enforce cost saving initiatives, the innovation sought after as a result of the Packard Commission caused a two year schedule slip to EMD and to the overall delivery of the first aircraft.

The artificial division of the workload also created a significant challenge for the F/A-22 program. Once the initial contract was awarded to the Lockheed Martin, General Dynamics and Boeing teams, with Lockheed Martin as the prime contractor with overall responsibility, the workload was divided in such a way to keep each of the companies viable as a prime contractor in the future instead of capitalizing on the capabilities and strengths of each of the companies. Was it important for the DoD to keep each of the companies viable as a prime contractor? The generic answer is yes so there will be adequate competition when the time comes for the development of the next aircraft. Each of these companies has a long legacy of building aircraft so why would this arbitrary division of labor create a problem? The recommended initiative discussed above from the Packard Commission to focus on the performance instead of the technical specifications creates the challenge. It is true that each of these companies could build an aircraft but they have teamed up to build one together. Even with the artificial division of the workload, all of the pieces will have to come together in one place for assembly. The lack of technical specifications creates an integration challenge that took additional time to work out. Once again more time equals more money.

The culmination of the continuous reduction in quantities and the deferred capability made it necessary for the USAF to create a modernization program for the F/A-22 to recapitalize on the deferred capability and meet the expectation of the operational community. Specifically, “the modernization and improvement program is intended to provide enhanced ground attack, information warfare, counter air, and other capabilities and improve the reliability and maintainability of the aircraft.”²⁰ Unfortunately, the challenges the F/A-22 program had through EMD and production were ignored or forgotten. The government and contractor teams should have used the lessons learned in the main F/A-22 program to have better success and have the

modernization program in much better condition than the aircraft. The modernization and improvement program faced many of the same challenges of the overall aircraft program including immature critical technologies. In 2007 a GAO report stated, “Program officials characterized their current stages of development as laboratory settings demonstrating basic performance, technical feasibility, and functionality but not form and fit (size, weight, materials, etc.).”²¹ The program underestimated the amount of time and money it would take to make these newly demonstrated technologies suitable to fly in an F/A-22.

The modernization and improvement program started in 2003, was divided into four separate release increments and was scheduled to have all planned capabilities integrated and fielded starting in 2010.²² Since that time the cost of the modernization program has more than doubled from and projected \$5.4 billion to around \$11.7 billion.²³ The F/A-22 program officials stated, “contributing factors to this cost growth include (1) changed and added requirements; (2) unexpected expenses for building a support infrastructure; and (3) unplanned efforts to improve aircraft reliability and maintainability.”²⁴ Furthermore, the schedule to field the increased capability slipped more than seven years with the final increment to be integrated and fielded starting in 2017. In the case of the schedule the program officials stated, “contributing factors to delays include (1) additional requirements, (2) unexpected problems and delays during testing, and (3) research, development, testing, and evaluation funding fluctuations.”²⁵ Again the program officials clearly underestimated the amount of time it would take to complete this improvement and modernization program and the result is a delay in the capability being delivered to the warfighter.

Reliability and maintainability was another significant concern for the F/A-22 program. The F/A-22 program has a reliability requirement, which required fleet aircraft to fly an average

of three hours between maintenance events not counting scheduled or routine maintenance. This was structured in the program in such a way that the program was supposed to meet this requirement by the time the fleet reached 100,000 operational hours of flying. This performance requirement was used in the lifecycle sustainment cost of the F/A-22 to determine the funding need to maintain the fleet of aircraft. Many factors including the reliability cost are used to calculate an aircraft cost per flying hour. In 2005, given the three-hour mean time between maintenance, the F/A-22 was estimated to have a cost per flying hour of \$23,282.²⁶ In 2015, using the same criteria, the F/A-22 is estimated to have a cost per flying hour of \$49,549, more than twice the original estimate.²⁷ So, for example, if a fleet of one hundred aircraft flies ten hours each the delta cost between what was planned and what the current estimate is for 2015 is an additional \$26.267 million. The additional cost leaves fewer resources available to fund the increased capabilities.

One of the similarities between the aircraft development program and the modernization and improvement program was the instability of funding. Despite the best efforts in planning and aligning the budget and resources to the amount of work to be accomplished in a time-phased approach, budget changes have a significant impact on a program. Between 2002 and 2008 the F/A-22 modernization budget was decreased by more than \$330 million.²⁸ Some of the budget reduction can be attributed to the fiscal constraints and cutbacks as the Congress was funding two wars but more than fifty percent of the budget decreases during this time can be attributed directly to the restructuring as a result of the budget cuts. Once a program is planned with the proposed budget and the resources are structured in such a way to consume this funding any changes to the budget forces this plan to be rebuilt. To put this in perspective, over the six-year period more than \$165 million was spent on re-planning work that was already

accomplished because of a decrease in funding for a specific year. This is \$165 million that could have been used providing additional capability or almost another airplane for the service.

