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Cost Considerations in Defense Acquisition Decision Making

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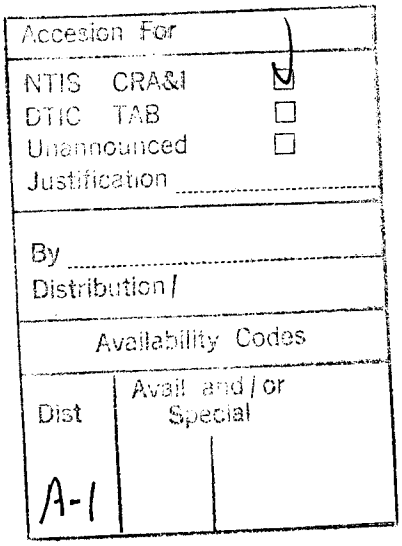

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COST CONSIDERATIONS IN DEFENSE ACQUISITION DECISION MAKING

INTRODUCTION

"Either we are going to spend ourselves into extinction, or we have to come up with alternative strategies and new ways to allocate resources."[1]

Decisions on weapons system acquisition can commit billions of dollars, can change national security choices, and can shape how wars are fought. With reduced DOD resources, it is now more important than ever that national security policies, strategies, processes, and day-to-day decisions optimize the resources allocated to defense by minimizing affordability costs and cost growth. A balance of "ends and means."[2]

Some have assessed the results of the formal (milestone) and the informal (day-to-day) DOD acquisition decision making as reflecting a commitment for optimum technology and performance. This optimizing technology approach continually strives for the highest attainable performance and physical characteristics with respect to the requirements and objectives. The hypothesis of this research paper is that **acquisition decision making is biased toward state-of-the-art technological insertion for optimum performance even though this may result in significant cost and schedule impacts.**

This research paper's primary concern is how acquisition decision makers deal with programmatic decisions on technology/performance vs. affordability costs and cost growth. In this context, the acquisition decision makers are the totality of acquisition program personnel plus the requirements generation and PPBS participants; not just the acquisition milestone decision authorities. Therefore, the purpose of this research effort was to obtain input and opinions on the above hypothesis and concerns from DOD acquisition, requirements, and resource (PPBS)

decision makers and noted individuals from industry and academia..

An alternative "satisficing" decision approach was also explored with the participants. A "satisficing" approach, that results from a concerted but unsuccessful effort to achieve objective and optimum performance requirements, could become the conflict resolution process that mutually satisfies both performance and affordability thresholds; thus optimizing defense budgets.

This paper also provides: a historical outline of U.S. cold war military strategy and its reliance on advanced technological weapons systems; acquisition process analysis from selected written material in a cost, schedule, and performance context; and, present day acquisition policies and initiatives. Various decision making approaches and styles are also reviewed for their applicability.

But the main effort of this paper is the analysis of the participant feedback, plus the background analysis, to determine how the DOD community utilizes cost, schedule, and performance trade-offs in requirements and acquisition decision making. Conclusions and recommendations for improvements are also provided.

BACKGROUND

Cold War Strategies: During the cold war, our national security military strategy traded-off personnel solutions for high technology weapons. For 40 years we were confronted with an enemy with global interests and commensurate force projection capabilities; an adversary that committed large amounts of resources to support its global hegemonic ambitions; and a political form of government that was in constant conflict with the tenets of democratic governments, i.e., individual freedom, capitalism, and free markets.

The Communist world posed a multi-faceted threat, both on the tactical and strategic battlefield, that presented major challenges for the U.S. policy of reliance on superior and more advanced technological superiority. The USSR and its Warsaw Pact partners could field large and balanced military forces of ground, air, and naval units with advanced tactical capabilities that supported a strategy of massive forces with minimal regard for casualties. Also, a very ominous strategic nuclear capability and significant command, control, and communications assets gave the Soviets superpower status similar to the U.S.

This is the U.S. cold war legacy of concerted application of advanced technology, for superior performance, as the primary criteria in resource allocations for new DOD weapons systems and equipment.[3] The main political reason for U.S. reliance on a technological superior force was to reduce costs, manpower requirements and casualties.

Regional Threats: With the demise of the global cold war threat posed by the USSR and the Warsaw Pact, the U.S. is now focusing on national security strategies based primarily on regional military threats. This strategy appears reasonable if you examine the resource commitments required over an extended period of time to become a global military threat.[4]

Only our former cold war adversary can accomplish this in a few years. Other potential military threats would require many years of dedicated and notable allocation of resources to project more than a regional conventional threat. The most obvious and resource capable countries would also have to change their political idealogy and national objectives as well for us to consider them as serious threats to our security. This further supports changing our strategy to increase emphasis on regional and limited technological threats.

The regional threats we face today (Iran, Iraq, Libya, North Korea, Serbia, Somalia, etc.), have limited resources and limited military capability. Their military capabilities are limited

because economically they are not capable of posing a serious threat to U.S. (and coalition forces) air and sea superiority and their ground assets are no match for our ground forces. Their threat is based on projected early ground success from superior numbers before we can timely counter with an equal ground force. (editorial note: This analysis de-emphasizes Nuc/chem/bio.)

A conclusion could be made from the above that we no longer have the need to urgently chase the latest technology, without proper appreciation for its costs and their related impacts, for immediate infusion into all possible applications of military weapons systems.[5] We can now more prudently plan for more operationally efficient and cost effective technology infusion for equipping the force.

U.S. Economy: Through-out this century, the U.S. economy and industrial strength has been the key element of national power supporting our superpower status and power projection capabilities. We rescued the free world from the jaws of defeat in three major wars , World War I, World War II, and the Cold War. But, as emphatically pointed out by many historians, economists, and statesmen, there is an eventual price to pay for these valiant efforts. The price is the continued pressure on the health of our economy and its capability to continue to support superior standards of living as well as a leadership role in geopolitics.

For the past decade, the posture of our economy has not been capable of supplying all of the resources asked of it; thus the persistent budget deficits and spiraling debt. Our choices, both for domestic needs and national security policies, have been limited.

The most prominent legacy of the federal fiscal crisis is the divisiveness created by various interest groups fighting for "their fair share of federal funding." This has pitted the haves against the have-nots, the liberal persuasion against the military/industrial complex, the old against the young, and increased ethnic and racial tensions. This divisiveness undermines our national will

and character and if it continues to grow it can become a key factor in the relative decline of the U.S. as a superpower.

We cannot have "guns and butter" in the same sized helpings we have enjoyed in the past. But this is one of the choices we must make. Cutting military spending has not been easy. We must find ways to optimize the reduced economic resources allocated to the military by the political process.[6]

Resources: Equip the force, or materiel acquisition, continues to be a large portion of the defense resource allocation. Over the past 40 years of cold war tensions, the RDT&E and procurement portion has averaged from 30 to 45% of the DOD budget. In the 80's this was generally $100 to $120 billion annually. In the 90's, RDT&E and procurement projections have been reduced to 20 to 30%, or $50 to $70 billion, of the DOD resource allocation.

Some of the most important concerns for continued U.S. military superpower status are decisions we make on:

-- which technology efforts that are essential to pursue,

-- when and how to exploit emerging technologies,

-- affordability costs, trade-offs and opportunity costs,

-- the process selected for equip the force determinations.

How we make these decisions, the rationale/value judgements we use to make these decisions, and the data available to support decision making, are key ingredients. Some would say that in the past these decisions have been biased toward support for advanced technology and optimal performance without due consideration for cost and schedule impacts.

"With some consistency, ... , bureaucratic and political pressures colluded with the demands of the strategic situation (Soviet numerical superiority) to encourage trade-offs in one direction only, toward higher costs and longer development schedules, in an effort to meet original performance goals."[7]

From a dollar resource perspective, there are two categories of concern: affordability costs and cost growth. Affordability costs are simply: can we afford this program; can we afford it at a reduced cost; or is it too prohibitive in resource requirements? Cost growth is the increase in real cost, from the original affordability decision estimates, as the program progresses.[8]

If the answer is yes to affordability estimates, and the assigned program priority is high, then the DOD out-year budget is changed to add the projected costs of the new program. Lower priority programs, which had previously been determined to be affordable, must now deal with reduced or unfunded out-year budgets. Thus, programs are continuously jockeying for higher priority status and presenting their most optimistic projections for affordability determinations.

Most cost growth seems to result from over-optimistic projections in the program's initial stages. Cost growth can also result from inadequate assessment of program complexity, excessive and/or changing requirements, application of immature technology, budget instability, and various other reasons.

If the perceived bias toward advanced technology and performance achievement is correct, formal and informal decisions would consistently support performance goals.[9] Cost growth, as well as schedule growth, ensues. Consequently, the bow wave of increased costs reverberates throughout the PPBS, cutting other programs, eliminating funded programs, stretching out programs, reducing production quantities, and creating many other de-stabilizing outcomes.[10]

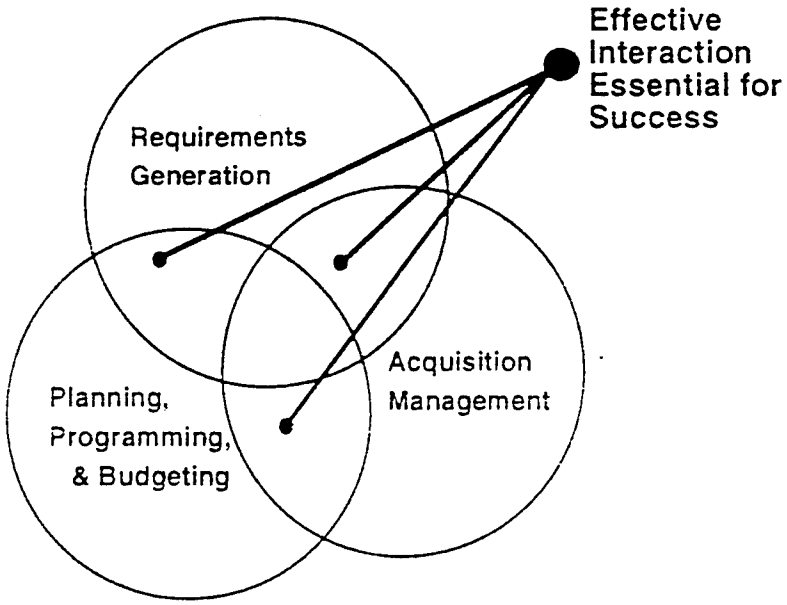
Political Arena: All of the above eventually gets played out in the "political arena." The

DOD/Service bureaucracy has political overtones and the final decision authority, Congress has been described as a political body where "all politics are local." We, in DOD, fill the air with our displeasure at the decisions made in this environment. What happened to objectivity and rational judgement? What about program commitments and stability?

Granted that a lot of critical and costly decisions get made in this environment no matter what we in DOD do, or not do. It is also postulated that we are more often than not the perpetuator of this incursion into our decision realm by the poor results of our decision making on affordability and cost growth.[11]

"There is broad agreement that the first P in PPBS is silent."[12]

REVIEW OF STUDIES, BOOKS, AND OTHER SELECTED MATERIAL



Equip The Force: The above pictorial is frequently used to illustrate the relationships of the requirements, acquisition, and PPBS processes. For success, all three spheres should work in harmony with mutual understanding and appreciation of the goals and constraints on each.[13] Some recent reform efforts made the following recommendations:[14]

a. Improve teamwork and dialogue among the user, acquirer, and budgeteer to promote flexibility of requirements.
b. Improve planning and use of resources by imposing some constraints on the requirements process.
c. Impose more discipline in what we buy and how we buy it.
d. Create an environment that promotes steady progress in cutting costs and increasing quality and productivity.
e. Improve the leadership and management capability of the people involved.

The Packard Commission stressed the mutual responsibility of the decision makers for both the requirements process and the acquisition process **".... to ensure that complex systems reflect a sensible calculus of cost, schedule, and performance."**[15]

Requirements Process: The requirements process continues as a purview of the military war-fighter and the acquisition process has a distinctive, but different, decision maker. I believe this concept of separated decision authority, particularly implied dual authority during the acquisition process, will become even more of a detriment as resources continue to decline.

Can we continue to allow the requirements generating process to make decisions in a pure threat projection environment without full consideration of resource constraints?[16] The same question can be put to DOD Laboratories and Industry who constantly push advanced technology insertion while optimistically projecting technology maturity, costs, and other impacts. The acquisition community eventually becomes a willing partner and signs on as the program advocate thus losing some objectivity for realistic projections and decisions.

Some would say this has worked well in the past. I would agree; just look at the

performance of our equipment and weapons systems in Desert Shield/Desert Storm. However, the weapons and equipment used in the Gulf War resulted from justifiable programs when the cold war threat was menacing and challenging and resources were more plentiful. Now, U.S. national security objectives and policies are aimed at other objectives and DOD resources are much more constrained.

