

MEADS: A Case Study



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By
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ABSTRACT

This paper attempts to answer the question, “Why would the U.S. Army exit the Medium Extended Air-Defense System (MEADS) program during its Design & Development (D&D) phase after achieving two successful flight tests, having few alternatives to counter emerging threats, and spending over \$2.5B of taxpayer funds?” This research investigates in-depth reasons why the Army chose to exit an arguably successful program. Research results reveal widely varying opinions pertaining to technical, programmatic and political issues that contributed to the U.S. Army decision to end a program after almost two decades in development and recent major accomplishments.

Keywords: MEADS, U.S. Army, OSD, foreign partners, technology transfer

INTRODUCTION

Identifying the Problem

On Valentine's Day 2011, Office of the Secretary of Defense (OSD) Comptroller Robert Hale announced that the U.S. would fund Medium Extended Air Defense System (MEADS) into FY 2013 up to its \$4 billion cap and then exit the program.

“Yes, our proposal (is) that we would invest no more U.S. funds in MEADS after 2013, fiscal year '13. We will let the program run out under its current plan so we don't incur any termination liability. But, we wouldn't spend money beyond there. (We) would try to harvest some of the technology (for) use in other programs. Our partners may go forward with some MEADS; but, it is not our plan to do so.” (Stewart & Shalal-Esa, 2011).

Approximately a year earlier, the Army signaled a strong desire to exit the program, albeit unofficially. The Army suggested that future allocated funds in 2012 represented a better alternative to termination liability. The Army cited cost escalation, schedule delays and cumbersome management structure as reasons for recommending cancellation. In addition, the Army said that MEADS would not meet U.S. requirements without expensive modifications (Whitlock, 2010).

In 2013 Senator Ayotte of New Hampshire began a fierce campaign, even appearing on Fox News, to stop the final year of funding for MEADS, or what she called; “The Missile to Nowhere” (Van Susteren 2013).

According to the Senate Appropriations Research, Development, Test and Evaluation (RDT&E) report (2013), “The fiscal year 2013 budget request includes \$400,861,000 for MEADS, a tri-national ground-based air and terminal ballistic missile defense program among the United States, Germany, and Italy. This request would fund the second and final year of a MEADS Proof of Concept and bring the MEADS development program to a close” (RDT&E Report, p. 178, 2013). The U.S. decision to forgo future funding follows three-for-three successful flight tests; the latest of which demonstrates MEADS ability to intercept two simultaneous targets attacking from opposite directions (MEADS International Page, 2014).

This research examines the decisions and events that led to the U.S. Army exiting the MEADS program after spending \$2.5 billion in U.S. taxpayer funding. The research attempts to address the reasons why the U.S. Army exited the MEADS program in order to capture lessons learned for consideration in future international partnership decisions.

The scope of the study is limited to material available through open source literature and survey responses provided by 27 MEADS’ senior leaders. The senior acquisition leaders surveyed held active roles in the MEADS program at some point during its lifecycle. The anonymity requirements of the survey respondents limit analysis of the data to narrative presentation, charts and graphs. The study was designed to research the reasoning for the Army exiting the MEADS program. The study is not intended to develop new methodology or ideas to prevent the Army from leaving the program or to reconsider its position.

The author organized the paper as follows:

- Introduction

- Literature Review
- Methodology
- Fieldwork and Findings
- Analysis and Discussion
- Conclusions and Recommendations

The Introduction of the research includes a MEADS System Overview and Background. This portion of the paper provides a description of the MEADS system, at a very high level, and provides some basic background information leading to the exit decision.

Literature reviewed came from government documents including, Congressional papers and confirmation hearings, Office of Secretary of Defense (OSD) and Army policy papers, internet searches, journals, research papers and anonymous online survey data.

The Methodology Section describes how the author conducted the research. Methodology includes a survey addressee cross section, survey questions, and an analysis of the data collected.

Next, the Fieldwork and Findings Section examines the research process. Fieldwork probes deeper into more detail concerning the techniques used to gather information. The techniques used were a research of literature and an online survey of personnel who participated in the MEADS development.

The Analysis and Discussion Section, author presents an assessment of data collected from the survey. The intent of this section is to provide in-depth responses and insights for answering the question posed earlier, “Why did the Army exit the MEADS program?”

Conclusions and Recommendations is the last section discussed. The author's conclusions and recommendations support the purpose of this research paper: To provide lesson learned to aid senior leaders in future cooperative development programs; capitalizing on the knowledge gained from the MEADS experience.

