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**COMPETITIVE ADVANTAGE, UNCERTAINTY, AND WEAPONS PROCUREMENT:
STRIKING BALANCE FOR THE FUTURE**

by

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Secretary Gates has established balance as the defining principle of our National Defense Strategy. Accomplishing balance in an era full of surprise and uncertainty with discontinuities and disruptive forces is immensely challenging. The ongoing overhaul of our strategic planning and acquisition processes is focused on creating the right balance of investments all leading to a sustained competitive advantage. This paper presents an analysis of how effective this overhaul has been in creating asymmetric capabilities that provide an enduring competitive advantage. Analysis indicates our strategic planning process lacks the flexibility and adaptability necessary to deal with uncertainty. Concurrently, our weapons procurement system is mired in process and consistently fails to deliver on time. Therefore, change must occur. We must aggressively develop scenarios of alternate futures that drive an adaptable hedging strategy. Along with this, our weapons procurement system must thrive in time based competition, delivering timely asymmetric capabilities. Finally, we can never truly quantify the future; therefore we must learn rapidly and adapt to disruptions with speed and agility. Through these measures we can in some measure balance our strategy, manage risk, and deliver asymmetric capabilities at the right time, thus sustaining our competitive advantage.

COMPETITIVE ADVANTAGE, UNCERTAINTY, AND WEAPONS PROCUREMENT: STRIKING BALANCE FOR THE FUTURE

On Monday, April 6th 2009, Defense Secretary Robert M. Gates announced key recommendations for his 2010 defense budget. Characterized as reshaping “the priorities of America’s defense establishment”¹ he wanted these changes to “profoundly reform”² how the Department of Defense (DoD) conducts business. The rationale for this shift was based on a “holistic assessment of capabilities, requirements, risk and needs”³ from which he concluded a shift in strategic direction was required. A principle objective was to “rebalance”⁴ DoD programs to “institutionalize and finance our capabilities”⁵ to fight today’s wars and the “scenarios we are most likely to face in the years ahead,”⁶ along with a hedge against other risks and contingencies. In order to accomplish this, Secretary Gates felt a “fundamental overhaul of our approach to procurement, acquisition, and contracting”⁷ was necessary to correct “underlying flaws in the priorities, cultural preferences and reward structure of our defense establishment.”⁸ Secretary Gates, in essence, was seeking to achieve the defining principle of our National Defense Strategy, balance.⁹

The recent overhauls of our strategic planning and acquisition processes have also sought to correct the underlying flaws Secretary Gate’s spoke of. The question is whether these efforts are achieving the right balance of investments and hedging against “surprise and uncertainty.”¹⁰ This paper explores that question through an analysis of scenario development, strategic planning, weapons procurement, and their interactions. By studying how these elements meld together, create our competitive strategy, and deliver asymmetries we can assess our ability to achieve an enduring competitive advantage. It is through an enduring and sustained competitive advantage balance is obtained along with a hedge against uncertainty. Unfortunately, the analysis presented indicates our current strategic planning process is lethargic and lacks the flexibility and adaptability to deal with uncertainty. Concurrently, our weapons procurement system is mired in process and consistently demonstrates poor timing, frequently delivering late products. Therefore, we can not effectively achieve timely asymmetric capabilities or sustain an

enduring competitive advantage. Change must occur and it should first begin with the aggressive development of scenarios that challenge our mental models of the future and demand action. Second, our strategic planning process must implement an adaptable hedging strategy that accounts for many alternate futures and does not simply seek to shape the future. Third, our weapons procurement system must thrive in time based competition so we can deliver timely asymmetric capabilities. Finally, as we can never truly quantify the future, we must learn rapidly and adapt to disruptions with speed and agility. Through these measures we can effectively balance our strategy, manage risk, create asymmetric capabilities and sustain our competitive advantage.

General Motors: A Parable for the Department of Defense

A job with General Motors (GM); it was the promise land, bountiful wages, healthcare, solid union contract, employment for life. It was more than just a job, it was a family affair, passed down from generations and there was no seeming end. Making cars for America would support entire towns whose sons and daughters rose, worked, and slept under the glow of the local manufacturing plant. None thought there would be change; none contemplated a potential shift to the status quo. Good manufacturing jobs in the heartland; jobs for the next generation. The future was set, stable, and predictable.

But somewhere along the way, the brilliant finish began to wear and rust marred the frame. Bit by bit, the empire was crumbling. Overextended, bloated, and lacking a clear strategy for the future, the competition was overtaking and market share dwindled. By 2006, GM had but 26% of the retail auto market and losses of \$8.6 billion.¹¹ With revenues in freefall it was saddled with an improper product mix of gas-guzzling trucks and SUV's, underutilized infrastructure supporting eight total brands (Buick, Cadillac, Chevrolet, GMC, Hummer, Pontiac, Saab, and Saturn), and insurance costs for a population in excess of 1 million employees, retirees, and dependents. In fact, GM's pension fund had over \$100 billion in assets while shareholder value was but a fraction at \$13 billion. Add to this GM's inability to restructure, severely limited by state franchise laws which protected over 1.1 million salespeople, accountants, and mechanics, and

failure was on the horizon. Most auto insiders felt bankruptcy was around the corner and questioned why a greater sense of urgency was not present.¹²

Over the next two years GM limped along with sales inflated by a series of rebates all backed by cheap financing. Perhaps this would allow the time needed to re-align the company, gain union concessions, and position for the future. This was not the case. The soaring fuel prices in early 2008 where gas peaked at over \$4.00 per gallon brought a stagnation of sales. Then, just as fuel prices began to recede, the financial markets collapsed. Credit, the life blood of auto sales became unavailable. As the magnitude of the recession became evident consumer confidence evaporated. Even low gas prices, interest free loans, and “at cost” pricing could not bring customers back.¹³

Many believe the infusion of additional cash will only prolong the inevitable, keeping GM on life support until the money runs out. And yet GM’s product development has been rapidly improving giving it the “technological resources to be a leader in low-emissions powertrains.”¹⁴ An example is the Chevy Volt, on track for release in 2010, representing the next generation, hybrid 2.0. GM is pushing the industry in new generation battery systems despite being on the precipice of bankruptcy and potentially being dissolved.

The genesis of these problems began over 50 years ago when a series of CEO’s made poor long term strategic decisions focusing almost exclusively on short term financial performance. In crafting GM’s competitive strategy these men failed to balance future uncertainty with their present reality. A company that once commanded a dominant competitive advantage found it lacked the agility to survive in turbulent markets. While most of industry could not foresee the events of the past year, GM was particularly ill-positioned for this uncertainty.

GM’s demise brings to the forefront the challenge of crafting a competitive strategy that retains competitive advantage during periods of uncertainty and disruptive market forces. It also highlights the need for an adaptable and flexible position allowing for agility when

confronted by disruptions. GM was saddled with an inflexible and lethargic bureaucracy that precluded a proactive response creating the right mixture of cost reductions, product development, and restructuring to survive in the short term and prosper for the future. In many respects, this is the same challenge facing the DoD, strategically positioning the organization to have an enduring competitive advantage. This has proven particularly challenging since the collapse of the Soviet Union, the events of September 11th, and our subsequent combat actions in Iraq and Afghanistan.¹⁵ The lethal but relatively stable period of super power peer to peer dominance was replaced with an era characterized as one of “surprise and uncertainty”¹⁶ with a high potential for discontinuities and disruptive forces.