DOD Acquisition Policies/Directives: DOD policies, integrated management framework, and responsibilities for defense acquisition are detailed in DOD Directive 5000.1. A summary of this policy framework follows:[17]

a. " ... requires a highly disciplined management framework that effectively translates operational needs into stable, affordable acquisition programs."
b. "Broad mission needs must be initially identified by the requirements generation system."
c. "The acquisition system must identify and assess alternative ways of satisfying these needs in light of ... technology development, producibility, ... , and support infrastructure constraints."
d. "Initial affordability decisions ... must be made in the PPBS process, based on ..., and overall funding constraints."
e. "The initial broad mission need statements must be progressively translated into performance objectives, system specific performance requirements, and a stable system design that can be efficiently produced."
f. "Major cost-performance-schedule trade-offs must be made throughout the course of program implementation."

DOD Manual 5000.2M provides the documentation requirements that supports the above iterative trade-off decision processes.[18] The specific guidance for the Materiel Need Statement (MNS) and the Operational Requirements Document (ORD) requires that the documentation address material alternatives; constraints (other than acquisition resourcing); and provide prioritized parameters, requirements, thresholds and objectives suitable for trade-off decision making.

The Acquisition Program Baseline and Integrated Program Summary (IPS) are prepared

by the acquisition community and include the above in more detail and depth. It also includes acquisition strategies, technology/system alternatives, cost drivers, major trade-offs, risk assessments, and affordability considerations.

The above details are used to illustrate the complex amount of related concerns required for proper decision making. It also illustrates the breadth of inputs needed:

-- from technology to requirements,

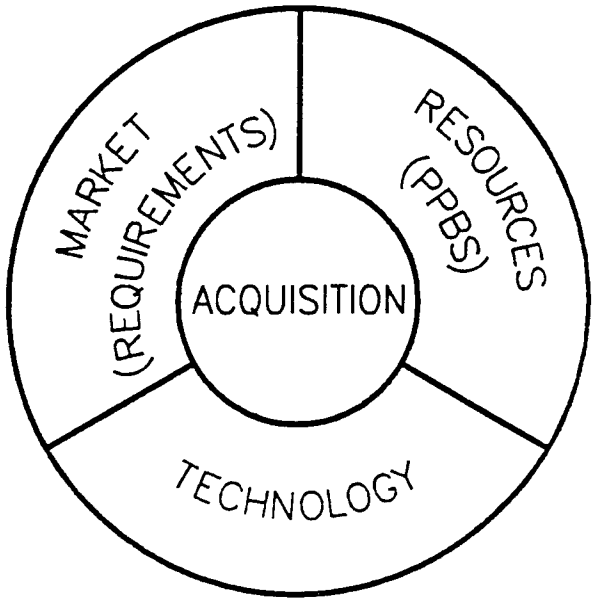
-- from requirements to acquisition strategy,

-- from requirements/acquisition strategy to affordability estimates,

-- from affordability estimates to the PPBS,

-- and trade-offs between performance/cost/schedule.

Equip The Force Model: The literature and DOD policy and guidance detailed above does not fully depict the influence of technology. The following pictorial representation is my view of the major elements in the equip the force arena:



The war-fighting role of the user is the market, or the requirements generator. Technology is the purview of DOD laboratories and/or industry. The PPBS provides the resources. **The acquisition process/leadership team is the "central focus" that connects these elements into an integrated team for equipping the force.**

Training: The acquisition leader/manager is trained to be knowledgeable and conversant in both the user market and supporting technologies with a primary emphasis on acquiring one to satisfy the other in harmony with the PPBS process. To improve his capability in all areas, detailed training and developmental assignments are programmed for his career progression. The most notable training program being DAWIA which includes training at DSMC and ICAF for PMs and higher level acquisition positions.[19] Similar cross-training developmental tracks are also provided for the technologist and resource analyst.

My theory is that this is not generally true for the requirements representative. Why not include requirements generation personnel in the DAWIA training and acquisition developmental track with assignments in either requirements or acquisition as they progress in their careers?

Organizational Characteristics: "Reframing Organizations," by Bolman and Deal, outlines various organizational structures, including the "adhocracy" structure.[20] The "adhocracy" structure seemingly depicts the process used by the equip the force players during their combined efforts. The following are some key quotes on "adhocracy":

"... loose, flexible, self-renewing organic form tied together mostly by lateral coordination. ... Usually found in diverse, free-wheeling environments, ... Ambiguous authority structures, unclear objectives, and contradictory assignments of responsibility can legitimize controversies and challenge traditions... An adhocracy relies on extensive training of its employees and promotes from within... Adhocracy works best when individuals must perform creative tasks in a rapidly changing environment."

Some key words here are diverse, ambiguous, turbulence, controversies and learning. Also, it is noted that training and promotion from within are recommended for this type of organization. Does this not reflect the turbulent environment, as well as the approach, now being used for the combined equip the force community?

Decision Making Views: The literature on decision making can be outlined by five main schools of thought.[21] These schools of thought include the three basic conceptions of G.T. Allison, whose "Essence of Decision" is an analysis of the decision making during the Cuban Missile crisis.[22] They also include views established by H.A. Simon's "A Behavioral Model of Rational Choice," which is the best-known presentation of satisficing decision making.[23]

These five schools of thought are:

a. **The rational manager view** - This is the classical normative theory of decision making, in which decision makers are all-knowing and able to evaluate all alternatives. They are dissatisfied with any solution but the best.

b. **The "satisficing," process oriented view** - This considers decision makers to be rational, although cognitive limits lead to a bounded rationality. Thus the goal of any decision maker is to get a good enough answer, not just the best possible one.

c. **The organizational procedures view** - This focuses on the interrelations among components of the organization. It highlights organizational structure, mechanisms for communication and coordination, and the standard operating procedures by which decision making is systematized and often simplified.

d. **The political view** - This regards the participants in the decision making process as actors with parts to play. They have strong individual preferences and vested interests and form coalitions of organizational subgroups. Decisions are frequently dominated by bargaining and conflict, with the result that only small deviations from the status quo are normally possible. Major invasions are resisted by those whose position, interests, or simply job satisfaction will be affected.

e. **The Individual differences approach** - This view argues that an individual's personality and style strongly determine his/her choices and behavior. Personal "rationality" is subjective and behavior is very much determined by the manner in which an individual processes information.

For a given situation, the "correct" view may involve a blend of all five points of view, or the particular context may make one of them the most relevant. The rational ideal stresses the need for definition of objectives, consistency, and comprehensive analysis. The true believer in rationality thus tries to get managers to clarify their goals explicitly; to search for many alternatives; and to define utility functions.

Simon concludes that the rational conception is completely lacking in descriptive reality and suggests a definition of satisficing man, who does the best he can but does not even attempt optimization. The "satisficing" view, or pragmatic approach, to decision making is an attempt to move closer to reality and to understand the world as it actually is. Such a descriptive focus provides a basis for developing prescriptions that are "behaviorally grounded."[24] Also satisficing theories hold that, when there is a choice between alternatives, what it is right to do is determined by the goodness of the alternatives. Satisficing and maximizing theories have exactly the same view of goodness and its structure; they only hold different views about the derivation of rightness from goodness.[25]

Some "experts" have tended to assume that there is a single "right" way to make decisions. Which view do we use in acquisition decision making? I postulate that the guidance and directives are focused on both the rational and organizational procedures views; however, our day-to-day and informal decision making also includes large doses of the political view. Formal milestone decision authoritys may be amenable to satisfice in their decisions, but the milestone decision package they are presented with has just completed the coordination process in a rational managers, and/or organizational procedures approach, and/or political view, resulting in very little latitude, or need, for satisficing trade-offs.

RESEARCH PARTICIPANT INPUT

Hypothesis: The hypothesis of this research paper is that acquisition decision making is primarily biased toward technological insertion to achieve optimum performance even though this may result in significant cost and schedule growth. The primary concern is how acquisition decision makers deal with programmatic decisions on technology/performance vs. affordability costs and cost growth. Therefore, the purpose of this research effort was to obtain input and opinions on this theory from DOD acquisition decision makers and noted individuals from industry and academia.

Primary Concern: Some have assessed the results of formal (milestone) and informal (day-to-day) acquisition decision making as reflecting an "optimizing" approach. This approach continually strives for the highest attainable point with respect to the objective(s). There are obvious time and cost constraints on the amount of effort that can be spent in the search for an optimum solution.

DOD Manual 5000.2M guidance for preparation and content of requirements documents is summarized as follows:

-- Performance capabilities and characteristics shall be stated by "a minimum acceptable value (threshold) required to satisfy the mission need."

-- Performance objectives shall represent---"beneficial increases in capability or operations---above the threshold."

-- These capabilities shall be "stated in operational terms and prioritized if possible."

This requirements structure guidance, if followed in the derivation and finalization of the Operational Requirements Document (ORD), system specification and contract incentives, could support trade-off decision making throughout the acquisition process.

For the primary concern, the following questions were provided to each participant:

a. Do written acquisition policy directives, and real world practices, support effective formal (milestone) and informal (day-to-day) decision making in affordability trade-offs between performance, costs, and schedule? For requirements determinations and requirements trade-offs during the acquisition process?

b. Is performance achievement, rather than cost and/or schedule accomplishment, more influential in the decision process? Should it be?

c. In the real world, do we spend too much time and dollars to obtain the last 5 or 10% of performance? If so, is it necessary?

d. Does the present, material acquisition process, both policy and practice, properly provide guidance and structure to address these concerns?

e. Is the guidance in DOD MANUAL 5000.2M for requirements documents generally followed, particularly the identification in the ORD of minimum acceptable values (thresholds), performance objectives for beneficial increases in operational capabilities above the threshold, and these capabilities prioritized?

f. Should a continuing shrinkage of the DOD budget necessitate a structural change in weapons system acquisition guidance that reflects increased emphasis on cost and schedule containment, with performance trade-offs?

Alternative: An alternative "satisficing" decision approach was also explored with the participants.

A "satisficing," or "good enough" trade-off solution, that results from a concerted but unsuccessful effort to achieve objective and optimum performance requirements, could become the conflict resolution, or trade-off proposal/decision, that mutually satisfies both performance and affordability thresholds; thus optimizing defense budgets.

For the alternative approach, the following questions were provided to each participant:

a. Is the satisficing approach to decision making presently utilized? If so, what program(s)? How was it used? Results?

b. In the real world, is the ORD and system specification sufficiently structured with objectives, thresholds, priorities, etc., to support trade-offs, or "good enough" decisions?

c. Does the satisficing decision approach merit serious consideration for DOD wide implementation?

d. If you answered affirmatively to B.3 above, do you have any recommendations for implementing satisficing decision making in DOD acquisition?

e. If implemented, will the satisficing decision criteria approach also improve the acceptance of commercial or non-developmental equipment?

Respondent Questionnaire: I provided the questionnaire, with the above outline attached, to

12 selected service participants and 3 industry/academia participants (see attachment 1, with 2 enclosures). I determined the 12 service participants with one senior respondent, currently involved in acquisition policy and/or decision making, from each service, in each of the following categories:

-- Service Acquisition Executive Office,

-- PEO/PMs,

-- System Command,

-- Requirements Organization.

Also, I contacted the following industry/academia individuals, and they agreed to participate: Dr. Jacques Gansler, The Analytical Sciences Corporation (TASC) Senior Vice-President; Professor Murray Weidenbaum, Director of the Center for the Study of American Business, Washington University; and Professor J. Ronald Fox, Professor of Business Administration, Harvard Business School.

Respondent's Opinions: Attachment 2 provides the input opinions received from 13 of the 15 participants. This paragraph is a summary of the respondents individual views (sub-paragraph a) and accumulative opinions (sub-paragraph b) for each of the primary concern questions In next paragraph, a summary of the respondents views on the alternative "satisficing" approach is provided.

a. Some of the more significant individual views provided on the primary concern/hypothesis are:

(1). "A structural change is necessary in the entire acquisition process---simplify, streamline, and reduce the details."

(2). "The written directives and real world practices do not support informal decision making in affordability trade-offs between performance, costs, and schedule. ...the directives need to be changed, but more importantly, the individuals responsible for these programs need to be better trained and skilled in understanding where trade-offs can be made, how they can be made, and when is the best time to make them. Part of the problem lies in the arrangements in which the user who defines the requirements has little responsibility for acquisition costs. ...predestined to result in very difficult, if not inappropriate trade-offs."

(3). "The current process....keeps resource constraints out of the military requirements process, perpetuating the myth that requirements are determined by military need and threat, and that the acquisition community's only role is to satisfy that requirement. ...the true need is to satisfy military requirements within an affordable set of resources. ...without resource constraints, one is likely to ask for the last 5-10% of performance."

(4). "....We probably spend too much...to obtain the last 5-10% of performance; however, this is related to the budgeting process. ...The combat developer and the user will not back off on pushing towards objective performance if budgeted funds are still available."

(5). "When the threat is stretching the technology, then the last 5-10% is often very essential ...the load of functional requirements is a more serious problem. ....The acquisition process is out of control in both policy and practice....A paradigm change is required. Acquisition reform, modest risk taking, and long term commitments inside and outside the bureaucracy are essential."