MEADS System Overview

MEADS is a tri-national Air-and-Missile defense (AMD) program for U.S., German, and Italian forces designed to replace Patriot, Hawk, and Nike Hercules. Engineers designed MEADS to defeat next-generation threats including tactical ballistic missiles (TBMs), unmanned aerial systems, cruise missiles, and aircraft. MEADS provides full 360-degree battle space protection for defeating threats attacking from any direction. It is the first AMD system that provides continuous "on-the-move" protection for maneuver forces. In addition, MEADS protects homeland defense assets (Lockheed Martin MEADS Page, 2014).

Lightweight MEADS Major End Items (MEIs), shown in Figure 1, simplify strategic and tactical transport with excellent cross-country mobility and are C-130, C-17 and A-400M aircraft transportable. The core vehicle for the U.S. MEADS program is the Family of Medium Tactical Vehicles (FMTV) 6x6 trucks. These 5-ton capacity vehicles carry the radars, containerized Tactical Operations Center (TOC), launcher and reload packs. Germany and Italy use their national trucks to carry MEADS end items (MEADS International Page, 2014).

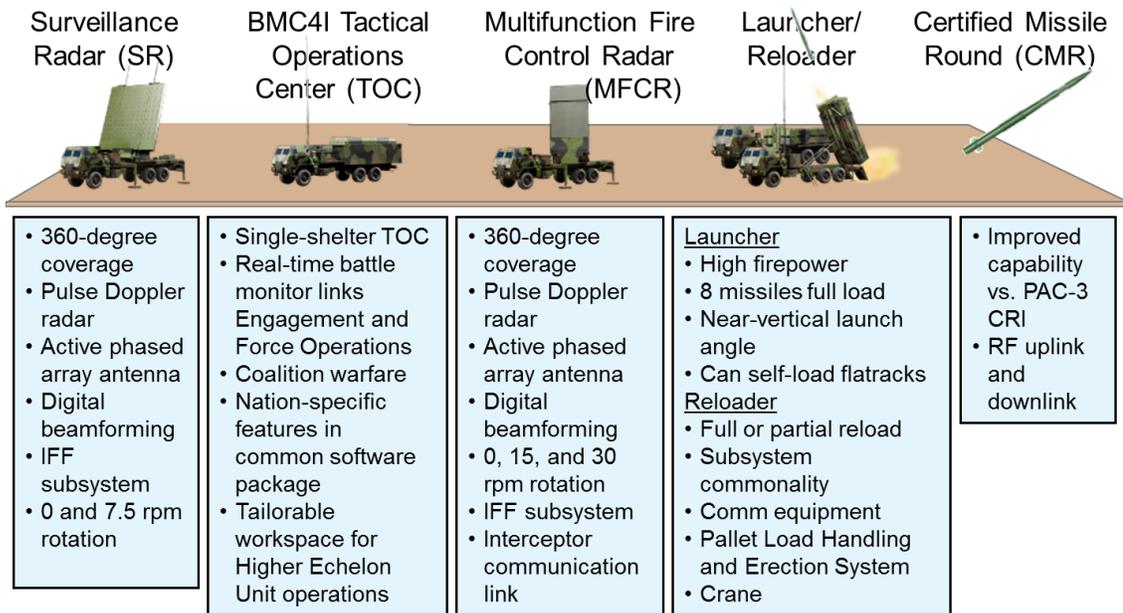


Figure 1: MEADS Major End Items

MEADS netted-distributed architecture using “plug-and-fight” capability provides operational flexibility to tailor battle elements using distributed sensors, launchers and TOCs. Through its plug-and-fight capability, MEADS sensors, shooters or other TOCs become nodes on the MEADS network allowing the combat commander to dynamically add or subtract elements without shutting the system down. A standardized interface extends plug-and-fight to non-MEADS elements. Designed for coalition fighting, the MEADS shares communications with external systems such as the Terminal High Altitude Air Defense (THAAD) system and Patriot, thereby greatly enhancing interoperability. This flexibility is unique for ground-based AMD systems (MEADS International Page, 2014).

Using its 360-degree defensive capability, advanced MEADS radars and Missile Segment Enhancement (MSE) missile; MEADS defends up to eight times the battle space area of a sectored Patriot with far fewer system assets. Engineers designed MEADS for survivability,

sustainability, and electronic counter-measure resistance. Graceful degradation and optimized on-board provisions result in high operational availability. Cutting-edge prognostics and diagnostics minimize downtime and reduce resources required to sustain fielded systems for extended periods. Lower operation and sustainment costs and an advanced logistic design and reliability reduce cost of ownership. No U.S. Army maintenance company is required. Thus, MEADS significantly reduces demand for deployed personnel, equipment and airlift (MEADS International Page, 2014).