Secretary Gates made it clear that we must “rebalance our strategy and our forces”¹⁷ aligning planning, budgeting and weapons-buying for the 21st Century. However, the assessment of our current state varies. President Obama intimated we are rearward looking and promised to “reform our defense budget so that we’re not paying for Cold War-era weapons systems we don’t use.”¹⁸ In contrast, Secretary Gates criticized some for a “tendency towards what might be called ‘Next-War-it is.’”¹⁹ He further stipulated that “the kinds of capabilities we will most likely need in the years ahead will often resemble the kinds of capabilities we need today.”²⁰ Given the belief disruptive forces are on the horizon, his assumption is open to question. Consequently, assessing the strategic balance within DoD and whether our weapons procurement programs have the right mix of capabilities to deal with an uncertain future presents a massively complex effort. The problem becomes even more challenging with a defense procurement system perceived as wholly inefficient with “runaway costs, prolonged delivery schedules and poor performance.”²¹ These factors make it imperative we realign our strategy for the 21st Century and create a procurement system that provides the “right product at the right time.”²² While GM’s commitment to change was questioned, that is not the case within the senior levels of DoD as “the terrorist attacks on September 11 imposed a powerful sense of urgency to transform the Department.”²³ In *Leading Change*, John Kotter noted that for a transformation effort to succeed you “must develop a clear vision of the future and then strategies for achieving that vision.”²⁴ Therefore, the question at hand is how to

create a clear enough vision of the future, derive a strategy that deals with uncertainty, and then effectively develop and field weapon systems that retain our competitive advantage, all melded together in a seamless and adaptable process that avoids the lethargy and inflexibility of GM. Scenario development is the first element of this string. Through the creation of challenging and demanding future scenarios our strategic planning process has, at its core, the foundation to craft an effective hedge against risks and map a prudent investment strategy. Subsequently, our weapons procurement system must deliver timely asymmetric capabilities leading to a sustained competitive advantage.

Scenario Development and Strategy

When many consider strategy development during periods of uncertainty, gambling comes to mind. In these situations you either make one big bet accepting tremendous risk or hedge by diversifying your portfolio. In reality, strategy under uncertainty requires neither, for the goal is to provide a knowledgeable sense of risk and reward so that wise and prudent decisions can be made.²⁵ The concept of strategy under uncertainty is built upon scenario development. Scenarios first entered the military lexicon as a post World War II planning tool for the Air Force. Grappling with the new nuclear age, planners began to explore numerous Soviet – U.S. scenarios and options for strategically positioning our nuclear forces. From this, the field began to expand and as often happens, drifted to the business world.²⁶

Beginning in 1970, Royal Dutch/Shell Oil formed a planning group under the direction of Pierre Wack. Given the uncertainty of the world oil market and the rising influence of Arab countries, his charter was to devise a strategy that would position the company for continued success. As he began to explore the situation and provide projections of the future, a future where oil prices continued to rise and Dutch/Shell would lose competitive advantage, he found little reaction from executive leadership. He recognized their “mental model” precluded a view of alternate futures. To succeed, his scenarios needed to be transforming events; events where the listener “re-perceived” the world through

descriptions of the full ramifications, forces acting upon this vision, and a glimpse of decisions required.²⁷

With the start of the October 1973 “Yom Kippur” War and the ensuing rapid rise in oil prices, Dutch/Shell was prepared for the impact and quickly responded. While their vision did not specifically predict this Middle East crisis, the perception of events was accurate enough to make better decisions and expand their market position. Given the success of Dutch/Shell, the art of scenario planning quickly traveled to many other businesses and the tools grew. Regardless, the founding principle of Pierre Wack’s technique remains; scenarios allow leaders to put structure to uncertainty as they are based on a “sound analysis of reality and they change the decision makers’ assumptions of how the world works and compels them to reorganize their mental model of reality.”²⁸

The challenge when looking at an uncertain future and exploring scenarios is to not make it a binary proposition where there is either predictability or complete chaos. Rather, the answer lies between and the art focuses on how to quantify the range of uncertainty and provide some measure of risk assessment and mitigation strategies. Underestimating or overestimating uncertainty can lead to monumental impacts. From a business perspective, one can simply recall statements that doubted the proliferation of home computers and criticality of operating systems. Many businesses’ felt the future lay only in main frame computing and large data storage. These businesses have ceased to exist while young men working out of a garage now run many of the most powerful companies on the planet.²⁹ The same analysis can be applied to our invasion of Iraq. While the insurgency developed over a period of time, the base assumptions and planning failed to adapt and a new reality quickly confronted us. One technique used to assess uncertainty and prevent a binary view breaks scenarios into four distinct groups. The process begins with a rigorous analysis ensuring all known elements are understood and the residual uncertainty is quantified. Based on the magnitude of this residual uncertainty, each scenario is tagged as either associated with a clear enough future, alternate future, range of futures, or true ambiguity.³⁰

Developing strategies for a clear enough future is relatively straight forward. In many respects, this was the approach taken by defense planners following the 1991 Gulf War. Given the overwhelming superiority of U.S. technology, future conflicts were envisioned as “shock and awe” events where adversaries were quickly overwhelmed and compelled to exhibit behavior consistent with U.S. interests. Thus began the “revolution in military affairs” where technology provided the strategy and information dominance gave us certainty for all future wars.³¹ History has shown the future was not as clear as we predicted.

Alternate futures are characterized by a few outcomes or discrete scenarios often thought of as branches and sequels. These types of scenarios led to the development of game theory and systems thinking where you could effectively model potential outcomes, assess feedback, and analyze the range of options.³² Strategies could be developed shaping the alternate futures thus increasing the probability of favorable outcomes. The Cold War provided ample iterations on these techniques as the range of future outcomes was somewhat limited given the super power standoff. Nuclear parity and mutually assured destruction created boundary conditions that focused defense planners to a much narrower scope. Game theory was ideally suited as players interacted within specified “rules of engagement” allowing for a systematic approach to analyze interdependencies and quantify threat behavior. Our Cold War strategy was defined and existed for decades based on these techniques.³³

A range of futures moves away from shaping a particular outcome to influencing the general direction of events. In this particular realm, robust scenario planning is essential to identify the probable range of future outcomes, requiring both art and science. Scenario planners must probe the boundaries determining a limited set of alternate scenarios that most closely represents the range of action. Each scenario must be independent and non-overlapping with a distinct picture that drives strategic decision making.³⁴ One could argue that since September 2001 we have dealt with a range of futures.

Ambiguity represents the most qualitative area where tools and theory break down. While some believe the only option is to sit and wait for events, there are concrete steps to quantify ambiguity. Variables can be identified that mark the evolution of strategic threats. These can then be linked to indicators that drive multiple options. Observation of patterns provides an analogous assessment to other comparable situations. While the progression in those situations may have some unique, non-overlapping characteristics, insights can be gained that mark the transition from uncertain to more certain. True ambiguity requires a flexible approach where organizational agility is vital to retain advantage.³⁵ These types of situations confound planners. In the case of dealing with rogue states and transnational actors, poorly understood value systems or bizarre motivations defy conventional pattern analysis and variables are hard to identify. These situations necessitate exploration of extreme potential outcomes and the associated threat to U.S. security. The 2006 QDR highlights this threat as one of the top four priorities: “preventing hostile states and non-state actors from acquiring or using WMD (weapons of mass destruction).”³⁶

With uncertainty quantified (best we can), a strategic posture can be developed along with a portfolio of actions. Courtland, Kirkland, and Viguerie define three potential postures; shaping the future, adapting to the future, and reserving the right to play. Each is rather self explanatory. Shaping attempts to drive a desired state where we take the lead in selected areas. Adapting allows the market to move but relies on speed, agility, and flexibility to react and capture opportunities. Finally, reserving the right to play utilizes selected investments to retain sufficient staying power without making premature commitments. Reserving the right to play allows for a “wait and see” approach where higher certainty is obtained before formulating a strategy. The portfolio of actions includes big bets, options, and no-regret moves. Big bets, where there is a significant payoff but associated high degree of risk, are traditionally associated with shaping strategies. Options, associated with adapting and reserving the right to play, involve modest amounts of investment allowing for scalability based on evolving clarity. Finally, no-regret moves work across the spectrum of uncertainty and form the safe core of most strategies.³⁷ Other works have also defined investment strategies.³⁸ Time-based

competition; hedging, “wildcatting;” cost-imposing; these all map closely to the postures and actions presented above. Big bets impose cost penalties on peer and near peer competitors, hedging, wildcatting, and time based competition rely on adapting and reserving the right to play, and shaping drives competitor competition and imposes cost penalties. Regardless of the technique’s name, the key is driving actions that lead to a balanced investment portfolio; a balanced portfolio that addresses uncertainty and retains competitive advantage.