(6). "Acquisition policy directives, implementing procedures and real world practices do provide an effective framework for making affordability trade-offs ....Spending additional dollars on the last 5-10%...does not necessarily mean that we are expending exorbitant amounts to do so. Last year,...reviewed several systems to see if that assumption was true. No data supported that premise....The hypothesis stated is basically flawed unless the outcome of this paper is to redirect the reason for the existence of the Defense Acquisition Process."

(7). "There is adequate flexibility to conduct trade-offs, but, our process inhibits use of that flexibility....Today, cost is the driver....requirements must be traded-off early and continually modified to live within cost. ....we will have to accept some degradation in unique requirements to achieve exponential increase in force effectiveness. ....No, there is flexibility, but we need direction to cause the process to allow requirements trade-off when it makes sense. Today, too many functional advocates are given the room to prevent any trade-offs."

(8). "...the first step....putting greater discipline into the requirements generation and validation process. ...we must deploy systems that are better...but not necessarily pushing the edge of the technology envelope. Then, using evolutionary upgrades... ...focus on balancing cost/schedule/performance goals at the beginning... ...requirements can not be developed in a fiscally unconstrained environment then expect the acquisition process to operate in a fiscally constrained environment...."

(9). "....Today, cost and schedule (very much related) have achieved parity. Users seem inclined to set achievable performance thresholds ("live or die" requirements) with more challenging objectives that can be addressed through P3I programs...The rigidity of our process

(APBs, TEMPs, OT)...make it very tough to relax a requirement....Common sense can prevail, but the bureaucracy sometimes forces us into less-than-optimum decisions."

(10). "Performance, in terms of minimum acceptable or the acquisition is no longer desired, does and should have preeminence. Cost merely determines whether minimum performance requirements are affordable. ....Perhaps (we do spend too much on the last 5-10% of performance), ...because the acquisition force does not communicate adequately to the user ...because the user may not want a lesser performing solution, and if the program is terminated, the acquirer loses their job? ...The incentive in the acquisition community is toward large programs requiring a large infrastructure."

(11). "Performance is on a par with cost. Schedule is often a lower priority. Need to allow some ranges of performance ... Yes, that would be appropriate (a structural change in acquisition guidance that reflects increased emphasis on cost and schedule containment)."

(12). "Written acquisition directives better support...formal...decision making in affordability trade-offs...conversely, the informal day-to-day decision making has major conflict between cost (affordability) and performance....JDAM has specified an average unit procurement price requirement (AUPPR) as an objective and a minimum of performance thresholds ("live-or-die"), all other requirements can be traded to achieve AUPPR."

(13). "Directives push affordability, but the way we currently do business does not encourage trade-offs until late in the decision making cycle...We need to get a combined cost-effectiveness evaluation, with better assessment of risk....We need to leverage commercial technology developments more...and focus big bucks into just a few key technologies that will give us a lasting war-fighting edge."

b. A summary of respondents views and opinions on the primary questions is as follows:

(1). Input indicates a majority opinion that present written policies support formal (milestone) decision making in affordability trade-offs but there are significant problems needing correction early on in the requirements process and in the informal decision making process.

(2). The majority generally support the premise that there is a bias towards performance but most also believe this is necessary if it can be fully supported by threat analysis. Some respondents also indicate a significant change is occurring with more cost-performance parity.

(3). Almost all agree that we spend a lot to accomplish the last 5-10% of performance; however, most now believe we must change and be more concerned about cost and schedule.

(4). A vast majority of the respondents believe that the materiel acquisition process needs significant change, from adding resource constraints and more time in the early stages of the requirements process, improved training and skills for players, simplification/streamlining/reduction of details, reduction in functional and administration influence/delays, and use of performance

specifications to increase contractor's flexibility in meeting user's requirements.

(5). A majority supports a structural change in weapons system acquisition guidance to reflect increased emphasis on cost and schedule containment, with performance trade-offs. Included are recommendations for a paradigm shift in approach; more emphasis on early stages; improvements that reduce the functional influence on the informal process; and approaches that improve the application of commercial/NDI equipment and practices.

Respondent's Opinions On "Satisficing": This paragraph is a summary of the respondent's individual views (sub-paragraph a) and accumulative opinions (sub-paragraph b) for each of the questions for the alternative "satisficing" approach.

a. Some of the significant individual views provided on the alternative "satisficing" approach are:

(1). "...Yes, (satisficing approach could improve acceptance of commercial and NDI equipment) because that's how the typical commercial item is designed---trading-off cost, performance, serviceability, etc. ...The fundamental problems ... are beyond the power of DOD to remedy. Congress fails to adopt a long term approach to procurement financing ... a program manager protects "his" program by overstating initial performance and underestimating time and cost..."

(2). "(utilize the satisficing decision approach?) Not with the present skill level for most government personnel associated with managing the acquisition process. ...The acceptance of commercial and NDI equipment is contingent .. on the determination of the user and the ... acquisition organization to accomplish this objective."

(3). "...when you use the expression, "satisficing approach", you should make that "satisficing and resource constrained approach". Without the resource constraint, there is no reason to simply satisfy performance (as contrasted to achieving higher performance)."

(4). "This (satisficing) approach is basically used when funds run short. At that point, the combat developer and the user are forced into a trade-off mode....Many ORDs ... fail to adequately prioritize which makes trade-off determination more difficult...A "satisficing" approach would enhance acceptance of COTS/NDI because, by definition, satisficing involves trade-offs on performance requirements..."

(5). "Yes, (satisficing) has been used on a number of programs ... user requirements were challenged and reviewed....Core and desirable requirements were categorized, materiel developer

requirements were stated in performance terms and the debates resulted in a lot of buy-in at all levels....(satisficing decision approach) currently being done under the concept of "best value." It is better to improve the best value process than introduce a variant with a new name...(implementing satisficing approach) must be a part of acquisition reform....The real money, near term, is not in the technical trade-offs, it's in the bureaucratic processes."

(6). "The recommended satisficing approach is already being used in terms of trade-offs. What would be done differently? If the suggestion is that we should always accept a degraded level of capability solely based on cost and schedule, then the solution is unacceptable...The "satisficing" approach can not improve acceptance of commercial or NDI if they can not provide the need capabilities"

(7). "...anytime you fail to meet your requirement, no one is inclined to debate the impact of the failure, especially in an era where time is not critical. Just fix it($), and retest ($), and conduct more reviews ($). Pretty soon, cost overruns prevail and the death spiral proceeds...In today's world, satisficing should be a watchword; certainly a prerequisite to HTI throughout the force..."

(8). "A key is for the acquisition community to focus on the threshold values....plan to achieve the objective values in the ORD through evolutionary upgrades... ...satisficing starts with the user defining realistic requirements....that can be satisfied in an evolutionary manner... Commercial and Non-developmental items are appropriate for requirements that are not critical for warfighting or extreme operating environments."

(9). "Still a long way to go...ORDs are really improving. threshold requirements are limited to a handful of "live-or-die" requirements; others become objectives or goals. Simplifying required program documentation ... through fewer "live-or-die" cost, schedule, performance requirements would reduce rigidity (increase PM flexibility)..."

(10). "My understanding of your definitions lead me to restate them as, "It doesn't hack the requirement, do you still want it?' Given that, the answer is no--never have seen it (satisficing approach)....Priorities? I've seen little to no prioritization within a weapons system requirement....(satisficing) No. a better approach would be to spend more time analyzing trade-offs in pre-milestone I modeling....I've observed a significant shift in acquisition responsibility away from the developer to the user. Unfortunately, neither manpower nor funds have accompanied the shift."

(11). "Many problems exist in that the ORD often goes too far....It (satisficing decision approach) is worth a hard look....Should be addressed as a part of acquisition reform...."

(12). "Yes. This (satisficing approach) is being used ....Yes, however, in my view this approach (satisficing) is permitted and encouraged in existing DOD acquisition regulations....(satisficing approach improve acceptability of commercial/NDI?) No..."

(13). "Yes (satisficing approach is used), but the performance is often set too high due to reliance on old specs/stds/rules of thumb. Also, cost seldom if ever set as a threshold/objective. I'd focus on the analysis tools, ...cost models for life cycle and more real time estimates of early conceptual system alternatives...We need to do more commercial and NDI in

many, even most, technical areas..."

b. A summary of respondents views and opinions on the alternative satisficing approach is as follows:

(1). About a third believe the satisficing approach to decision making should, and is, being used. Some program examples are provided from all services. Another large group believe it should be done under certain conditions, such as in a resource constrained environment where high tech immature technologies are not necessary.

(2). Eleven out of the thirteen respondents believe the structures for the ORD and system specifications are sufficient to support trade-offs and "good enough" decisions. Most have some recommendations for improvement, e.g., add resource constrains to the requirements process; improve dialogue, use of concurrent engineering principles and cost effectiveness analysis between the user and development community earlier in the requirements process; prioritization of the requirements; use of performance specifications; and accomplishing the objective requirements through evolutionary systems upgrades.

(3). A two-thirds majority support serious consideration of the satisficing decision approach for DOD wide implementation. This opinion input is conditional and should be combined with improved decision skill levels, adding resource constraints to the requirements process, maintaining responsiveness to threats, and implementation only on a limited basis.

(4). Of the two-thirds majority who answered affirmatively in (3) above, recommendations for implementation include more training and improved skills for players, empowering decision makers, simplifying documentation, less "live-of-die" and more realistic requirements, adding resource constraints to the requirements process, evolutionary accomplishment of requirements, and including the satisficing decision approach in the acquisition reform initiatives.

(5). Seven of the replies indicate that the satisficing trade-off approach would improve the likelihood of acceptance of commercial/NDI equipment. Three others agreed but felt additional changes are also required, i.e., a cultural change in DOD, further declining budgets and force levels, acceptance of commercial practices/processes/components, and adding resource constraints to the requirements process.

CONCLUSIONS

The following conclusions are summarized from either the research participant input, or my analysis of the written material, or combinations of both:

1. Present written acquisition directives, policies, etc, do support formal decision making on trade-offs; however, significant problems exist in the informal system. The ORD and system specification structure, guidance, policies, etc., support performance vs cost/schedule trade-offs.

2. There is a bias towards technology and performance, with less emphasis on cost/schedule impacts. Conversely, there seems to be some philosophical and policy changes taking place with more parity between performance, cost, and schedule. The main reason seems to be a lessening of the threat and reduced resources. DOD spends too much on the last 5-10% of performance achievement, but some now perceive us moving toward a more resource constrained environment with reduced breadth of high technology infusion.

Technological Imperative: "Because we can have it, we must have it!"[26]

3. The materiel acquisition process needs significant change, beginning with a structural change in the acquisition guidance that:

-- reflects increased emphasis on cost and schedule constrains,

-- reduces the influence and delays created or precipitated by functional and administrative procedures,[27]

-- simplifys, streamlines, and reduces the details in acquisition documentation,

-- adds resource constraints and enforcement of priorities in the requirements process,

-- improves utilization of commercial and NDI equipment,

-- improves the training and skills of the equip the force players.

4. There is some support for DOD application of a satisficing decision approach. It is now being used in some significant programs but recognition and encouragement of its use is seen as an improvement when resources are constrained. Some implementing considerations include:

-- empowering decision makers,

-- reducing the amount of "do-or-die" requirements in both requirements and acquisition documentation,

-- increasing flexibility in requirements to assist trade-offs in future decision making,

-- adding the "satisficing" decision approach to the acquisition reform initiatives.

5. The respondents believe that the satisficing trade-off decision approach will improve the acceptance and utilization of commercial and NDI equipment.

6. The respondents from the requirements and Service acquisition staffs think the present formal processes and approaches need little or no changes. Also, recent changes in policy and guidance (that reflects concern for improved cost/performance/schedule parity) are more appreciated and optimistically accepted by (policy) staffers than by the "doers" at this time. Most of the recommendations for change were provided by the PEO/PMs, Systems Commands, and industry/academia respondents who have not seen the full impact of these changes. This latter group, which includes the author of this paper, continues to be pessimistic.

7. The most volatile and emotional input came from the requirements community with strong statements like .... "It doesn't hack the requirement, do you still want it?", or "accepting less than what is required is foreign to me," and "cost merely determines whether minimum performance requirements are affordable." This seemingly consistent input, with a bias towards technology and performance, supports my theory that performance is the driver and resources are secondary. This approach fails to comprehend that with limited resources we must continually challenge requirements and resultant affordability costs. It may be more beneficial to have a large number of less expensive C-17s that need fully supported airfields than a reduced quantity of more expensive C-17s that can utilize marginal airfields closer to the combatant operations.