The DoD is faced with a lose – lose scenario in the acquisition contract types and structure with the defense contractors being the only winners. The DoD contracting strategy varies depending on the maturity level of the system and the clarity of the requirements being acquired. According to the Federal Acquisition Regulations (FAR) contract types should vary according to: “(1) The degree and timing of the responsibility assumed by the contractor for the costs of performance; and (2) The amount and nature of the profit incentive offered to the contractor for achieving or exceeding specified standards or goals.”²⁹

Generally, two types of contract variations are used in DoD programs, fixed price contracts and cost reimbursement contracts. Fixed price type contracts put the full burden of the cost performance on the contractor while the cost plus type contracts puts minimal cost performance responsibility on the contractor. Both of these contract types provide flexibility for the contracting officer that could be used to incentivize program schedule and or performance. Fixed price contracts will have a negotiated fixed price for the duration of the contract but may include additional negotiated incentive clauses for the contractor to achieve critical performance or schedule milestones. The contractor is further incentivized to complete the task below the negotiated fixed price as this delta adds to the contractor profit margin. The government team generally finds this more acceptable because they have confidence the cost will not exceed the negotiated price. This does come with challenges to the government. For example, under a fixed price contract type if any of the requirements need to be modified in any way it is more advantageous for the contractor to reenter contract negotiations. This is simply because any work that is added to the fixed price contract that was not anticipated in the beginning creates

additional risk and essentially closes the gap on the available profit for the contractor.

Additionally, since the burden and responsibility is primarily on the contractor the negotiated incentives may be higher than they would be on cost plus type contracts.³⁰

Cost plus type contracts on the other hand reimburse the contractor for the allowable cost associated with the contract and put more of the burden on the DoD to monitor the contractor's performance for efficient and effective cost controls. Cost plus type contracts may also include incentive clauses to help control the cost. These type contracts are more advantageous for the contractor because they will be reimbursed the amount they spend and do not have to worry about losing the profit margin the same way they do with the fixed price contracts. Cost plus contracts usually create more flexibility with modifications within the scope of the requirements since the contractor knows they will get paid for the work they accomplish. Expertise and professionalism are required of both the government and contractor program management teams to ensure any changes fall within the already negotiated contract scope. Identifying and adequately managing which type of contract to use and enforcing government and contractor accountability is imperative to providing the expected capability to the warfighter to meet the operational need.

According to the Defense Acquisition Guidebook, "The Critical Design Review (CDR) confirms the system design is stable and is expected to meet system performance requirements, confirms the system is on track to achieve affordability and should cost goals as evidenced by the detailed design documentation, and establishes the system's initial product baseline."³¹ In the case of the F/A-22 at the completion of the CDR the program took over three more years to meet the best practice standards even though the design was effectively complete. This was attributed to late drawing releases to sub vendors, which created a parts shortage, which in turn forced the

contractor to either do nothing and wait for the parts or perform as much out of sequence work as they could, which delayed the start of flight testing and increased the overall cost of the program.³²

Initiatives for acquisition reform have been and continue to be a major topic of discussion for not only the senior leaders in the DoD but all acquisition professionals trying to provide the best capability for today's warfighter. Reform means to change something in an attempt to get a better result than previously realized so it has been used frequently in the acquisition process. The F/A-22 program suffered through many of the initiatives of acquisition reform as the DoD was drawing down at the end of the Cold War and with the constraints of the fiscal resources. These growing pains were certainly contributing factors to the challenges the F/A-22 program faced throughout EMD.

Defense Secretary Cohen outlined an example of reform in a 1997 report entitled the *Defense Reform Initiative*. The intent of the report was to highlight the need for change from a Cold War era culture across the entire DoD. The initiative focused the necessary change on three main elements including shaping the international security environment favorable for the interest of the United States, responding to the full spectrum of crises that may threaten the interest of the United States, and modernizing the force in preparation for an undetermined future through new technologies.³³ Secretary Cohen outlined the successful adaptation of the commercial industry during this time and wanted to utilize those lessons learned in the restructuring and reform of the DoD.

Secretary Cohen's report highlighted the shared experiences of some of the corporate executives which culminated in principles including: focus the enterprise on a unifying vision, commit the leadership team to change, focus on core competencies, streamline organizations for

agility, invest in people, exploit information technology, and break down barriers between organizations.³⁴ These are all key characteristics that could lead to the success of a company if implemented properly but could they be used in a military acquisition process environment? Secretary Cohen used these core principles identified by the corporation senior executives to shape the Department of Defense Reform Initiative. Interestingly, these core principles continue to be a focus item for the DoD acquisition process. The initiatives highlighted in the report include: “Reengineer: Adopt modern business practices to achieve world-class standards of performance; Consolidate: Streamline organizations to remove redundancy and maximize synergy; Compete: Apply market mechanisms to improve quality, reduce costs, and respond to customer needs; Eliminate: Reduce excess support structures to free resources and focus on core competencies.”³⁵ These have been the foundation, in varying forms, of DoD acquisition reform since the time of the 1997 report.