While scenario planning frequently devolves into the detailed analysis of potential outcomes it is important to remember that Pierre Wack envisioned scenarios as learning events where perceptions were changed and “mental models” challenged.³⁹ One of his protégés, Arie de Geus went on to analyze the influence planning had on learning. As he studied corporate leaders he noticed that success was predicated on the ability to absorb what is going on and act on the information with appropriate speed. It was in essence corporate learning that provided the engine of progress. From this he began to ask, “how does a company learn and adapt” and what was a planner’s role in this process. As he poured through case study after case study a pattern emerged, pain, or rather crisis management was driving change. While often effective, it was a dangerous position to be in. As the crisis deepened, options became constrained and autocratic management became the norm. It was here where the planner could have the biggest impact. Through the scenario process you were not changing the microcosm rather you were influencing learning and teaching adaptation. Ultimately, he concluded that “learning faster than your competitor comes to be seen as the only sustainable competitive advantage in an environment of rapid innovation and change.” It was clear, the strategic posture of an organization and its portfolio of actions was driven by the ability to learn. Organizational learning created the conditions for speed, agility, and flexibility necessary to excel when trying to deal with uncertainty.⁴⁰

Capabilities Based Planning

As the DoD sifted through the carnage following the attacks of September 11th it was evident that past operational assumptions and planning was no longer valid. New threats, new disruptions, and new methods would be required to combat this reality. Therefore, a complete overhaul of the planning system began in earnest analyzing every aspect from strategy development through weapons procurement. Over the next four years, directives began emerging framing the attributes of the new capabilities based planning process. No longer were threat based approaches to be used, rather capabilities based planning would focus on delivering capabilities for a wide spectrum of security challenges.⁴¹ The capabilities based approach would help to “mitigate uncertainty by emphasizing the nation’s ability to shape the battlefield, regardless of whom we fight or where we fight.”⁴² Two key enabling functions would be decision making within an economic framework and choices made using a portfolio approach, or in other words, early budgetary alignment and decision making using a joint perspective.

While the shift from a threat to capabilities based approach was clearly driven by an uncertain future, understanding the budgetary and portfolio management issues necessitate a review of the setting prior to 2001. The previous planning process had been a service dominated event where friction was common between the Combatant Commands, their joint requirements, and service parochial interests. Many perceived services’ stove piped requirements with little consideration of alternatives outside their sphere or the existence of unnecessary overlapping mission areas. Consequently, the joint needs of Combatant Commanders were not the focal point of planning and services often championed weapons systems that did not meet the portfolio of effects a theatre commander demanded. Additionally, requirements were resourced at the end of the planning cycle. Senior leaders would then have to focus much time and energy fixing problems whose languishing nature prevented the application of quick and effect proactive solutions. Correcting these two issues along with mitigating the risks of uncertainty became a focal point in shaping the new planning strategy.⁴³

What emerged was a confederation of process elements loosely categorized into the four specific areas depicted in Figure 1, and collectively referred to as capabilities based planning (CBP). Strategy, enhanced planning, resourcing, and execution and accountability would serve as the mechanism to bring about future capabilities that met joint requirements within funding constraints. Strategy would see increased streamlining via the Strategic Planning Guidance (SPG). Information contained in numerous strategic planning documents would be synthesized into the SPG and under the leadership of the Joint Staff and Combatant Commanders, drive the other processes. Enhanced planning would merge numerous other processes to identify the right capabilities, ensuring they met strategic intent. This would primarily be accomplished by overlaying the Defense Planning Scenarios (DPS), what we might face, with the Joint Concept of Operations (JOpsC), our vision of how operations would be conducted eight to twenty years into the future. Underlying analysis and assessment, the Joint Capabilities Integration and Development System (JCIDS) would shepherd the creation of new capabilities and provide synchronization across the disparate process elements. To ensure a joint perspective, JCIDS would be administered and issues adjudicated by the Joint Requirements Oversight Council (JROC). The JROC, chaired by the Vice Chairman of the Joint Chiefs of Staff and with membership including the Vice Chiefs of each military service, would review and validate all documentation emanating from JCIDS. Finally, the Joint Programming Guidance (JPG) would merge the needs with resource allocation and ensure proper funding. Lastly, a means of assessment, focused around capabilities categories, would provide metrics of performance and feedback on progress.⁴⁴

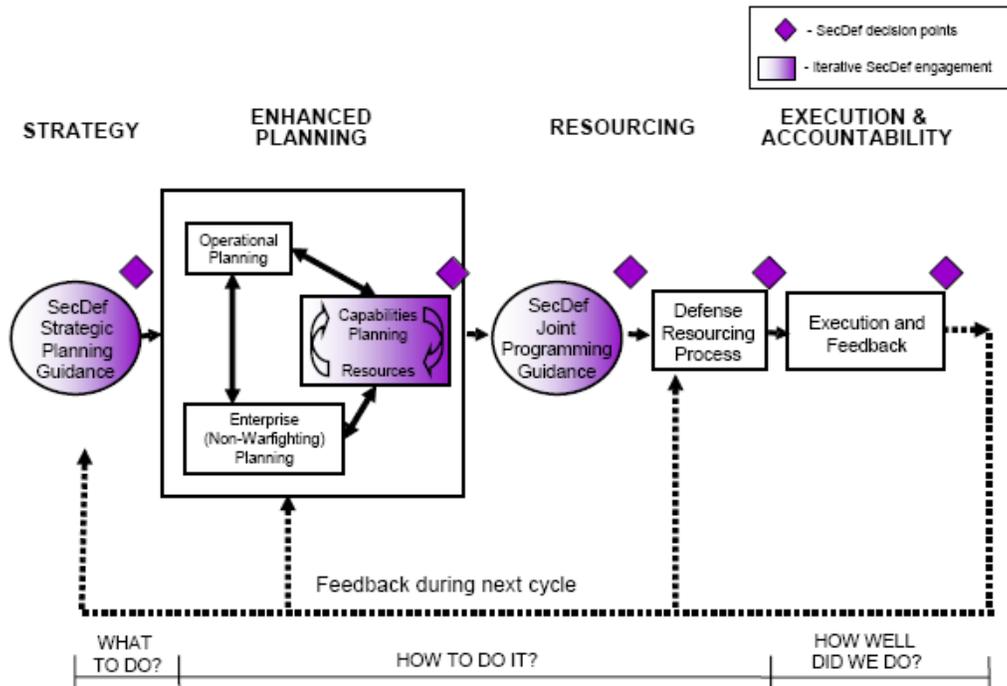


Figure 1. Simplified Capabilities Based Planning Process Model⁴⁵

Discussed earlier, the family of Joint Operations Concepts (JOpsC) guides the transformation of the joint force as it prepares to operate and win eight to twenty years into the future. Depicted in Figure 2, the JOpsC is a hierarchy of operating concepts headed by the Capstone Concept for Joint Operations (CCJO). The CCJO provides a broad foundation of how to operate in the future and drives the creation of Joint Operating Concepts and Joint Functional Concepts. Joint Operating Concepts describe a broad joint force operation (e.g. stability operations) while Joint Functional Concepts address enduring functions (e.g. battlespace awareness). These then combine to form Joint Integrating Concepts (JICs) that detail methods of accomplishing narrowly scoped functions such as global strike. When the family of JOpsC is tied to the CBP process, capabilities based assessments (CBA), shown in Figure 3, is the analytic method to determine capabilities gaps and link to JCIDS.⁴⁶