RECOMMENDATIONS

"Insanity is doing the same thing over and over and expecting a different result."[28]

1. Affordability costs can have severe long term effects and must be controlled from the beginning by establishing realistic resource constraints that are affordable, both with respect to the program itself and the "opportunity costs" in the remainder of the budget. This can be accomplished by:

-- challenging the requirements and the threat projections,
-- thorough analysis of the technologies and their risks, both individually and collectively for the total system,
-- improved realistic dialogue from the development community on the applicability of technological and conceptual alternatives.
-- increased and/or /improved use of integrated product and process development (concurrent and cost engineering).

"There seems to be a conspiracy of both software providers and the buyer to bid and accept a low price at the beginning."[29]

2. Cost growth undermines our credibility and increases program instability, both for the program it occurs on and other programs. Cost and schedule are where we compromise too much and where our credibility suffers the most. Somehow we need a cultural change in our official program estimates that reduce over-optimism in performance, cost, and schedule. With marginal ingredients from the user/requirements community and the technology/industrial community, the acquisition community "signs a contract" (APB and IPS) with DOD leadership and Congress to design, build, test, and produce a supportable and operationally acceptable system. All of this happens at the "infant" stage of a program and is supported by data derived from less

than 1 or 2% expenditure of required funding; with up to 10 more years of effort remaining before initial fielding; and with the threat and political/resource environment subject to constant change. More reality and flexibility in the requirements, in the program plans, in the process, and in trade-off decision making is essential to satisfying operational and affordable performance requirements with improved cost and schedule containment.

3. Resource constraints need to be more prevalent in the requirements process, either directly or by improved recognition of the criticality of ends vs means in military planning. This can be accomplished by training, as suggested earlier with involvement in DAWIA, and/or bringing the acquisition and requirements communities under the same decision authorities. The long, laborious, and risky acquisition process requires more resource constraints from the beginning; a minimum number of "do-or-die" threshold requirements; and full prioritization of thresholds and objectives. This prioritization would support trade-offs of lower priority thresholds and objectives to accomplish higher priority thresholds and/or objectives.

4. DOD must be more selective and curb it's appetite for infusion of advanced technologies at all costs. I am convinced that technology is not the primary culprit, but overdoses of technology lead to hidden combinations of cost and schedule impacts such that we see only the tip of the iceberg.[30] Additionally, we must never forget the optimistic nature of the laboratory scientist/engineer. Conversely, high-tech solutions which are essential and necessary to counter validated threats are justifiable exceptions.

5. DOD should promote and encourage more decision making using the "satisficing" process oriented view and less of the other views (rational manager, organizational procedures, political, and individual differences). Our decision making style and it's results have contributed to our present position of constantly being under the microscope from the Congress, the media, and the public.

SUMMARY

The reduction in the global threat plus changes in domestic political and economic priorities have increased the need for the requirements and acquisition processes to more effectively support trade-offs between performance and costs/schedules. We need to make better affordability judgements at the beginning of programs, and obviously, we need to do a better job of containing cost and schedule growth during program execution. Our perceived lack of adequate consideration for cost and schedule impacts, from inception to the completion of major system acquisitions, creates unwanted notoriety and severely damages our credibility.

Proposed initiatives for improving the process to better support trade-offs between performance, costs and schedule are as follows:

1. Recommend consideration of changes in written DOD policies and guidance to emphasize and institutionalize increased emphasis on costs and schedule and "satisficing" process oriented decision making.

2. Recommend changes In the requirements process:

-- Utilize resource constraints as requirements,

-- Requirements documents shall have only a small number of "live-or-die" threshold (with corresponding objective) requirements,

-- Other requirements shall be stated as objectives.

-- Both thresholds and objectives (in combination) shall be prioritized,

-- To support trade-offs of lower priority threshold and objective requirements to achieve increased performance in higher priority threshold and objective requirements.

3. Pursuit of advanced technology has to be more selective and more prudently applied using evolutionary upgrade approaches.

4. Reduce the influence and delays from functional personnel and organizations.

6. Simplify, streamline, and reduce the details in acquisition documentation.

7. Increase utilization of commercial and NDI equipment, performance type specifications, and "best value" contract awards.

8. Improve the training and skills of the equip the force players including requirements generation personnel.

It is controversial to recommend formal policy and/or directives be provided, or changed, to promote and institutionalize the above recommendations for change. However, some recommendations cannot be accomplished without overt actions by senior leadership.

"...there is nothing more difficult to take in hand, more perilous to conduct, or more uncertain in its success, than to take the lead in the introduction of a new order of things. Because the innovator has for enemies all those who have done well under the old conditions, and lukewarm defenders in those who may do well under the new. This coolness arises partly from fear of the opponents, who have the laws on their side, and partly from the incredulity of men, who do not readily believe in new things until they have had a long experience of them. Thus, it happens that whenever those who are hostile have the opportunity to attack they do it like partisans, whilst the others defend lukewarmly..."[31]

1. Quote by former Army Chief of Staff General Edward C. Meyer, New York Tines, Oct. 3, 1984.

2. "Affording Defense," by Jacques S. Gansler; The MIT Press, Cambridge, Mass, 1989; pg 7-9, 43, 61, and 131.

3. "Developing Battlefield Technologies in the 1990s," Institute of National Strategic Studies, McNair Paper 21, edited by Edwin Carlisle; (specific article) "Defense Decision Making Under a Technology-Maximizing Acquisition Policy," by Edwin Carlisle; August 1993; pg.51.

4. Ibid., pg 37.

5. "Defense Management Reform: For Better or for Worse?", Nov 1990, by Thomas McNaugher; The Brookings Inst., Washington, D.C.; Reprint from 1990-91 American Defense Annual, published by D.C. Heath, Lexington Books; pg. 180-188.

6. Affording Defense," by Jacques Gansler, The MIT Press, Cambridge,Mass, 1989; pg 1-3, 8-9, and 121.

7. "Defense Management Reform: For Better of for Worse?", Nov. 1990, by Thomas L. McNaugher; published by the Brookings Institute, Washington D.C., Brookings General Series (Reprint); originally printed in 1990-91 American Defense Annual, published by D.C. Heath, Lexington Books.

8. "Developing Battlefield Technologies in the 1990s," edited by Edwin Carlisle; Institute for National Strategic Studies, McNair Papers 21; August 1993; (specific article) "The Defense Acquisition Challenge: Fielding Affordable Weapons," by Robert Camache; pg 17-27.

9. "Defense Management Reform: For Better or for Worse?" by Thomas NcNaugher, Nov 1990; Brookings Inst, Washington, D.C.; reprint, 1990-91 American Defense Annual, published by D.C. Heath, Lexington Books; pg 174-180.

10. "Affording Defense," by Jacques S. Gansler; MIT Press, Cambridge, Mass, 1989; Pgs. 120-140.

11. "Defense Management Reform: For Better or for Worse?" by Thomas McNaugher; Brookings Inst., Nov 1990; reprint from 1990-91 American Defense Annual; published by D.C. Heath, Lexington Books; pg. 174-180.

12. "Defense Resource Management Study--Final Report," by D. Rice, Feb. 1979; pg. 4.

13. DoD Directive 5000.1, "Defense Acquisition," Feb. 23, 1991.

14. "Defense Management Report to the President," by Secretary of Defense, Dick Chaney, July 1989; pgs. 6-7, 17-19, and 27-28.

15. Ibid, pg. 17.

16. "Affording Defense," by Jacques S. Gansler; MIT Press, Cambridge, Mass, 1989; pg. 65-78, and 130-135.

17. DOD Directive 5000.1, "Defense Acquisition," Feb 23, 1991; pgs. 2-12 & 2-13.

18. DoD 5000.2M, "Defense Acquisition Management Documentation and Reports," Feb. 1991; Pgs. 2-1 through 4-4.

19. Defense Acquisition Workforce Improvement Act Legislation, Chapter 87, "Defense Acquisition Workforce," sub-chapter I through V.

20. "Reframing Organizations: Artistry, Choice, and leadership," by Lee Bolman and Terrance Deal, 1991; Jossey-Boss Inc.,San Francisco, Ca; pgs. 16-19 and 91-93.

21. "Decision Support Systems: An Organizational Perspective," by Peter Keen and Michael S. Morton; published by Addison-Wesley Publishing Co., 1978

22. "Essence of Decision," by G.T. Allison, 1971

23. "A Behavioral Model of Rational Choice", by H.A. Simon, 1975.

24. "Decision Support Systems: An Organizational Perspective," by Keen and Morton, 1978.

25. "Foundations of Decision Theory: Issues and Advances," by Michael Bacharach and Susan Hurley; Oxford UK, Cambridge Mass, USA; B. Blackwell, 1991; pgs. 130-131

26. "Affording Defense," by Jacques S. Gansler; MIT Press, Cambridge, Mass, 1989; pg.145.

27. "Defense Management Reform: For Better or for Worse?' by Thomas NcNaugher; Brookings Inst., Washington D.C., Nov 1990; reprint from 1990-91 American Defense Annual, published by D.C. Heath, Lexington Books; pg 178-185.

28. Quote from Walt Humphrey, Software Engineering Institute, 25 Feb. 1994.

29. Quote by Dr. Winston Royce; Director of Software Development Technology, TRW, Fairfax, Va.; 4 March, 1994.

30. "Is Software DOD's Achilles Heel?", by James Kitfield, Military Forum, July 1989; pg 30-35.

31. "The Prince," by Niccolo Machiavelli, 1513.

BIBLIOGRAPHY

1. "Small Wars, Big Defense: Paying for the Military After the Cold War," by Murray Weidenbaum, 1992; Oxford University Press, Pgs. 3-19, 89-102, 114-124, 151-166, and 189-210.

2. "Defense Acquisition Management," by George Sammet, Jr., and David Green, 1990; Florida Atlantic University Press, Boca Raton; pgs. 1-29, 83-149, 398-410.

3. "The Defense Revolution: Strategy for the Brave New World," by Kenneth Adelman and Norman Augustine, 1990; Institute for Contemporary Studies Press; pgs. 7-30, 45-120, and 197-231.

4. "The Defense Management Challenge: Weapon's Acquisition," by J. Ronald Fox (With James Field), 1988; Harvard Business School Press, Boston.

5. "A Framework for Enhancing Operational Capabilities," by Glen Kent and William Simons, 1991; Rand (R-4043-AF).

6. "An Analysis of Weapon System Acquisition Schedules," By Jeffrey Drezner and Giles Smith, Dec. 1990; Rand (R-3937-ACQ).

7. "Weapons Acquisition - A Rare Opportunity for Change," Comptroller General of the U.S. (GAO/NSIAD-93-15/Dec 1992).

8. "Defense Policy - Major Issues in 1993," by Robert Goldich and Steve Daggett, May 25, 1993; Congressional Research Service Report to Congress.

9. "Defense Acquisition Policy: A Disciplined Management Approach," by C.B. Cochrane, Nov 2, 1992; Defense Systems Management College, Acquisition Policy Department.

10. "Defense Acquisition" on Science and Technology (W/Attachments), by Don Yockey, the Under Secretary of Defense, 20 May, 1992.

11. Statement by Ms. Colleen Preston, Dep Under Secretary of Defense (Acquisition Reform), to the Senate Armed Services Committee, Sub-Committee on Defense Technology, Acquisition, and Industrial Base, June 28, 1993.

12. Report of the Defense Science Board Task Force on Defense Acquisition Reform, Office of the Secretary of Defense; June 16, 1993.

13. "Defense Industry in Transition: Issues and Options for Congress," by Gary Pagliano; Congressional Research Service Issue Brief; Aug 16, 1993.

14. "Three Barriers to Major Defense Acquisition Reform," edited remarks of William J. Perry, (then) Deputy Secretary of Defense, from a speech to the National Contract Management Association; Washington, D.C., Nov 18, 1993.

15. "Multiple Criteria Decision Making," by Milan Zeleny; McGraw-Hill, 1989; pgs. 63-127.

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REPLY TO
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MEMORANDUM FOR: SEE DISTRIBUTION

SUBJECT: RESEARCH PAPER QUESTIONNAIRE

1. First, some background. I am a student at the Industrial College of the Armed Forces, class of 1994. I am also a Department of Army civilian, certified in the Army acquisition corps, and enrolled in ICAF basic courses plus advanced studies at the Senior Acquisition University.

2. During my academic year at ICAF, I have elected to prepare and write a research paper. Enclosure 1 outlines my hypothesis and plan for "Cost Considerations in Defense Acquisition Decision Making." Input from experienced acquisition personnel, and noted individuals from industry and academia, is key to the analysis and subsequent recommendations.

3. I have selected the respondents by various means and it is easily recognizable that the people listed have outstanding credentials. I thank you for taking the time to participate and express your opinion. Your response, by answering the questions in enclosure 2, will be most influential to the overall paper. Receipt of you replies by 24 January, 1994, is requested. I apologize for such short notice.

4. I also want to note a change in my work (student) phone number. On January 7, 1994, all ICAF students will be changing study rooms. I will notify you of my new phone number. Please note that the fax number will not change.