In the testimony to the Acquisition and Technology Subcommittee of the Senate Armed Services Committee on March 18, 1998, then Under Secretary of Defense for Acquisition and Technology Dr. Jacques S. Gansler stated, “The Department of Defense averages thirteen to fifteen years from weapon initiation through development to initial production.”³⁶ The timeline for the acquisition of a weapon system creates a significant challenge for many acquisitions programs including the F/A-22, of chasing technology. There has been exponential growth in technology of all kinds in the last thirty-five years in both the military and commercial environments. The timeline identified above challenges providing the best and latest technology for the warfighter. For example, with the continuous improvement and growth of technology, by the time an avionics suite is developed, produced, and integrated into an aircraft most of the components are long out of date and obsolete.

Dr. Gansler outlined some of the initiatives described above in his 1998 testimony. Dr. Gansler said, “Acquisition Reform, Mr. Chairman, is not a slogan. It is a fundamental transformation in our organization, structure, policies, and processes — one which our acquisition workforce welcomes and which we all will work hard to achieve.”³⁷ This statement demonstrated the underlying perception of mismanagement, misunderstanding, and apprehensive concern for the overall DoD acquisition process. Much of this concern coming on the heels of the legislative initiatives by the Congress and administration including the Defense Acquisition Workforce Improvement Act, the Federal Acquisition Streamlining Act, the Federal Acquisition Reform Act, and the Information Technology Reform Act.³⁸ Was this just entirely too much legislation in an effort to fix and reform the acquisition process for implementation? The goal of course with the increased legislative initiatives and oversight was for the acquisition professionals to do the job better than had been demonstrated, to do it faster, and to do it cheaper in light of the continued reduction in budget and resources after the end of the Cold War.

The acquisition process continued to be challenged in numerous ways from the smallest of acquisition programs within the DoD to the largest. In the testimony by Dr. Gansler he outlined three main tasks in transforming the way the DoD was doing business. These included, “to modernize our current weapons systems, to develop and deploy the major new systems and subsystems required for 21st century operations, [and] to support those systems efficiently and effectively — and do all three of these at lower cost, within drastically reduced cycle times, and with greater performance.”³⁹ These initiatives coincide with the principles identified by Secretary Cohen highlighting the unity between and amongst the leadership. This does not seem like an unreasonable expectation or unattainable task for the DoD. Each of these shows the link established by the Goldwater-Nichols Act of 1986 between the civilian and military leadership

and the efforts of the legislation to strengthen the core of our Government. Understanding that Dr. Gansler's testimony and identified task for transforming the DoD acquisition process is roughly a decade after the Goldwater-Nichols Act mandate is validation of the needed legislative reform.

Dr. Gansler's recommendations are evidence that innovation continued in order to prepare the United States for future challenges even in a time of reducing the military and resources. This innovative spirit focused on the modernization of current weapon systems to enhance the capabilities of existing systems, to free up and make available additional resources to counter the threat gaps of the future, and to design in the inherent support and maintenance of these systems from the beginning.

In order to accomplish these three main tasks Dr. Gansler set five priorities for the acquisition team including, "continued acquisition reform, civilian and military industrial integration, support and infrastructure restructuring, reengineer DoD logistics, and workforce enhancement."⁴⁰ These were developed in part to recapitalize enough of the budget to begin the much-needed and neglected modernization of the military weapon systems over the previous decade. These priorities are seemingly timeless and could be applied in many acquisition programs in the modern era but what is at the heart of these initiatives and why is this considered to be acquisition reform? Further analysis of a few of these priorities should help with understanding.

The priorities identified for acquisition reform are intended to be a continuous improvement and implementation of the evolving initiatives and best practices of both the military and commercial industry. Everyone in the cradle to grave lifecycle of an acquisition program must be involved. Additionally, this should include increasing communication between

the government and contractor teams to identify the expectations of a program, capitalize on the commercial best practices that could be used to satisfy military requirements thus reducing the overall cost, and increasing the prospect of more competition in the acquisition process to drive down the cost.⁴¹ For example, these can be accomplished by using existing manufacturing and production lines for commercial materials instead of having to start up a separate line for a military delivery. Implementation could save significant infrastructure cost and provide goods and services to the warfighter cheaper and faster than before. Another example could be to structure the contracting of goods in such a way that make them available on an as needed basis and provide direct delivery instead of buying a lot of an item and paying the storage and warehouse management cost for that storage.⁴²

A few examples of reform were the base realignment and closure used to consolidate capabilities and reduce the infrastructure cost to the government, revamp the training program for the acquisition workforce, and make as much of the training as possible available online saving the travel cost of education for the force. These initiatives do not come without challenges and require the leaders of the DoD to make some extremely difficult decisions. Each of these cost saving measures required a change in the way of doing business and in many cases a loss of employment for many people.