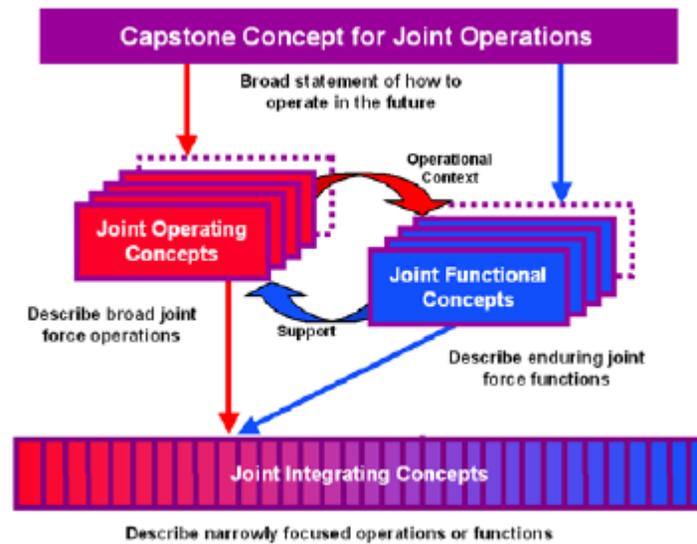


Figure 2. Joint Operating Concepts Family⁴⁷

While these processes identified the means to quantify and program long term requirements, there was recognition that short term needs must be addressed. Through the implementation of Joint Urgent Need Statements (JUONs), Combatant Commander's Integrated Priority Lists (IPL), and Concept of Operations (CONOPS), insight could be gained to the contemporary operating environment allowing for adjustments of current programs to meet pressing and urgent operational requirements. As with the JOpsC and CBA, figure 3 represents the interaction between short term elements and how short and long term capability needs are brought together. Elements are broken into guidance, assessment and analysis, reconciliations and recommendations, and finally decisions and actions. In essence, overlaying what we have with what we need drives decisions and actions.

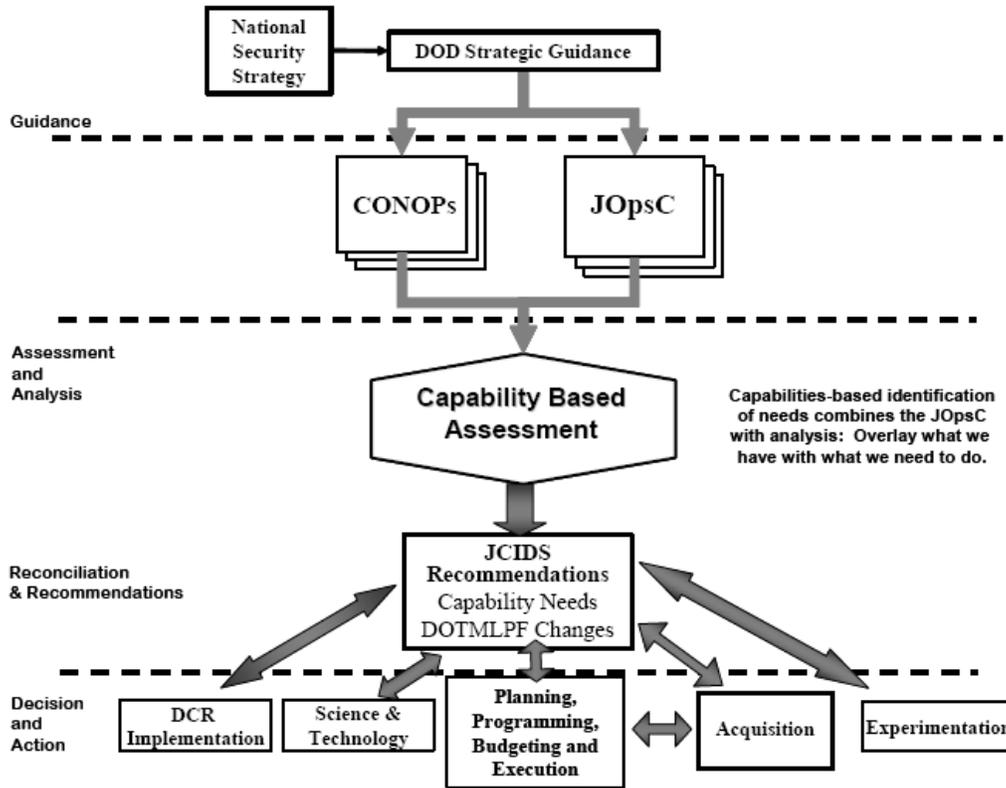


Figure 3. Top Down Capability Need Identification Process⁴⁸

Another critical relationship is that between the CBP, specifically JCIDS, and the Defense Acquisition System (DAS). Figure 4 provides the flow from a capabilities gap validation through product deployment. Upon JROC approval of an Initial Capabilities Document (ICD) or Joint Capabilities Document (JCD), defining a capabilities gap, actions begin to meet the validated need. Should a material solution be considered, the acquisition process is entered. Working through a material solution analysis, various options are considered taking into account feasibility, cost, and numerous other factors. Upon selection of an alternative, technical and product development begins in earnest leading to a Capabilities Development Document (CDD), Capabilities Production Document (CPD) and ultimately fielding of a new capability.⁴⁹

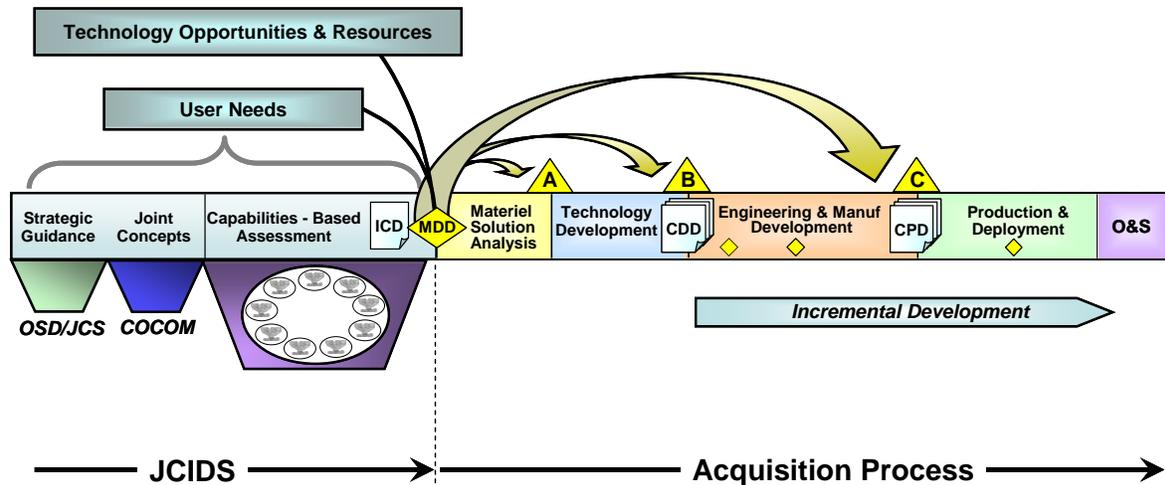


Figure 4. JCIDS Process and Acquisition Decisions⁵⁰

While much thought and effort was expended creating a planning system to correct past deficiencies, output would determine success. To date, the results are mixed. Progress has been achieved in making COCOM's the centerpiece and driving action. This has created numerous "quick wins" and short term reprogramming movements to meet urgent capability needs. The JPG for FY 06-11 shows evidence of the improvement. The 2005 COCOM Integrated Priority Lists identified 69 capability gaps. Of these, the JROC recommended 23 for movement into the FY06 POM and subsequently 19 of these gaps were incorporated into the JPG moving \$3 billion in current year money and \$7 billion in out years. While only a small step, future years have brought even more focus to the COCOMs with a greater sense of urgency and budget flexibility to meet emerging needs.