5. I thank you for your support.

JERRY L. WILSON
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2 encls

attachment #1

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COST CONSIDERATIONS IN DEFENSE ACQUISITION DECISION MAKING

I. INTRODUCTION:

The U.S. defense community is presently undergoing significant reductions and future projections envision even more significant surgery. "Downsizing," "peace dividend," "reduced threat in the post cold war era," "domestic economic priorities," and other one-liners characterize the political and budgetary changes in vogue today and the foreseeable future. Today's priorities are aimed at deficit reduction, increased domestic savings and investment, and improved productivity; with the projection that overall domestic needs and national security interests are best served by higher priority efforts to improve the health of the economy.

With reduced resources, it is vital that national security policies, strategies, and weapon system acquisitions be executed with minimum cost growth; thus optimizing the resources allocated to defense. This paper will focus on the acquisition portion. Decisions on weapons system acquisition can commit billions of dollars and can affect national security choices.

THE HYPOTHESIS OF THIS RESEARCH PAPER IS THAT ACQUISITION DECISION MAKING IS PRIMARILY BIASED TOWARD ACHIEVING OPTIMUM PERFORMANCE EVEN THOUGH THIS MAY RESULT IN SIGNIFICANT COST AND SCHEDULE GROWTH. THEREFORE, THE PURPOSE OF THIS RESEARCH EFFORT IS TO OBTAIN INPUT AND OPINIONS ON THIS THEORY FROM ACQUISITION DECISION MAKERS AND NOTED INDIVIDUALS FROM INDUSTRY AND ACADEMIA. AN ALTERNATIVE DECISION APPROACH WILL ALSO BE EXPLORED WITH THE RESEARCH PARTICIPANTS. EXISTING STUDIES, REPORTS, BOOKS/ARTICLES, ETC., AND THE ABOVE PARTICIPANT INPUT WILL BE SYNOPSIZED FOR CONCLUSIONS AND RECOMMENDATIONS.

II. DISCUSSION: Cost growth in acquisition can occur from the following:

A. Overly optimistic expectations stated in the operational requirement (ORD) and system specifications. This optimism results in unexpected cost and schedule growth in the later stages of an acquisition program.

B. Adequate knowledge and proper analysis of the technology, risk, and limitations for the sub-system but inadequate knowledge, and/or optimistic estimates, for the integration into the overall system. This results in program delays due to unplanned sub-system redesign and overall system engineering performance trade-offs.

C. Designers/developers may be fully cognizant of each individual design parameter, but not fully cognizant of the combined impacts created when these individual design/performance parameters (survivability, environmental, lethality, signature reduction, manprint, logistics, etc.) are collectively added to the overall functional and physical requirements envelope. This also results in unforeseen cost growth due to redesign, retest, and trade-off decisions.

D. Poor and/or inadequate contractor performance from underestimation of the technical difficulties/risks, and their cost impacts, which results in poor system performance, schedule delays due to redesign/retest, and cost growth.

III. GUIDANCE: Guidance for requirements documents in DODD 5000.2-M is as follows:

A. Performance capabilities and characteristics be stated by "a minimum acceptable value (threshold) required to satisfy the mission need."

B. Performance objectives shall represent ---"beneficial increases in capability of operations ---- above the threshold."

C. These capabilities shall be "--- state(d) in operational terms and prioritize(d) if possible."

This requirements structure guidance, if followed in the derivation and finalization of the ORD, system specification and contract incentives, would appear to support trade-off decision making through-out the acquisition process while minimizing cost and schedule growth.

IV. SUMMARY:

The main concern of this research paper is not just the reasons/causes for cost growth, but how the acquisition community deals with the programmatic decisions which can result in cost growth. Also, in this context, the "decision makers" are the totality of acquisition program personnel, not just milestone decision authorities, as well as the requirements and PPBS players.

SOME HAVE ASSESSED THE RESULTS OF FORMAL (MILESTONE) AND INFORMAL (DAY-TO-DAY) DOD ACQUISITION DECISION MAKING AS REFLECTING AN "OPTIMIZING" APPROACH. THIS APPROACH CONTINUALLY STRIVES FOR THE HIGHEST ATTAINABLE POINT WITH RESPECT TO THE OBJECTIVE(S). THERE ARE OBVIOUS TIME AND COST CONSTRAINTS ON THE AMOUNT OF EFFORT THAT CAN BE SPENT IN THE SEARCH FOR AN OPTIMUM SOLUTION.

V. QUESTIONS:

A. For the above hypothesis, the following questions will be provided to each research participant:

1. Do written acquisition policy directives, and real world practices, support effective formal (MILESTONE) and informal (DAY-TO-DAY) decision making in affordability trade-offs between performance, costs, and schedule? For requirements determinations, and requirements trade-offs during the acquisition process?

2. Is performance achievement, rather than cost and/or schedule accomplishment, more influential in the decision process? Should it be?

3. In the real world, do we spend too much time and dollars to obtain the last 5 or 10% of performance? If so, is it necessary?

4. Does the present materiel acquisition process, both policy and practice, properly provide guidance and structure to address these concerns?

5. Is the guidance in of DODD 5000.2M for requirements documents generally followed, particularly the identification in the ORD of minimum acceptable values (thresholds), performance objectives for beneficial increases in operational capabilities above the threshold, and these capabilities prioritized?

6. Should a continuing shrinkage of the DOD budget necessitate a structural change in weapons system acquisition guidance that reflects increased emphasis on cost and schedule containment, with performance trade-offs?

B. An alternative "satisficing" decision approach will be explored with the participants:

A "SATISFICING", OR "GOOD ENOUGH" TRADE-OFF SOLUTION, RESULTS FROM A CONCERTED BUT UNSUCCESSFUL EFFORT TO ACHIEVE OBJECTIVE AND OPTIMUM PERFORMANCE REQUIREMENTS. THE "SATISFICING" APPROACH/DECISION COULD BE THE CONFLICT RESOLUTION THAT MUTUALLY SATISFIES BOTH PERFORMANCE AND AFFORDABILITY THRESHOLDS---THUS OPTIMIZING DEFENSE BUDGETS.

For the alternative approach, the following questions will be provided to each participant:

1. Is the satisficing approach to decision making presently utilized? If so, what program(s)? How was it used? Results?

2. In the real world, is the ORD and system specification sufficiently structured with objectives, thresholds, priorities, etc., to support trade-offs, or "GOOD ENOUGH" decisions?

3. Does the satisficing decision approach merit serious consideration for DOD wide implementation?

4. If you answered affirmatively to B.3 above, do you have any recommendations for implementing satisficing decision making in DOD acquisition?

5. If implemented, will the satisficing decision criteria approach also improve the acceptance of commercial or non-developmental equipment?

VI. QUESTIONNAIRE PLAN:

A. I will provide a questionnaire, with the above outline attached, to 12 selected service participants and 3 industry/academia participants. The questions, outlined above, will be specifically and separately formatted for the completion by the participants.

B. After receipt of the replies, I will conduct follow-up interviews where it appears beneficial.

c. I will determine the 12 service participants as follows: 1 senior respondent, currently involved in acquisition policy and/or decision making, from each service, in each of the following categories:

1. Service Acquisition Executive Office
2. PEO/PM
3. System Command
4. Requirements Organization

D. For the industry/academia participants, I will telephonically contact Dr. Jacques Gansler, TASC; Professor Murray Weidenbaum, Director of the Center for the Study of American Business, Washington University; and Professor J. Ronald Fox, Professor of Business Administration, Harvard Business School, and request their participation.

E. I plan to complete the specific determination of the respondents and mailing of the questionnaires by 23 Dec 1993. Respondent replies will be requested NLT 24 Jan 1994.

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RESPONDENT'S INPUT

COST CONSIDERATIONS IN DEFENSE ACQUISITION DECISION MAKING

HYPOTHESIS:

THE HYPOTHESIS OF THIS RESEARCH PAPER IS THAT DOD ACQUISITION IS PRIMARILY BIASED TOWARD ACHIEVING OPTIMUM PERFORMANCE EVEN THOUGH THIS MAY RESULT IN SIGNIFICANT COST AND SCHEDULE GROWTH. THEREFORE, THE PURPOSE OF THIS RESEARCH EFFORT IS TO OBTAIN INPUT AND OPINIONS ON THIS THEORY FROM ACQUISITION DECISION MAKERS. AN ALTERNATIVE DECISION APPROACH WILL ALSO BE EXPLORED WITH THE RESEARCH PARTICIPANTS.

ASSESSMENT:

SOME HAVE ASSESSED THE RESULTS OF FORMAL (MILESTONE) AND INFORMAL (DAY-TO-DAY) DOD ACQUISITION DECISION MAKING AS REFLECTING AN "OPTIMIZING" APPROACH. THIS APPROACH CONTINUALLY STRIVES FOR THE HIGHEST ATTAINABLE PERFORMANCE WITH RESPECT TO THE OBJECTIVE(S). THERE ARE OBVIOUS TIME AND COST CONSTRAINTS ON THE AMOUNT OF EFFORT THAT CAN BE SPENT IN THE SEARCH FOR AN OPTIMUM SOLUTION.

Questions:

For the above hypothesis and assessment, answer the following:

1. Do written acquisition policy directives, and real world practices, support effective formal (milestone) and informal (day-to-day) decision making in affordability trade-offs between performance, costs, and schedule? For requirements determinations, and requirement trade-offs during the acquisition process?

a. I would expect that the user (DOD) would be biased toward superior performance, knowing that certain amounts of costs overruns are usual, if not anticipated. It's a matter of judgement as to how far to push without generating powerful pressures to cancel or cut back the program. The rewards for cost saving are dwarfed by the rewards for a "successful" program. "Case law" (actions on specific weapon systems programs) is far more effective than the finest written document.

b. The written directives and real world practices do not support informal decision making in affordability trade-offs between performance, costs, and schedule. In my view the directives need to be changed, but more importantly, the individuals responsible for these programs need to be better trained and skilled in understanding where trade-offs can be made, how they can be made, and when is the best time to make them. Part of the problem lies in the arrangements in which the user who defines the requirements has little responsibility for acquisition costs. These arrangements are predestined to result in very difficult, if not inappropriate trade-offs.

attachment #2

c. The current process for establishing weapons' requirements is not resource constrained; and, therefore, maximizes performance. My personal biases would be to change the word "requirements" since what actually should be done is to attempt to see whether mission needs can be satisfied within resource constraints -- where the resources of concern are life cycle costs of the weapon, in the quantities required.

d. Existing policy is adequate with respect to affordability trade-offs. Existing policy has built-in reviews throughout the life-cycle to ensure affordability is considered. DOD 5000.2 dictates that all ACAT I new starts be reviewed during an annual Milestone I Review window to consider affordability issues. Affordability constraints for each acquisition program are established at Milestone I and updated at subsequent milestone decision points. ORDs are updated at MS II based on studies and testing conducted during Phase I. ORDs can also be modified based on trade-offs during phase II. (Verbal clarification by Mr. Charles: We have existing policy for affordability -- do we have enough money in the budget, but we don't have a policy for performance vs $ trade-offs and we need to have one.)

e. (1). No. on the surface the policies support this but in their details they leave the decisions to disparate functional components - the logistic, procurement and technical proponents. The concurrent engineering teams that include the whole team, not just the technical proponents, are making some headway in resolving this situation. (2). The requirements process, except in the case of mature NDI or commercial technology, suffers from the lack of evincive market data. No matter how well meaning the participants are, over optimism and marketing tend to flavor requirements decisions.

f. Acquisition policy directives, implementing procedures and real world practices do provide an effective framework for making affordability trade-offs in both the program management area and in determining requirements.

(1): Real world practices in terms of good common sense management and business practices, employment of generally accepted engineering and analysis techniques, use of advisory/feedback loops, and other "generally accepted business practices" make management of the day-to-day activities not only proactive but much more effective in coming up with resolutions to issues. It is only when a manager refuses to "manage" or leans on regulatory crutches that breakdowns occur on this level. In every management/business sense, there is little difference in managing a weapons program than managing a commercial development/acquisition on a day-to-day basis. The major difference occurs in that the day-to-day decisions must reflect a different standard of accountability to the public since the resources expended are not profits but taxes.

(2): Formal decision making is effective if it is implemented properly. Too much oversight means that day-to-day management may cease to exist, however, many program officers bring this upon themselves by not fixing their own problems early or not implementing effective management techniques. Formal decision making is an accounting for how well the program manager has done his day-to-day work. As such, no good manager should object to those reviews.

(3): It should also be noted that one of the hardest problems faced by OSD and the Services in implementing Defense Enterprise Programs is that program managers are given a clean slate to work with in managing their programs. Only a minimum of items that are required for other programs are required to be done for these systems however, the PMs have to develop a management strategy that is approved by OSD. More often than not, the Pms have complained that there is not enough guidance for them to do their work and then they revert back to some modified form of management by the acquisition regulations.

g. There is adequate flexibility to conduct trade-offs -- but ..... our process inhibits use of that flexibility. APBs are too specific and demand rigidity in contract specs. We lock in requirements at beginning of program rather than afford the program the benefit of adjusting requirements, specs and expectations downstream when our eyes are wide open and our expectations can be better measured.