The most recent reform initiative started in September of 2010, which was a memorandum from the previous Under Secretary of Defense for Acquisition, Technology, and Logistics Ashton Carter. This memorandum was entitled *Better Buying Power: Guidance for Obtaining Greater Efficiency and Productivity in Defense Spending* and is a, “mandate to deliver better value to the taxpayer and warfighter by improving the way the Department does business.”⁴³ This is essentially a DoD mandate to “Do More Without More.”⁴⁴

Better Buying Power (BBP) is defined as “the implementation of best practices to strengthen the Defense Department's buying power, improve industry productivity, and provide an affordable, value-added military capability to the Warfighter.”⁴⁵ So why is this initiative any different than the two previously mentioned initiatives and why will this one be successful when the other two have not been in changing the way the DoD does business? This new initiative seeks to gain buy-in from the senior leaders of the DoD, the Congress, as well as the commercial industry leadership. Additionally, there is a feedback mechanism for both government and commercial organizations for continuous improvement in the system. This feedback mechanism and communication at the senior levels established the foundation to manage the expectation across the teams. It also provides a realistic look at what can be accomplished, what may not be accomplished, and the expectations for the timeframes for execution. Secretary Carter highlights, “It has taken years for excessive cost and unproductive overhead to creep into our business process, and it will take years to work them out.”⁴⁶ This initiative continues to bring the senior leaders from the DoD, the Congress, and industry together on a regular basis to capitalize on the things that are working well while working through the challenges in the system. This frontal assault of improving the process makes it different from the previously attempted initiatives.

Much like the previously described initiatives, BBP includes fundamental focus areas for improving and targeting efficiencies in the acquisition system by changing the way the DoD conducts business. These five focus areas include, target affordability and cost growth, incentivize productivity and innovation in industry, promote real competition, improve tradecraft in services acquisition, and reduce non-productive processes and bureaucracy.⁴⁷ Over the course of time each of these initiatives, with the attention of the senior leaders from the acquisition

community, will provide the process improvements to provide the needed capability to the warfighter.

Just one example of the continuous improvement and of the feedback from the acquisition community is being incorporated is evidenced in the later revisions to the BBP 3.0. With the foundation set for BBP there has been continuous improvement and evolution of these initiatives initially outlined in BBP. These provided an emphasis that once the initiatives were released and ingrained into the culture of the acquisition community, there would be opportunity to capitalize on workforce experiences and the data collected on acquisition programs over time to refine the BBP initiatives. BBP 3.0 continues the emphasis on increasing efficiency and effectiveness through the technical excellence and innovation from the acquisition community. BBP 3.0 has fundamental focus areas including, “achieve affordable programs, control cost throughout the lifecycle, incentivize productivity and innovation in industry and government, eliminate unproductive processes and bureaucracy, promote effective communication, improve tradecraft in acquisition of services, and improve the professionalism of the total acquisition workforce.”⁴⁸ This change symbolizes the commitment from the senior leaders of the acquisition community with a focus on providing the best product at the best value.

Although it will take time to realize whether or not the commitments of both the commercial and government teams pay off in the long run it is important that both parties have recognized the need for change and are taking steps in the right direction to improve the overall acquisition process. With the continued focus and senior leader attention the acquisition process will continue improving.

Bureaucracy, politics, leadership, budget scrutiny, and resource limitations, as well as the acquisition process itself, are all contributing factors that delay delivering much needed

capability to the warfighter. If these are not proactively managed they can have significant cost, schedule and performance impacts on defense acquisition programs. These impacts can range from cost overruns to decreased capabilities to mistrust amongst the DoD senior executives and the Congress. There were numerous challenges in the F/A-22 program that led to the program death spiral including chasing technology, budget instability, unrealistic expectations, artificial division of the workload, acquisition process timeline, and increased legislation just to name a few. Each of these individually could derail an acquisition program and the F/A-22 encountered all of them. The reality being that not even the BBP initiatives, if they had been instituted in the late 1980s, would have made a significant difference on the outcome of the F/A-22 program because of the combination of the aforementioned challenges. Senior DoD executives have recognized the challenge and are implementing new initiatives to work toward a better product. Some of these include a commitment from the leadership team to change, increasing communication between the government and contractor teams, continuing the feedback mechanism for acquisition process reform, incentivizing productivity and innovation, and promoting real competition in programs. Proactive leadership and management from the senior executives down to the lower worker in both the government and contractor teams is essential for these new initiatives to make a difference in delivering capability to the warfighter in a timely manner.

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