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For long term planning, many of the same systemic issues remain with service domination of a lengthy and complex staffing path. Long term capability development looks for an inclusive process that seeks to build consensus. Current estimates indicate thousands of man-years are required to assess whether planned capabilities meet requirements defined in the JICs. Additionally, as the JROC is led by the four service Vice Chiefs of Staff, many believe consensual politics drive decision making, ensuring service budget lines.⁵² Inadequate COCOM staffing precludes robust analysis of long term capability requirements and areas of potentially "wasting assets" compounding the

problem.⁵³ Consequently, services can easily dominate the discussion leading to an incomplete alignment of capabilities for each theatre, a one size fits all approach, and the retention of capabilities that may no longer be needed. Recommendations have been made to replace the service Vice Chiefs with the Deputy Commander from the COCOMs forcing services to focus on how to meet the long term requirements of each COCOM. Further recommendations have called for the creation of a “Joint Capabilities Command”⁵⁴ that advocates for long term capabilities requirements. How this is balanced with the current responsibilities of the Joint Forces Command (JFCOM) had led many to question the validity of another unified command. Finally, the consensus building process adds little value but significant time. Perceptions that weapons procurement provides gold plated solutions stems from these types of activities. As there is no time phasing to the process or initial fiscal cap placed on the investment, material solution requirements continue to evolve and expand.⁵⁵ While perhaps adequate for a “Cold-War” solution where large quantities of technically superior equipment were produced, the process is ill suited for an era of rapidly changing technology trends, disruptive technologies, and adversaries adept at exploiting technology.

Science and technology (S&T) integration has also posed problems. While S&T is managed within the acquisition system, it does have the responsibility to look forward and identify technology trends that support future operating concepts. The 2007 Department of Defense Research and Engineering (DDR&E) strategic plan notes that “future capabilities depend on today’s research and engineering (R&E) investment. It is through these efforts we can defend against a wide range of asymmetric challenges and hedge against future uncertainty.”⁵⁶ Consequently, S&T can not simply be on the receiving end of the JCIDS process nor should it be driving joint concepts and defining capabilities needs. Rather, technologists must be integrated with those looking at joint operating concepts and planning scenarios so an understanding of technical possibilities can be realized. Through this, the balance between “capability pull and technology push” can be optimized.⁵⁷

Additionally, the S&T planning process and influence within the Office of the Secretary of Defense (OSD) has been questioned. Throughout the years, the Director of DDR&E has gradually lost influence. Once considered the third most powerful civilian in the Pentagon, this office is now part of the Undersecretary of Defense for Acquisition, Technology & Logistics (AT&L). The Department's Chief Technologist is often consumed by the details of "how to buy" rather than providing a realistic and informed assessment of technology maturity and how it can meet emerging needs. The S&T strategic planning process reflects the degradation of influence.⁵⁸ While the Director of DDR&E provides strategic guidance, with very limited budget authority, service S&T plans are developed and assessed at component level. In the case of the Army, the Army Capabilities and Integration Center (ARCIC) has defined the future force concept. Army Technology Objectives (ATOs) and the Army Science and Technology Master Plan (ASTMP) flow from the ARCIC vision and result in a portfolio of investments across the S&T domains.⁵⁹ Periodic portfolio assessments are conducted using a mix of metrics, criteria, and experience to validate the right balance of investments.⁶⁰ While a thorough and detailed process, mapping portfolio assessment criteria to joint criteria, other service needs, or ongoing programs is not readily apparent. Consequently, it is difficult to assess the balance across DoD and how all S&T investment link to joint operating concepts.

Weapons Procurement

Along with revamping the strategic planning process, the Secretary of Defense directed a holistic review of the Defense Acquisition System (DAS), for the best planning process would fail if weapons systems could not be effectively developed and fielded. Beginning in 2002 with the cancellation of the two acquisition capstone documents, Department of Defense Directive (DoDD) 5000.1 and Department of Defense Instruction (DoDI) 5000.2, changes were implemented with the intent of creating a system that could rapidly deliver affordable and sustainable capabilities to the Warfighter.⁶¹ The history of DoDD 5000.1, The Defense Acquisition System, and DoDI 5000.2, Operation of the Defense Acquisition System, dates back to 1971 with their initial implementation under David Packard. Created as a means to guide and improve the management of acquisition

programs, they have been revised over ten times in the last thirty years.⁶² Published again in 2003, this revision focused on creating links with the new JCIDS process and ensuring a joint perspective. Figure 5 shows the new acquisition model and how it was tied closely to JCIDS. Other changes include removing numerous mandatory procedures and shifting to a guidebook of best practices. This was done to foster greater efficiency, flexibility, creativity, and innovation.⁶³