If our requirements are overreaching, we are bound to failure at test. Better sort out risk before test plan is in concrete.

h. (1) Acquisition policy directives do provide the guidance needed to make affordability trade-offs. This is one of the key reasons for doing Cost and Operational Effectiveness Analyses (COEA). Affordability begins with the customer (the user) recognizing the cost of what is desired (the objective) versus what is the minimum acceptable capability (the threshold). The difference between the threshold and objective then provides the developer with the trade space needed to make cost/schedule/performance trade-offs during the acquisition process.

(2). It should also be recognized that making cost, schedule, and performance trade-offs is part of good business practices. We do not need directives and policy to tell us to make good business decisions. The same trade-off/decision process we use to buy items for our home and to buy cars should be applied to our weapons system acquisition process. However, the large defense budgets of the 1980s created some bad habits which are difficult to break.

(3). Today, the first step is to change our past practices by putting greater discipline into the requirements generation and validation process. In part, this is done during the COEA process and greater emphasis on up-front planning of a program as part of the Concept Exploration Phase, Phase 0. The key is to know what we want, how much we are willing to spend, and when we want it before a program goes to milestone I. This means both the user and developer must agree to a baseline for requirements and cost goals and know what trade space is available. With the goals and trade space defined, effective decisions can be supported as long as the developer and user remain in continuous communications.

i. The current process permits effective trade-offs to be made if decision-makers step up to making these sometimes difficult choices. Often it is found late in the development phase that specific performance goals may be unaffordable (excess cost and schedule needed to achieve them) -- unfortunately little cost and schedule is recovered when the performance requirements are reduced at this phase.

j. Yes, the current guidance is adequate. Real world practices? What are they? If this is a veiled attempt at asking if the acquisition community follows the rules, I must answer yes -- a t least in areas I've observed. Regarding requirements, the "evolutionary requirements" vision of DOD 5000 is quite flexible. Trade-offs occur between objective and threshold.

k. Yes -- but this initial start-up of requirements determination often misleads decision makers. Need savvy analysts to ask the right questions.

l. Written acquisition policy directives better support effective formal milestone decision making in affordability trade-offs between performance, costs, and schedule. Conversely, the informal day-to-day decision making currently has major conflict between cost (affordability) and performance. Advocates for performance capabilities that advance (or achieve) the latest or greatest state of the art strive for the highest attainable objectives, whereas the current fiscal climate in DOD creates advocates for lowest cost solutions, with lower performance thresholds if necessary to reduce cost. The informal actions can effectively delay the formal decision making process by requiring more trade-off studies. Schedule accomplishment appears to be the lesser consideration that the performance vs. affordability trade-offs.

m. Directives push affordability, but the way we currently do business does not encourage affordability tradeoffs until quite late in the decision making cycle. For instance -

- pre milestone 0 conceptual work is scanty, and no analysis tools exist for rough conceptual costing on a force-wide basis

- we operate in a "replacement" mode, i.e. a ship is coming near the end of its service life & we start planning a new ship to "plug the hole" in the fleet architecture array. Surprise, the new looks much like the old, conceptually.

- Mission Need Statements do not address cost or force levels, and COEAs are typically done on a platform basis rather than a broader total force basis.

2. Is performance achievement, rather than cost and/or schedule accomplishment, more influential in the decision process? Should it be?

a. Subject to limits, the answer to the first question is yes. Determining those limits in advance is an art form. Of course the answer to the second question is that it depends. If an air-superiority fighter has overwhelming superiority over expected opponents, costly increments are not attractive. But rules for decionmaking under uncertainty must contain an element of judgement.

b. The answer to this question varies from program to program. It is problematic to talk about whether "performance achievement is more influential than cost and/or schedule." Presumably you mean technical performance when you say performance. It is the relationship between incremental amounts of technical performance and its associated cost that is important. It is not particularly useful to talk about technical performance, costs, or schedule as independent entities. If one talks about cost, one always needs to talk about cost to perform "X," and the "X" is technical performance on a particular schedule. Technical performance, cost, and schedule are three interlined variables. They should continue to be linked.

c. Clearly, if there are no resource constraints in the requirements process, then performance dominates. Obviously, it is necessary to satisfy the military need. A cheap system that doesn't do the job is totally worthless; but introducing resource constraints could well yield the greater use of commercial items and yet still satisfy the military performance needs.

d. Performance achievement is the most influential factor in the acquisition decision process. Contractors strive to achieve the objective performance to gain a competitive advantage. PMs budget to achieve the maximum obtainable performance with the available funds.

e. In my experience, the influence of performance is directly related to the threat. When the threat is formidable, performance is the driver. In other cases such as O&S cost reduction, cost and schedule are the drivers. But in almost all cases, the obligational schedule forces business tradeoffs that are undesirable.

f. There is no single factor - cost, schedule, or performance - that is paramount at all times, nor should any one be. That does not mean that at any given time, one factor could not take precedence over another factor based on outside influences. Much time is spent in coming up with threshold performance values to keep performance from getting out of balance and to provide a starting point from which to begin a program.

A perfect example of when performance should outweigh, at least initially cost and schedule, is when a performance level is absolute. (Weapon system can not spend more than seven seconds on a firing point because its location can be detected and the system can be fired upon that quickly.) The next question would move performance out of the primary position. That question (in two parts) would be -- can we afford the cost of building something that meets that performance standard and can the system be fielded in time to meet the threat in the field. If the answer to either of these is no, then the operational requirement (performance) does not take precedence in making a decision. At that point, a serious manager would ask what affect the loss of that operational requirement has on the system -- it could be a major pillar that ends the program (trade-offs begin at this point).

g. Today, cost is the driver. Thus requirements must be traded-off early and continually modified to live within cost. In a more threatening environment, we must provide the soldier what he needs and

assume more risk -- and budget for some failures.

h. (1) Early in a program's life, performance achievement has been most important to satisfy a war-fighting need. as programs evolve, cost and schedule have become more important primarily because development problems occurred which resulted in schedule slips and cost increases.

(2) In the current budget environment, cost is of significantly greater importance than in the early-1980s which puts additional pressure on making trade-offs between schedule and performance in order to reduce cost. Unfortunately, cost is usually looked at on an annual basis when preparing budgets rather than minimizing the cost of the entire program. The result is reduced annual costs but increased program costs.

(3) As developers, we must remember that our job is to satisfy our customers' requirements. If performance is their top priority and they are willing to accept and support cost growth and/or schedule delays, then we strive to satisfy their performance requirements. We must provide them with timely and accurate information to decide which of the three factors (cost, schedule, or performance) is most important, and this may change over the life of a program. It is not our job to make their decision; but it is our job to provide the customers with honest, timely, and accurate information to support their decisions.

i. In the past, I believe performance was clearly the dominant measure of success. Today cost and schedule (very much related) have achieved parity. Users seem more inclined to set achievable performance thresholds ("live of die" requirements) with more challenging objectives (goals) that can be addressed through P3I programs if funding permits. This works much better.

j. Performance, in terms of minimum acceptable or the acquisition is no longer desired, does and should have preeminence. Cost merely determines whether minimum performance requirements are affordable. Schedules are habitually slipped.

k. Performance is on a par with cost. Schedule is often a lower priority. In my judgement performance is critical, but the process often is too black and white. Need to allow some ranges of performance, and I've seen examples of flexibility and inflexibility.

l. No. Cost and performance appear to be the more important considerations in decision making with schedule of secondary importance. In the past, performance may have been of paramount consideration, but due to major DOD budget reduction, cost has achieved increased importance.

m. Not yes, but hell yes. Performance comes first, schedule second, and cost a long third. We need to get a combined cost-effectiveness evaluation, with better assessment of risk. We should give great weight to force flexibility, as a hedge against significant mission/role shifts that are bound to occur in the long life of ship design/acquisition/operation. For a ship... concept to contract design - 6 to 10 yrs; contract design to 1st ship commissioned - 5 to 8 yrs; ship operation/expected service life - 30 to 40 yrs; ship class production run (mostly same design, to last ship) - 5 to 15 years; total can vary from 46 to 73 years; hence my recommendation for FLEXIBILITY.

3. In the real world, do we spend too much time and dollars to obtain the last 5 or 10% of performance? If so, is it necessary?

a. Undoubtedly. See answer to 2.

b. Usually too much time and dollars are spent to obtain the last 5 or 10 percent. Sometimes that is necessary. One cannot say that it is necessary or not necessary all of the time. Sometimes it is not until

after the fact that one realizes that one has invested too much time or effort to obtain a small additional increment of technical performance.

c. Again, without resource constraints, one is likely to ask for the last 5 of 10% of performance. However, since it is known that the last 5 of 10% of performance may well increase the costs of the weapon system by over 50%, a resource constraint would most likely reduce the requirement for the last 5 or 10% of performance. Since the weapon system is being designed for use in 20 years, it is rarely possible to predict what the threat needs are, and certainly not to a 5 or 10% performance difference; thus, there is no such thing as a firm "requirement" (to that kind of accuracy).

d. We probably spend too much time and money to obtain the last 5 or 10% of performance; however, this too is related to the budgeting process. If the money is there, there is no incentive not to spend it. The combat developer and the user will not back off on pushing towards objective performance if budgeted funds are still available. (Verbal clarification by Mr. Charles: We need to do more in this area.)

e. (1) Generally that doesn't appear to be the case. The load of functional requirements is a more serious problem. (2). When the threat is stretching the technology, then the last 5% to 10% is often very essential - examples are anti-armor weapons and hardening against tunable lasers. In most cases more than 5 to 10% of the performance is left on the factory floor due to poor process control or use of inspection instead of process control.

f. Spending additional dollars on the last 5-10% of performance does not necessarily mean that we are expending exorbitant amounts to do so. Last year, OASD(RDA) and ODCSOPS reviewed several systems to see if that assumption was true. No data supported that premise. It does cost more, incrementally, to build that last amount, but the question must be asked -- why are you developing and buying this system in the first place? Intense up-front analysis is conducted to try to identify cost drivers and manage risk areas. This is common acceptable business and engineering practices used by everyone. Well managed risk and controls on cost drivers can sometimes eliminate or reduce the negative impact of additional cost, but no risk program or cost driver control will eliminate the cost growth that is always present when you reach for the top of the technology envelope. Sometimes reaching a "satisficing" solution that is below the performance threshold is not an acceptable answer especially if it leads to significant cost increases in other areas -- people (including lives lost), time (maintenance, supply, loading, etc), support equipment, or any other area.

g. We do -- each and every time. The threat will tell us if it is necessary. With HTI, we will have to accept some degradation in unique requirements to achieve exponential increase in force effectiveness.

h. (1) Yes. In the past we did this and experienced cost growth and schedule delays. In part, this was driven by our major threat (the former Soviet Union) who had technologically advanced weapon systems and continued to develop new weapon systems. We believed it was necessary to focus on performance to maintain technologically superior weapons because we could not match quantity of weapon systems with the former Soviet Union. TO do this, we pushed the edge of the technology envelop to get the last 5 or 10% of performance. In part, this was justified based on satisfying our customer's requirements. Looking back, we achieved the world's best military systems by taking this approach.

(2). Today, not only has the budget environment changed, but so has the threat environment. As a result, we must deploy systems that are better than our existing capabilities but not necessarily pushing the edge of the technology envelope. Then, using evolutionary upgrades, we can increase/improve a system's capabilities to meet new threats when technology has ben demonstrated thereby driving down cost and risk."

i. Sometimes we do! The rigidity of our process (APB's, TEMP's, OT) can back us into a corner

and make it very tough to relax a requirement that hasn't quite been met. Common sense can prevail, but the bureaucracy sometimes forces us into less-then-optimum decisions. In many cases the last 5-10% of performance becomes "nice-to-have".

j... Perhaps, but if we do it, it is probably because the acquisition force does not communicate adequately to the user who advocates the requirement. Could that be because the user may not want a lesser performing solution, and if the program is terminated, the acquirer loses their job?

k. The real world is a continuum of events. On balance I don't think we overdo the last 5-10%, but there are certainly examples of overkill.

l. No. This may have been true in the past, but my perception is that the budgetary pressure will effectively reduce the tendency to try to obtain the maximum feasible performance. Past tendency to try to achieve all objective performance goals vice considering cost effectiveness trade-offs should be precluded by the current formal decision making process.

m. In many cases we do, but in a few select cases the last 5-10% is warranted & in fact necessary. We need to leverage commercial technology developments more in areas where commercial/naval roles converge, "translate" commercial to navy at relatively low cost where we can, and focus big bucks into just a few key technologies that will give us a lasting war-fighting edge, despite having to fund it alone. Even then we must seek out joint (Army/AF) partnerships or suitable international partners for sharing development costs of these "military unique" technologies. In 95% of cases, we pay too much for last 5% of performance. In 5% of the cases, the dollars are well spent and we need to apply even more assets to ensure capable implementation of the technology. An example of the 5% needed... stealth. Even in that case, we need to ensure broader (perhaps shallower) implementation that is affordable.