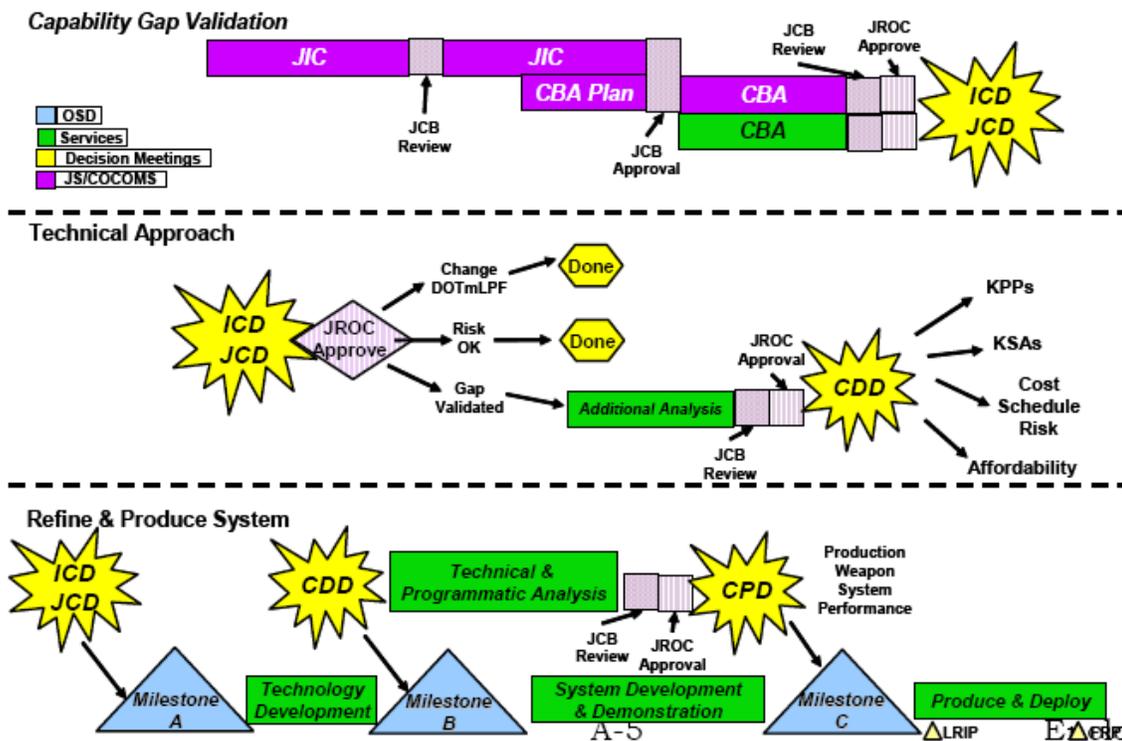


Figure 5. JCIDS and Acquisition Process: 2003⁶⁴

Despite these changes and attempts at streamlining, no topic has created more animosity than the Pentagon’s weapons procurement process. Since World War II there have been approximately 130 studies of the acquisition system, all designed to address runaway costs, delayed schedules, and an anemic bureaucracy.⁶⁵ Recent data indicates the 95 largest weapons programs exceeded their research and development budgets by an average of 40 percent. Their acquisition costs were 26 percent higher than planned with schedule delays averaging 21 months.⁶⁶ During testimony to Congress addressing weapons procurement, Secretary Gates listed a host of acquisition problems including “a

litigious process, parochial interests, excessive and changing requirements, budget churn and instability, and sometimes adversarial relationships within DoD.”⁶⁷ He went on to note that while military operations have become joint, budget and procurement decisions still remain very service centric, an interesting comment given JCIDS was designed to correct those issues.⁶⁸

The latest assessment of acquisition performance, published in 2006, portrayed a highly complex mechanism fragmented in operations with budget, requirements, and acquisition processes being driven farther apart creating greater instability. The causes of instability were a combination of changes in the security environment, differences between the concept of acquisition and actual implementation, and motivations and values within the acquisition community. Therefore, while the delivery of a new weapon system relied on the integration of requirements, budget, and acquisition, these independent processes conflicted with each other. Having different incentives, each element created a change that ripples through the other, causing overall program turbulence and magnified issues. The orchestrated movement between requirements, program feasibility, and budget limitations was further complicated by time horizons. Where requirements and programs had a long view, budgeting was short term. Therefore, long term costs were often acceptable to meet short term fiscal limits.⁶⁹

Looking strictly within the acquisition system, there were numerous elements driving poor performance. Throughout the years of “Cold-War” procurement, the process became a monolithic entity dedicated to oversight where “many people can say ‘no’ but few can say ‘yes.’”⁷⁰ While oversight at OSD provided the visibility needed to meet GAO and Congressional requirements, it did not correct fundamental programmatic issues. Monumental amounts of guidance, often conflicting, and a series of endless reviews drained senior leadership from focusing on critical tasks.⁷¹ With little to no decision making left at the service level, all significant programmatic trades to achieve cost, schedule, or performance were funneled to OSD.⁷² Underpinning all was a failure to appreciate the time and complexity of development. Habitually, programs were initiated and contracts implement prior to full development of requirements using a

robust systems engineering process. Invariably cost or schedule growth resulted, sending ripples through the integrated acquisition, budget, and requirements process.⁷³ Senator Carl Levin stated, “the system accepts unreasonable cost estimates and unrealistic development schedules, it establishes unrealistic performance expectations, insists on using immature technologies, and imposes costly changes in ongoing programs.”⁷⁴ In many respects, oversight requirements and funding timelines drove contract award versus completion of detailed analysis to adequately scope the effort and determine appropriate cost and schedule targets.

A recent study by the Defense Science Board (DSB) Task Force on Developmental Test and Evaluation echoed many of these findings along with one poignant insight. The board felt the single most important step in addressing the failure of acquisition programs was “a viable systems engineering strategy from the beginning.”⁷⁵ Unfortunately, the past 20 years have seen continued downsizing and elimination of DoD systems engineering functions. The rationale, based on the monolithic oversight model, was that weapon systems performance specifications would drive systems engineering functions to industry. Government oversight would simply monitor achievement of performance attributes. Data has shown contracts awarded based on performance specifications often fail to account for the challenge of decomposing requirements to detailed system specifications and design requirements. The result is contract values and acquisition program baselines misaligned with true cost and schedule. Lack of early government systems engineering has made it difficult to achieve equilibrium between requirements, budget, and acquisition prior to contract award.⁷⁶

The Armed Reconnaissance Helicopter (ARH) Program provides an excellent case study of how these acquisition factors interact, producing undesirable effects. The ARH program was initiated following termination of the RAH-66 Comanche in early 2004. After investing \$6.9 billion over a twenty year development cycle, many questioned the validity of the RAH-66 given changes in the contemporary operating environment. The RAH-66, leveraging low-observables and a highly sophisticated mission system, was designed for “deep attacks”; however, operations in Iraq and Afghanistan required greater

synergy between ground maneuver and aviation forces.⁷⁷ Additionally, the proliferation of man-portable air defense systems (MANPADS) and infrared threats had altered the operational dictum, as demonstrated during the disastrous “Karbal Gap” deep attack mission where of thirty AH-64D Apache helicopters, one was shot down and twenty eight sustained battle damage.⁷⁸ An extensive Army aviation modernization study began looking at capabilities required for today’s fight, and the future, resulting in the announcement of the RAH-66 termination with the intent of reprogramming \$14 billion out to 2011. The goal was to reinvest the “aviation dollars” procuring over 800 new aircraft and modernizing and recapitalizing over 1400 aircraft. The acting Secretary of the Army, Les Brownlee emphasized, “it’s critical to the Army now, as we’re at war, and for the future that the funds that were identified for the Comanche program in the fiscal year 2005 budget, as well as those funds in the future year’s defense plan, remain with Army aviation. We are preparing now to submit an amendment to the fiscal year 2005 budget currently before the Congress to reflect those changes.”⁷⁹

Funding began to flow for procurement and upgrades. The AH-64D Block III Apache, CH-47F Chinook, and UH-60M Blackhawk, all upgrade programs to existing platforms, greatly benefited. There was one new start program, a replacement for the aging OH-58D Kiowa Warrior fleet, whose airframes were approaching 40 years old. Speed was of the essence, Comanche money was only available to 2011, therefore contract award must come quickly with a rapid development and fielding plan. The concept seemed sound, utilization of a proven airframe with mature components would allow for speed while keeping cost down. The competition for the new Armed Reconnaissance Helicopter was rapidly conducted and in July of 2005, Bell Helicopter’s proposal based on a modified Bell 407 was selected with an initial procurement of 368 helicopters. Initial cost and schedule called for \$359 million in development and an \$8.56 million average unit cost. Fielding was on track for 2009.⁸⁰