4. Does the present materiel acquisition process, both policy and practice, properly provide guidance and structure to address these concerns?

a. If anything, perhaps too much guidance is provided (see response for #5). The more I read acquisition instructions, the more I became concerned the they can never be too detailed for the dumb and inexperienced. The other side of the coin is that, for the smart and experienced, the details are something to be ignored or gotten around.

b. I believe the guidance needs to be clearer. Also, there needs to be great improvement in the skill of government personnel responsible for managing the acquisition process. Their training needs to consist of more real life examples and discussions of the types of decisions and dilemmas and the options realistically available to government personnel who manage the acquisition process.

c. The current process actually keeps resource constraints out of the military requirements process -- perpetuating the myth that requirements are determined by military need and threat, and that the acquisition community's only role is to satisfy that requirement. In reality, the true need is to satisfy military requirements within an affordable set of resources.

d. Within the material developer sphere, adequate policy and guidance exists. In practice, the combat developer and the user are usually opposed to satisficing any performance capability. Guidance in DOD MANUAL 5000.2M is generally followed but you must remember that the combat developer defines what are "beneficial" increases in operational capabilities above the threshold.

e. The acquisition process is out of control in both policy and practice.

f. The current acquisition process does provide proper guidance and structure to address these concerns. Management from both the user and materiel developer side is based on common sense and acceptable business and engineering practices. Many times we rely too much on the crutch of "what the regulation does or doesn't say" rather than looking at the broadness of the instructions and using that to our advantage.

g. No -- there is flexibility -- but we need direction to cause the process to allow requirements trade-off when and where it makes sense. Today, too many functional advocates are given the room to prevent any trade-offs.

h. The present policy does provide the guidance and structure to address these concerns. What is needed is a change in our culture in the Air Force, OSD, and Congress to make the policy part of our practice. Our streamlining initiatives are helping us to rethink our culture so that we focus on balancing cost/schedule/performance goals at the beginning of a program. To do this more time will be required for Phase 0 studies; this will be a major change from the past. Also, we need to use performance specifications to allow the contractors the maximum flexibility in meeting our user's requirements. Both of these changes are being implemented as part of our acquisition reform initiatives.

i. My view (a minority opinion, no doubt) is that the process provides too much guidance and structure. Attempts to streamline and reform acquisition have largely failed to date due to an overabundance of functional "rice bowls" and overseers protecting turf and jobs. The process needs less, not more, to function efficiently.

j. No. The incentive in the acquisition community is toward large programs requiring a large infrastructure. The user merely wants a solution to an operational need, not the most expensive one.

k. Yes. Service decision meetings and associated documentation coupled with OSD oversight provide the vehicle to address concerns. This does not mean that the concerns are necessarily addressed.

l. The formal acquisition process does provide the necessary guidance and structure to address these concerns. In practice, resolution of these issues may require seemingly unending battles between advocates of performance and cost/affordability considerations. The practice tends to delay the formal decision making process until informal resolution (or accommodation) of different issues had been completed.

m. I think the policy is fine and sufficient. What is insufficient is the implementation through organizational culture in the myriad of complex interorganizational relationships. What we need is not more words on paper... we have pretty good words now, and surely enough. What we do need is proactive organizational development of the teams and procedures at the working level to get it done, and a balancing of oversight and empowerment.

5. Should a continuing shrinkage of the DOD budget necessitate a structural change in weapons system acquisition guidance that reflects increased emphasis on cost and schedule containment, with performance trade-offs?

a. A structural change is necessary in the entire acquisition process---simplify, streamline, and reduce the details. The writers of guidance should be forced to read all of the existing guidance provided.

b. The question of performance trade-offs is tricky. The amount of trade-off appropriate varies from one program to another, depending, for example, on the threat to be met.

c. Clearly, the defense acquisition process has to change if we are to get increasing performance with reduced costs and schedules. Since the commercial world is now achieving this combination, the defense world needs to use commercial practices -- applied to its defense-unique needs.

d. Certainly the diminished level of funding for DOD is forcing the acquisition community to examine all of the processes in an effort to save money. One area that deserves study would be the increased use of modified NDI or foreign systems. Possible performance trade-offs could be offset by reduced development costs and schedule. Under the current budgeting system, unless the players are incentivized to save money, we will continue to strive for maximum obtainable performance consistent with available funds. (Verbal clarification by Mr. Charles: Policies and processes that assist performance vs cost trade-offs, both before and after the ORD is finalized, is the right idea but we don't presently have any formal policies.)

e. A paradigm change is required. Acquisition reform, modest risk taking and long-term commitments inside and outside the bureaucracy are essential.

f. At no time should we assume that either cost, schedule, or performance by itself is paramount above any of the other two although one may take precedence based on other factors in order to come to a decision. The DOD materiel acquisition process was designed to provide a disciplined approach to acquiring materiel that meets operational needs. If the trade-off is always against performance (requirements) and performance is not equally considered with cost and schedule then there is no reason to have a Defense Materiel Acquisition process because you will be wasting money buying less capable programs that can never meet the threat simply because of dollars. In the budgeting and programming worlds this is called "salami slicing" programs. It is what we do instead of good fiscal management. When outside influences such as reductions in available funding are a reason for canceling programs instead of cutting off pieces that does not mean the process itself should be shifted to follow that scope. It is simply good fiscal management.

g. Yes -- if not, the testers and analyzers will hamstring the process and the PM. At some point, the burden of proof must shift to the graders of the paper and let those who are accountable exercise their authority and talents.

h. (1). Changes are needed to accommodate reductions in DOD's budget-- but not to just place greater emphasis on cost and schedule containment. Emphasis is also required on requirements development and validation. Requirements can not be developed in a fiscally unconstrained environment then expect the acquisition process to operate in a fiscally constrained environment. To be successful, the customer must be an integral part of trade-off decisions.

(2). The current structure does provide a logical and disciplined process for weapon system acquisition. We must now change our management structure to operate in the reduced budget environment. This is the basis for many of the proposed acquisition reform initiatives. The reform initiatives are trying to reduce/remove statutory and regulatory requirements, FARS/DFARS, and MIL Spec and Standards which add cost to a program without a commensurate increase in value-added.

(3). Finally, acquisition reform initiatives are placing greater reliance on commercial processes and practices. The combination of these reform initiatives will allow us to better achieve the right balance between cost, schedule, and performance.

i. Yes, and on a few programs with which I am familiar (Joint Direct Attack munitions), this is being done. JDAM has specified an average unit procurement price requirement (AUPPR) as an objective and a minimum of performance thresholds ("live-or-die") -- all other requirements can be traded to achieve AUPPR. I hope this is a glimpse of the future.

j. Cost containment is a fact of life. But it cannot degrade performance requirements below which a system is no longer wanted. Reduced budgets require trade-offs before requirements are documented in the ORD. Anything else if folly.

k. Yes -- this would be appropriate.

l. No. The present formal weapons system acquisition guidance provides adequate provisions for cost and performance trade-offs, e.g., COEA studies are required.

m. The format for documents is generally followed, but the intent is generally followed to the minimum level.

- thresholds and objectives are identified, but the threshold is often an objective
- the analysis and comparison of alternative concepts often focuses on a small box. i.e., not much difference between alternatives
- capabilities are generally prioritized, but analysis tools are limited in ability to discriminate between alternatives' performance.

6. Other comments?

a. In my years of dealing with legislatures, regulations, and administrative rulings, I've never learned how to require the use of common sense and good judgement. Perhaps these are acquired tastes.

b. Undoubtedly some improvements can be made by improving the directives and other documentation associated with the acquisition process. But the primary improvement will come from improving the practical skills of government acquisition managers, as I have indicated in my book, The Defense Management Challenge.

c. (See my introductory comments) Before answering your specific questions, let me observe that you need to reword your hypothesis, and much of your other discussion, in order to make clear that there are two basic issues. One has to do with "cost growth" and the other has to do with weapon's "costs". In the former case, one is concerned with controlling the growth on the program after it gets started -- regardless of whether is was an expensive or inexpensive program. In the latter case, however, one is concerned with trying to reduce the actual cost of a weapon system (from that of the prior generation) and/or to live within a resource-constrained cost target, for the next-generation weapon system. In my opinion, the issue of weapon's cost is the far more important one, and it is the one that your questionnaire actually addresses. However, your hypothesis wording addresses cost growth; so you should go back and redo it.

d. Verbal input-- Our concentration for the foreseeable future is for modifications to existing equipment rather than new platforms or new systems. In the modification process there is normal guidance and procedures now in place that promotes cost vs performance trade-offs. Also in the modification process there is less rigidity from the requirements process thus allowing more room for trade-offs.

e. The cost and schedule are influenced more by administrative delay and decisions than by technical considerations. Overheads continue at contractors and government activities while insignificant issues are debated. Programs are stretched out to meet budget bogies greatly increasing overhead as a share of costs. Overheads are built by functionals especially procurement and cost/audit functionals. Despite work breakdown structures, Defense Financial Accounting systems, work measurement systems and audits of every type, we haven't any idea of what the pieces cost. Costs are pooled in ways that are great for accountability but terrible for management decisions.

f. The hypothesis stated is basically flawed unless the outcome of this paper is to redirect the reason for the existence of the Defense Acquisition Process. Since we acquire weapons and other materiel in order to defeat threats, then there must be some bias (although not a significant tilt) towards performance that will always drive cost and schedule. Every threat has a time-frame and a cost to defeat whether in terms of dollars, materiel, people, time or other resources. Why waste taxpayers dollars to buy equipment at all if your intent is never to be able enough to deter or defeat the threat and ensure your own safety and borders.

g. --

h. --

i. --

j. Your use of the word "optimum" seems pejorative to me. You seem to equate optimum with maximum. If there is a significant problem in need of a solution, it is the lack of attention and formal funding of pre-milestone I activities. Any "sins of the ORD" occurs as a result of the analysis and trade-offs among concepts that make-up pre-milestone I studies. Funding for these analysis before there is a formal program is, at best, sporadic.

k. ---

l.. In some instances the informal decision making structure appears to unnecessarily try to delay a program milestone decision until different views are accommodated. Hence, an apparent ability to hold a program "hostage" until a particular issue or position is accommodated vice permitting issues to be decisioned by the decision authority.

m. I don't think guidance need change...the acquisition system is decent. Its the implementation that needs to be improved, and if commercial can do the job, we should buy commercial. I think the key is to develop tools that measure cost-effectiveness of alternative concepts and then simple displays so that decision makers can understand the trade-offs of cost vs performance.

ALTERNATIVE "SATISFICING" DECISION APPROACH:

A "SATISFICING," OR "GOOD ENOUGH" TRADE-OFF SOLUTION, RESULTS FROM A CONCERTED BUT UNSUCCESSFUL EFFORT TO ACHIEVE OBJECTIVE AND OPTIMUM PERFORMANCE REQUIREMENTS. THIS "SATISFICING" APPROACH, OR DECISION, COULD BE THE CONFLICT RESOLUTION THAT MUTUALLY SATISFIES BOTH PERFORMANCE AND AFFORDABILITY THRESHOLDS---THUS OPTIMIZING DEFENSE BUDGETS.

Questions:

For the alternative approach, answer the following?

1. Is the satisficing approach to decision making presently utilized? If so, what program(s)? How was it used? What were the results?

a. In the "real" world, I find that most people satisfice rather than maximize, otherwise they would never get through the day's work. The problem is that announcing a "good enough" approach almost ensures that the results often won't be.

b. The question cannot be answered for "all programs." The variations are immense from one program to another.

c. (See my opening comments) In the same vein, when you use the expression "satisfying approach", you should make that "satisfying and resource-constrained approach". Without the resource constrain, there is no reason to simply satisfy performance (as contrasted to achieving higher performance). It is the resource constraint which is the essential concept that is now missing in the defense requirements process.

d. This approach is basically used when funds run short. At that point, the combat developer and the user are forced into a trade-off mode.

e. (1). Yes. It has been used on a number of programs:120mm Mortar System, Mobile Subscriber Equipment, Armor Gun System, New Training Helicopter, Javelin Rocket System, 155mm Howitzer Upgrade (Paladin), several training systems, et al. (2). Each system was treated somewhat uniquely but there were similarities. User requirements were challenged and reviewed up to the Army Secretariat/VCSA level. Core and desirable requirements were categorized, materiel developer requirements were stated in performance terms and the debates resulted in a lot of buy-in at all levels. In the case of Paladin, the VCSA capped the unit price leaving specific upgrades to the user and developer. Gold watches disappeared after the first review when it became apparent the cap was inflexible. (3). The result was the selection of more mature technologies except Javelin. Some were pure NDI, others had large NDI content. Pre-award testing occurred with the Mortar and Helicopter programs. All were purchased on best value, long-term contracts. The success rate for technical, financial and schedule has been very good for the group as a whole. The higher risk programs have been more troublesome as expected.

f. The satisficing approach that this alternative offers is already used daily in the program management and combat development areas. It is a basic principle of good management and engineering analysis that drives this kind of process. A simple example is any program that utilizes Mil Std 1388-1A/2A,

Logistics Support Analysis/Logistics Support Analysis Record. The process set forward in this Mil Std is only required in terms of the concept and the data formats that fit standard information systems. It is based on common, standard management and engineering practices that are used to analyze, among other things, what the options are if there is a problem with cost, schedule, ot inability to meet a requirement. The LSA/LSAR process is not confined to the realm of logistics. It has basic analysis that covers everything from identification of system operational requirements t the impact of changing to different size bolts or screws. Furthermore, the use of standard analyses in the development of the Cost and Operational Effectiveness Analysis (COEA) and recurring excursions into parts of those analyses to come up with modified solutions is another example of using trade-off techniques. There are some requirements that may exist as point estimates that can not be traded-off. The example previously used was time on firing position. If all considerations are looked at and there is no other solution to allowing the system to spend longer on the firing position, then the only choices are: kill the system or pay the added cost, otherwise it will cost lives and hardware -- one which can not be replaced and the other is an expensive and timely alternative.

g. Unclear on your thrust. But ..... anytime you fail to meet your requirement, no one is inclined to debate the impact of the failure -- especially in an era where time is not critical. Just fix it ($) and retest ($) and conduct more reviews ($). Pretty soon, cost overruns prevail and the death spiral proceeds.

h. (1). A recent example is the Precision Lightweight GPS Receiver (PLGR). This program was originally planned to be full MIL-Spec receiver. The Army and Air Force worked together to streamline the requirements so that a non-developmental program could be pursued and the user's requirements could still be met. Streamlining included reducing the number of MIL-Specs/Stds on contract by 90% and the number of acquisition regulations/policies/FARS/DFARS by 25%. The result was unit cost reduced 20% and a costly 3 to 5 year developmental was not required. The decision to streamline was done at the levels below the headquarters staff.

(2). This is one example where the user decided what was enough and, as a result, the user got the equipment sooner and cheaper. PLGRs are being delivered to the field today and the user is satisfied. The bottom line is that the working level can determine what is "good enough" and has the power to implement the streamlining to achieve it. All it takes is cooperation between the user and the developer.

i. Yes, on JDAM. See my last answer (5 above) for how. Preliminary results (through mid-term of source selection) indicate contractors understand emphasis on affordability and propose accordingly. Still a long way to go, though!

j. My understanding of your definitions lead me to restate them as, "It doesn't hack the requirement, Do you still want it?" Given that, the answer is no -- never have seen it.

k. No to my knowledge.

l. Yes. This decision approach is being used in the LX, Amphibious Assault Ship Program. The ORD provides threshold and objective performance goals. Trade-off studies are being conducted in the design of the ship, i.e., sensors, combat systems, etc. A formal COEA will be conducted before final selection of sensors, weapon systems, etc. There is no attempt being made to achieve all objective performance goals. Since this is an ongoing effort, results will be known in the future.

m. Yes, but the performance is often set too high due to reliance on old specs/stds/rules of thumb. Also, cost is seldom if ever set as a threshold/objective. If we do try to limit cost on ships, we do it by limiting size, which equates less and less with cost as we get into solid state computer/combat systems and the cost of code (software).

2. In the real world, is the ORD and system specification sufficiently structured with objectives, thresholds, priorities, etc., to support trade-offs, or "good enough' decisions?

a. See answer to 5, above.

b. Same comment as 1 above.

c. See 1 above.

d. ORDs are sufficiently structured with thresholds and objectives which are updated at MS II. Many ORDs however, fail to adequately prioritized which makes trade-off determination more difficult.

e. The structure and information are generally adequate to make qualitative decisions. But, we like to crunch numbers so the more that is known about an alternative the less attractive it becomes as compared to the "potential" of other alternatives.

f. The ORD is structured sufficiently well enough to provide to the materiel developer what the requirements are. How well the ORDs are written is another question in and of itself. The business of the user/user representative is to define what capabilities are needed to deter or defeat expected threats, not to tell the materiel developer how to build the system or what to build it with. The ORD and Key Operational Performance Parameters should be structured well enough to support acceptable trade-offs, however, that does not mean that there does not need to be a dialogue between both communities to ensure that the trade-offs are acceptable and do not cause other problems.

g. It's pretty good, but the materiel developer can greatly enhance the credibility of the ORD through technology assessments and involvement in its preparation and review. That's called concurrent engineering in the real world. Should also be applied to the requirements process.

h. (1) Today, no; but changes are being implemented which will support this. The ORD defines the user's critical system performance parameters in terms of threshold and objective values. These values should be the user's highest priority requirements. The space for trade-offs is between the threshold and objective values. If trade-offs are made which decrease performance below the threshold value, a program could become vulnerable to restructuring or termination. A key is for the acquisition community to focus on the threshold values when writing performance specifications and to plan to achieve the objective values in the ORD through evolutionary upgrades of the system. This approach will reduce cost, schedule, and risk and satisfy the customer's minimum requirements.

(2). The adoption of performance specifications as recommended by OSD's MIL Spec/Standard/ Process Action Team will change this. Performance specifications provide more latitude for the contractor to make trade-offs to meet the user's system performance requirements. This can be done because we will be telling the contractors"what to build," not "how to build it."

i. ORDs are clearly improving. Real threshold requirements are limited to the handful of "live-or-die" requirements; others become objectives or goals. This allows more flexibility to trade-off objectives to achieve cost and schedule. We're getting better.

j. Objectives and thresholds provide for trade-offs, however they do not allow for accepting an acquisition that does not meet the threshold. Priorities? I've seen little to no prioritization within a weapons system requirement.

k. Many problems exist in that the ORD often goes too far. The system, if properly exercised,

can prevent this excess.

l. Yes, the ORD is adequate to support trade-offs. The "system" specification (ship specs) will ultimately reflect the decisions made after trade-offs, and milestone II approval has been completed. The ship spec will be part of the contract for the detailed design and construction of the lead ship. In general, the ship spec will reflect threshold, or minimum, requirements to be met by the shipbuilder.

m. As mentioned above, we deal almost exclusively with performance and operational (near term) performance at that. Things we do not deal with sufficiently....logistics tail and cost thereof.....cost ($/effectiveness tie in) .... force level impacts (interaction of various ships/systems in fleet)... risks (technical, programmatic).

3. Does the satisficing decision approach merit serious consideration for DOD wide implementation?

a. Yes, but recognizing its limits.

b. Not with the present skill level for most government personnel associated with managing the acquisition process.

c. See 1 above.

d. Not under the current budgeting process. Material developers have insufficient incentives to "satisfice" until their available funds are depleted.

e. This is currently being done under the concept of Best Value. It is better to improve the Best Value process than introduce a variant with a new name.

f. The recommended "satisficing " approach is already being used in terms of trade-offs. What would be done differently? If the suggestion is that we should always accept a degraded level of capability solely based on cost and schedule, then the solution is unacceptable. Every level of technology has a dollar price which can not be avoided unless the system is not developed and produced, therefore, at what point would I reach the "satisficing" stage?

g. It depends on the threat. In today's world, satisficing should be a watchword; certainly a prerequisite to HTI throughout the force.

h. No. This approach is important and should be considered as a good business practice. We do not need nor want another policy to implement this. Current policy already provides us, the users and developers, the flexibility we need to change our culture; it is up to us to in fact change the culture.

i. I believe to a certain extent this is being done now, but on a limited basis.

j. No. A better approach would be to spend more time analyzing trade-offs in pre-milestone I modeling, simulations, and analysis.

k. It's worth a hard look.

l. Yes, however, in my view this approach is permitted and encouraged in existing DOD acquisition regulations.

m. I think we do it now, but only for operational performance. I'd focus on the analysis tools, prioritizing cost models for life cycle and more real time estimates of early conceptual system alternatives. Decision making is very much a political battle of conflicting requirements ... the ability to analyze and then concisely communicate the "nuggets" of that analysis to time and attention constrained decision makers is the key element.

4. If you answered affirmatively to 3 above, do you have any recommendations for implementing satisficing decision making in DOD acquisition?

a. Only by giving more discretion to decision makers.

b. Yes. The same answer as for #4 in the first part, above.

c. See 1 above.

d. N/A

e. It must be part of acquisition reform (formerly acquisition streamlining and acquisition challenge).

f. Same as 3 above.

g. Yes. No new reviews or assessments. Just issue a USD(A) Directive and follow through with audits. Give the PM's the authority and ability to overrule the "finders" of the world.

h. Just as a point of clarification, satisficing starts with the user defining realistic requirements; preferably ones that can be satisfied in an evolutionary manner as technology becomes available at lower cost and risk. Once this is done, acquisition business decisions will be easier and your proposed approach of satisficing will occur.

i. Simplifying required program documentation (APBs, TEMPs, etc) through fewer ""live-or-die" cost, schedule, performance requirements would reduce rigidity (increase PM flexibility) to deliver a good system to the user.

j. No response.

k. Should be addressed as part of acquisition reform -- Ms. Colleen Preston.

l. No.

m. N/A

5. If implemented, will the satisficing decision criteria approach also improve the acceptance of commercial or non-developmental equipment?

a. Yes, because that's how the typical commercial item is designed---trading off cost, performance, serviceability, etc.

b. The acceptance of commercial or non-developmental equipment is contingent primarily on the

determination of the user and the government acquisition organization to accomplish this objective and to make sure that this orientation is transmitted throughout their organizations. As long as commercial equipment is treated only as a "nice to have" feature, there will not be much change.

c. See 1 above.

d. A "satisficing" approach would enhance acceptance of COTS/NDI because by definition, satisficing involves trade-offs on performance requirements. COTS and NDI systems frequently require modification to meet our requirements (particularly those used in a combat zone). One of the most obvious examples of this problem are all the requirements for operating in an NBC environment. Not many NDI systems can withstand the rigors of decontamination with DS II or super-tropical bleach (STB).

e. The satisficing decision will work the best for commercial and NDI, least well for immature, high tech technologies. Simulation and modelling are helping the high end decisions but only to the extent real data are available to drive the decision process. Clever programming is not a substitute for valid data.

f. Acceptance of commercial or non-developmental materiel will depend on the merits of the materiel and the manufacturers themselves. The military already buys significant amounts of commercial and non-developmental items or items based on commercial specifications. The "satisficing" approach can not improve acceptance of commercial or non-development items if they can not provide the need capabilities.

g. Absolutely! Trade-offs will pave the way for use of commercial products. Just investigate continuing requirements for nuclear hardening in this day and age. Sure helped in Somalia.

h. (1). As discussed in the example of the PLGR program above, the "good enough" approach was used. The approach worked because the user was willing to trade-off requirements for cost and the developer modified his business and engineering practices by eliminating MIL Specs and Standards and FARS/DFARS/policies.

(2). User satisfaction must remain our measure of success. Satisfying military warfighting requirements is the reason we build/modify weapon systems. Using commercial practices, processes, and parts may allow us to meet the user's requirements cheaper and sooner; but we must not sacrifice meeting warfighting requirements just to use commercial or non-developmental items. Commercial and non-developmental items are appropriate for requirements that are not critical for warfighting or extreme operating environments.

i. Yes, commercial items offer the potential to set acceptable performance at reduced cost and schedule. I fear it may require a complete change of culture before DOD truly embraces commercial items.

j. Again, accepting less than what is required is foreign to me.

k. Yes - quite likely.

l. No.

m. I think only pressures of budget and resultant declining force levels/capability will improve acceptance of commercial and NDI. We need to do more commercial and NDI in many, even most, technical areas.... habitually, commercial, much HM&E. However, certain areas shouldn't go that route (Commercial) as the commercial and military role is "too different"....i.e., in combat systems/combat aircraft and the like. My message... MEASURE COST OF CONCEPTS (QUICKLY) AND PRESENT COST-

EFFECTIVENESS TO DECISION MAKERS IN SIMPLE/CLEAR MANNER.

6. Other comments?

a. The fundamental problems in the military acquisition process are beyond the power of DOD to remedy. Until greater trust is restored between DOD and the military committees (and sub-committees) of the Congress, a substantial amount of games playing will result. In turn, the Congress fails to adopt a long term approach to procurement financing---and to stick with it. Under these circumstances it is natural for a program manager to protect "his" program by overstating initial performance and underestimating time and cost. Good luck on your effort to force a basic rethinking of the DOD acquisition process.

b. -

c. See 1 above.

d. -

e. The real money, near term, is not in the technical tradeoffs, it's in the bureaucratic processes.

f. -

g. --

h. --

i. --

j. The opinions I've stated are mine alone. They are based on the past 2 1/2 years of managing requirements policy at Headquarters Air Combat Command. In that time, I've observed a significant shift in acquisition responsibility away from the developer to the user. Unfortunately, neither manpower nor funds have accompanied the shift. This has strained user-developer relations.

k. ---

l. No.

m. --