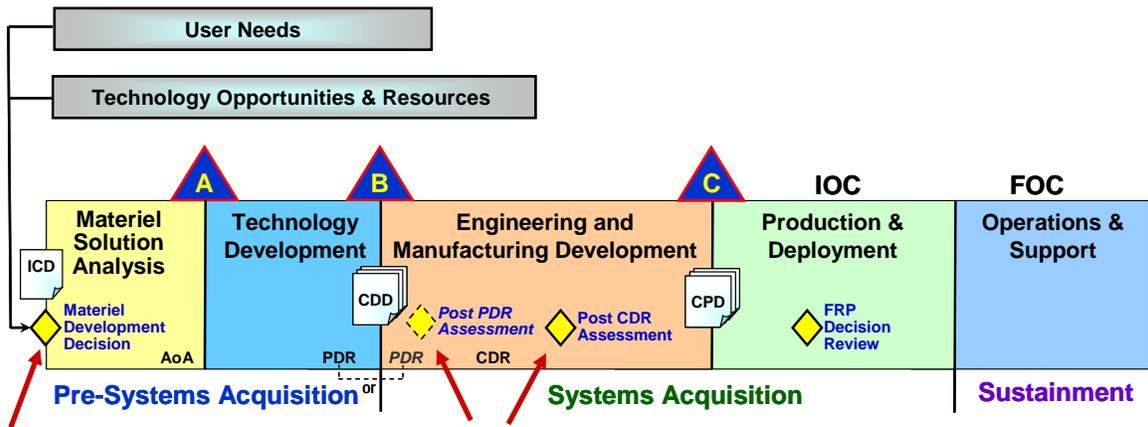
As the systems engineering process swung into full gear, the complexity of the integration effort became apparent. While the technology and airframe were proven and mature, transitioning this conglomeration of products into an integrated weapons

platform proved challenging. Bit by bit, design changes were required, allowing for the right weapons configuration, survivability, interoperability, transportability, qualification standards and many other requirements. Coupled with a shift in Bell's production methodology and program costs soared. By 2007, the Army recognized the magnitude of the problems and issued a stop work notice giving Bell 30 days to address the issues. After several months, the Army approved continuation of the program. The additional time did not improve the situation and in July of 2008 the Army filed a Nunn-McCurdy cost and schedule breach. Development costs were now projected at \$942 million with per unit cost of \$14.48 million, over a 43 percent increase beyond the baseline contract. Fielding had slipped to 2013. In October 2008 John Young, the Undersecretary of Defense for Acquisition, Technology, and Logistics, announced DoD would not re-certify the program as "the fundamental cost and schedule basis of the underlying award of the ARH is no longer valid."⁸¹ Young went on to note that while the Nunn-McCurdy process had validated the need for a manned armed reconnaissance helicopter the Army needed to show restraint on requirements. The ARH had gone the way of Comanche.⁸²

The details of what went wrong will be studied for some time at the Defense Acquisition University. Fundamentally the interaction between requirements, fiscal realities, and acquisition process failed. Budget drove the need for exacting speed as all knew service control of former Comanche dollars would lesson with time. A bill payer would be needed for current operations or money funneled into other means of conducting attack, reconnaissance, intelligence, surveillance, and target acquisition. Consequently requirements were not firmly established nor was there a detailed systems engineering analysis prior to contract award. Both worked in concert creating a cost and schedule baseline fraught with risk and a "conspiracy of hope"⁸³ that invalidated the initial concept and associated proposal. Eventually, the sins of the past manifested themselves in a Nunn-McCurdy breach and program termination.

Cognizant of the acquisition failures since 2003 and armed with significant analysis, the Under Secretary of Defense for Acquisition, Technology and Logistics, Mr. John Young

set about addressing the issues. An updated version of DoDD 5000.1, renumbered 5000.01 was released in November 2007. Then, late in 2008, a newly renumbered and revamped DoDI 5000.02 was published. These latest revisions to the capstone acquisition documents sought to correct the problems noted through a multi faceted approach. Depicted in figure 6, the new acquisition process would first implement a mandatory entry point. The Material Development Decision (MDD) would ensure a rigorous review of the requirements and robust assessment of alternatives. Depending on program maturity, the Milestone Decision Authority (MDA) would then enter the program at the appropriate point in the acquisition process. Additionally, there was a renewed emphasis on design reviews and the designation of preliminary design reviews (PDR) and critical design reviews (CDR) as program decision points. Recognizing the need for more robust government systems engineering, program managers would now submit a post PDR and CDR report to the MDA who would determine if program continuation was warranted. Other changes focused on a better understanding of technology maturity and the use of competitive prototypes before engineering development is initiated. These changes would facilitate reduced program risk and ensure technology was sufficiently matured prior to entering the newly renamed engineering and manufacturing development (EMD) phase. The name change, from system development and demonstration, was done to emphasize that sufficient systems engineering, technology development, and basic design work should be accomplished prior to entering EMD. Unfortunately, implementation of these updates has been sporadic. No implementation guidance was published and consequently program offices and acquisition officials are struggling with transitioning to this system.⁸⁴



Changes to Decision Points

Old (2003)	New (2008)	Change from 2003
Concept Decision (CD)	Materiel Development Decision (MDD)	MDD required prior to entering the process at any point
N/A	Post-PDR Assessment	MDA's assessment of PM's PDR Report (if PDR after MS B)
Design Readiness Review DRR	Post-CDR Assessment	MDA's assessment of PM's CDR Report

Figure 6: The Defense Acquisition Management System 2008⁸⁵

Along with the new DoD 5000 series documents, Senators’ Levin and McCain, the two ranking members of the Senate Armed Services Committee, introduced the “Weapon Systems Acquisition Reform Act of 2009.”⁸⁶ Also aimed at curbing the numerous cost and schedule overruns, the bill would reinforce the Nunn-McCurdy law mandating program cancellation of any weapon system that exceeded initial budget by 25 percent unless critical to national security. Senator Levin noted several keys to successful programs including “getting things right from the start with sound systems engineering, cost-estimating and developmental testing early in the program cycle.”⁸⁷ The bill would also require the Defense Department to:

- Establish a "director of independent cost assessment" to examine weapons cost as they are being studied by the Joint Requirements Oversight Council.
- Re-establish the post of Director of Developmental Testing.
- Require preliminary design reviews of programs before acquisition is approved.

- Address unreasonable performance requirements early in the program cycle by making tradeoffs between cost, schedule and performance.
- Require the Director of Defense Research and Engineering to assess the maturity of critical technologies by ordering competitive prototypes.

Time Pacing

Even with new and updated processes, a renewed focus on systems engineering, and other streamlining initiatives, effort has been futile if you can not deliver a capability at the needed time. Unfortunately, the common perception is that the Defense Department can not compete in the time domain and review of the JCIDS and acquisition system makes this quite apparent.⁸⁸ These lengthy processes have brought about a temporal risk making our military potentially unable to react in a timely fashion to new challenges or disruptive threats. Every service has recognized this fact and created numerous ad-hoc rapid acquisition offices. Between the Air Force's Warfighter Acquisition Program, the Navy Rapid Technology Transition process, and the Army's Rapid Fielding Initiative, Rapid Equipping Force, and Warfighting Rapid Acquisition Program billions of dollars have been refocused with the intent of speed. Having to move outside normal process to achieve rapid response illustrates how speed and the procurement process are incompatible. Realizing the move afoot, DoD entered the equation with the FY2005 Defense Authorization Act providing a Rapid Acquisition Authority for responding to combat emergencies. Additionally, OSD established the Joint Rapid Acquisition Cell to coordinate activities supporting immediate Warfighter requirements. Currently, policies and criteria for rapid acquisition, along with necessary waivers and exemptions, are being implemented. Speed is the focus.⁸⁹

While short term needs are addressed, long term capabilities developed through JCIDS continue to languish under the weight of process. Additionally, as most rapid acquisition programs do not have obligated funding, money is made available through the reprogramming process. Once again, instability enters the system as budget, requirements, and program execution begins to churn.⁹⁰ Balance requires an investment

strategy optimized across the span of time. Near term requirements, focused on proven technology or accelerating systems already in the pipeline, increase long term program instability. These facts, coupled with DoD's inability to compete in the time domain, make achieving balance an even more complex task. Thus, while close in dangers are mitigated, an uncertain future brings significantly increased risk. Time pacing is a means to effectively manage and reduce long term risk.⁹¹

In 1965 the cofounder of Intel Corporation, Gordon Moore, prophesized microprocessor capacity would double every 18 months. Now known as Moore's Law, many saw this as a computer science rule when it was in fact a business manifesto for Intel's product development strategy. Engineers and scientists became focused on achieving Moore's Law. The company operating system centered on a time paced product development cycle. Thus, the concept of time pacing entered commercial electronics and changed the business model for the entire industry. Most companies do not take a time pacing view and see event pacing as the natural order. As competitors begin to develop a new product, technology changes, or customer demand shifts, the company then focuses on new product development. Opportunistic planning seizes on degrading performance metrics, such as sales, to spur change. In stable markets event pacing effectively manages change.⁹²

For turbulent markets, where change is constant and technology advantages fleeting, time pacing offers the ability to compete. While associated with speed, speed is not the paramount concept. Developing a regular, rhythmic, and proactive process is vital where managers have a sense of urgency and must actively manage product transition.⁹³

Three elements used to meet the proactive time pacing process is performance metrics, charting transition path, and establishing an effective product rhythm. Performance metrics must go beyond cost, schedule, and performance. A schedule metric should be established at program inception and rather than schedule being an outcome, it becomes a driver of other metrics. Transition management begins with identifying and charting the program path from technology lab to final product, often called the "valley of death."

Program management must attack this phase with as much zeal as later development stages. Finally, the major rhythms of each product strategy element should be analyzed and defined. While business rhythm varies based on product complexity and market, opportunities for speed improvements can be found.⁹⁴

Time pacing requires adopting product modularity. When balancing schedule or product specification, time pacing companies, by definition, choose schedule. Therefore, spiral upgrades, within established rhythm, must follow initial product deployment. Then, by using a truly modular approach to product development, market feedback analysis can quickly drive changes without a complete redesign. Using this technique also allows strategic options as companies can tailor multiple product offerings for different market segments, essentially reusing core elements of technology. Whether shaping the pace of industry or adapting to market changes, uncertainty can then be more effectively managed.⁹⁵

Acquisition reform has recognized this concept and the 2006 Defense Acquisition Performance Assessment Report recommends the implementation of time certain procurement. As previously discussed, a “conspiracy of hope” to deliver a 100% solution with first article, along with other factors, has brought about massive schedule delays. Time certain procurement is not simply the renaming of spiral or incremental development. Rather, time becomes a key performance parameter measured and reported against performance and cost. Therefore, time becomes the focus of the requirements statement. Performance will be driven by the time allowed and budget available. Consequently, early trades in cost, schedule and performance must be made and adhered to through program development. With a well balanced program at initiation and risk contained, product deployment is more certain. As operational requirements and technology matures, product evolution keeps pace and is aligned with fiscal constraints along with a rhythm meeting needs of the Warfighter.⁹⁶

Competitive Strategy, Competitive Advantage, and Asymmetries

So what does the future hold? Will it be clear enough, are there alternate futures, a range of futures, or true ambiguity? Certainly we do not know what will come and our planning guidance echoes this belief stating we have moved “from a time of reasonable predictability to an era of surprise and uncertainty.”⁹⁷ Given this, from our capabilities based planning process can we quantify the residual uncertainty and craft a hedging strategy? The answer is not easily obtained; however, shaping the future is our preferred option and highlighted in the 2006 QDR. Most good strategies attempt shaping operations as they serve to create the future outcome expected, anticipated, and planned for. But what happens when shaping does not bring the desired outcome? Does our strategy allow adaptation or reserve the right to play? Both these techniques are needed when dealing with a range of futures and ambiguity.

The answers to these questions feed and define the development of our competitive strategy. Competitive strategy, while having been used for decades, formally came of age in 1980 with the release of Michael Porter’s seminal book *Competitive Strategies*. Through his “five forces,” business began to understand the structure of their environment and how strengths, weaknesses, and threats defined their market position. Armed with this vital information, the right strategic balance could be created, charting the long term direction of an enterprise. Done properly, this portfolio of decisions would achieve an enduring competitive advantage where competition was defeated, cost contained, and profitability maximized.⁹⁸

These lessons were not lost on the Pentagon and Andrew Marshall, the Director of the Office of Net Assessment. Initially used during the long term competition with the Soviet Union, competitive strategies were seen as means to manage defense resources through a mix of deterrence, shaping behavior, and the ability to deal with contingencies. By reflecting on the thinking and behavior of competitors and potential U.S. actions, competitive strategies could find areas of sustained competitive advantage. Besides

exploiting the areas of sustained competitive advantage, informed resource decisions could balance risk across the spectrum of competition.⁹⁹

Is our competitive strategy positioning us for success in the uncertain 21st Century or is it a short view, the General Motors view, leaving us vulnerable to our competition and disruptive forces? From an analysis of JCIDS and our acquisition process it is clear that adaptation for near term requirements has been successful. While often inducing instability to the process, we have adapted to the needs of the Combatant Commanders and focused resources in a timely fashion. The development of our long term investment strategies remains problematic. Confounded by a bureaucratic and consensus building approach, we consistently demonstrate an inability to compete in the time domain. Further, the focus on shaping outcomes leaves us vulnerable to the potential of disruptive forces. While we should clearly seek weapon systems and capabilities that support the entire range of futures, so called no regret moves, we must be able to adapt or reserve the right to play. Both pose significant challenges for our defense institution. Adapting requires the speed, agility, and flexibility that to date our JCIDS process has yet to show. Likewise, the data on our acquisition system and science and technology programs is similar or worse. While adapting is most often done in the short term, learning and making effective change for the long term is paramount. In an era of rapid innovation and change, learning faster than our adversary and adapting our processes is the only sustainable competitive advantage.¹⁰⁰ We have proven throughout history our incredible ability to learn and adapt, particularly at the tactical and operational level. It is process that shackles the speed of strategic action and makes us unable to compete in the time domain.

The challenges currently facing our Defense Department are immense; balancing execution of the current fight while preparing for the future. Balance, the defining principle of our National Defense Strategy, must be achieved. This will not be achieved through higher defense budgets rather through setting priorities, making tradeoffs, and accepting risk.¹⁰¹ The means to achieve balance is through our strategic planning and associated execution. Andrew Krepenevich's book *7 Deadly Scenarios* states the real

advantage of strategic planning is not in scenario development or producing some final document, “rather it lies in continuously developing insights as to where asymmetric advantages lie.”¹⁰² It is from asymmetries we derive our competitive advantage.

John Boyd’s famous OODA loop (observe-orient-decide-act) sought to exploit asymmetries. In his presentation entitled “Discourse on Winning and Losing” he stated we must “act more inconspicuously, more quickly, and with more irregularity as a basis to keep or gain initiative as well as to shape and shift.”¹⁰³ But this could only be accomplished by having a flexible “organic whole” that is quicker to adapt; for “in dealing with uncertainty, adaptability seems to be the right counterweight.” Strategies could then evolve permitting us “to actively shape and adapt to the unfolding world we are a part of, live-in, and feed-upon.” It is the link between strategy and adaptability that gives us the “presence and production of mismatches” that “sustain and nourish the enterprise.” In other words, it is these asymmetries that “sustain and nourish” our competitive advantage.¹⁰⁴

Sustaining and nourishing the enterprise requires a compelling vision of the future, not one that predicts but one that informs, challenges our mental models, and creates a sense of urgency. Urgency to accept change, viewing the future world not as a slight permutation of the present but a complex and dynamic organism that brings great uncertainty. It is uncertainty that forces us to accept the criticality of organizational speed, agility, and flexibility along with the fortitude to act decisively. Then, we can achieve the right balance of near and far term investments, create asymmetries, and retain our competitive advantage. General Motors was considered too big to fail and had the U.S. Government rescue them after decades of poor decisions. There is no one to rescue the Department of Defense. We are the nation’s defense and must act, ensuring our competitive advantage is never compromised.

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