MEADS Background

The multi-national approach to developing MEADS was born when its U.S. predecessor, Corps Surface-to-Air Missile (Corps-SAM) was unfunded during a defense review in the early 1990s (Global Security.org MEADS Page, 2014). In order to address the validated air-defense requirement, the Army and The Secretary of Defense contacted several potential international partners and ultimately established a Memorandum of Understanding (MOU) with Germany and Italy in May of 1996 for cooperatively developing an advanced air-defense system. The MOU defined teaming arrangements and workshare for the Project Definition and Validation (PD/V) Phase (Department of the Army RDT&E Budget Item Justification (R-2 Exhibit) (2002, February). Subsequently, a new MOU was negotiated that established conditions for cooperation among the nations in developing MEADS during the Design and Development (D&D) Phase. Based on the joint agreement codified in the MOU, the United States funded 58%, Germany funded 25%, and Italy funded 17% of the MEADS program (Army-Technology.com MEADS Page, 2014).

Figure 2 depicts the MEADS management structure highlighting the U.S. chain-of-command. The figure was taken from an unknown original source and used in presentations and briefing slides. The North Atlantic Treaty Organization (NATO) MEADS Management Agency (NAMEADSMA) is the tri-national program office. The NAMEADSMA General Manager reports to the MEADS Board of Directors (BoD), which is comprised of one member from each of the three nations and is the primary decision body for MEADS. In accordance with the MOU, each BoD member carries a single vote and full consensus is required for a decision. Although the U.S. funded 58% of the program, it had only one-third of the decision authority.

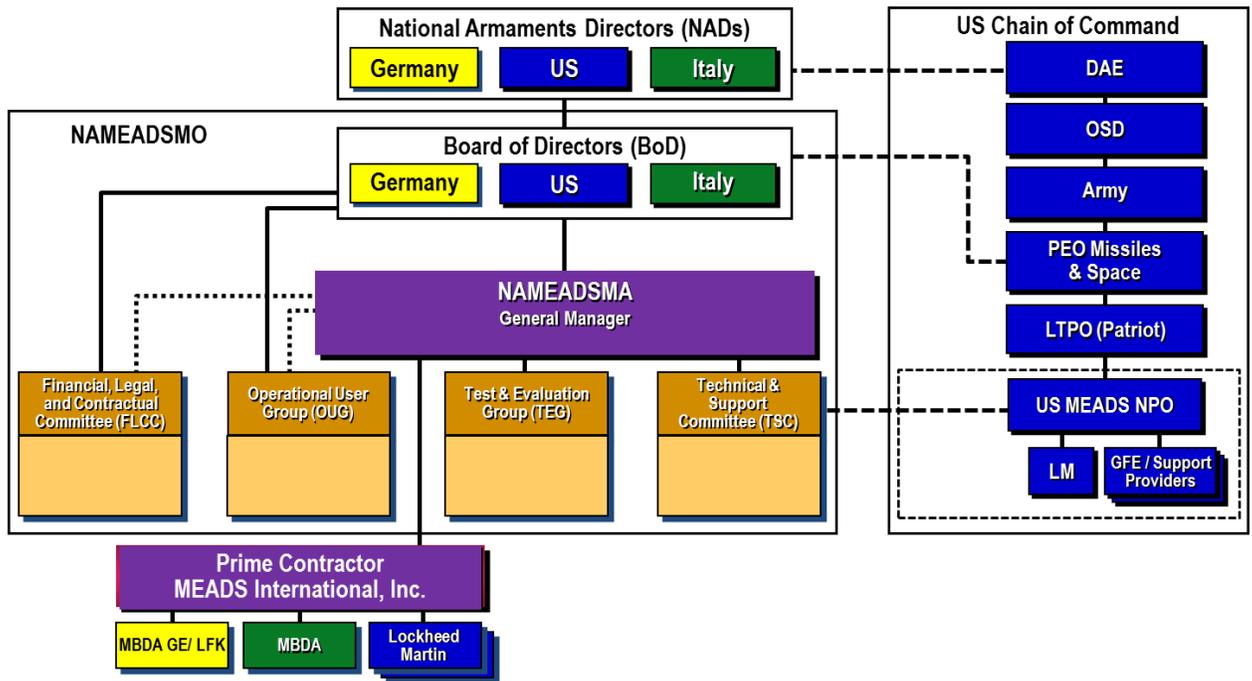


Figure 2: MEADS Management Structure

The Program Executive Office (PEO) Missiles and Space (M&S) historically provided the U.S. BoD member; however, the OSD provided the U.S. BoD member for an interim period.

The U.S. MEADS National Product Office (NPO) is responsible for the U.S.-unique requirements, Government Furnished Equipment (GFE) and the U.S. acquisition and milestone documentation. The U.S. NPO is also responsible for security and U.S. technology transfer, guided by the MEADS Technology Release Agreement (MTRA), a MOU annex. The U.S. NPO was subordinate to the Lower Tier Project Office (LTPO) whose main product is the Patriot Missile System. Thus, the LTPO was managing MEADS as its own replacement system.

In May 2005, MEADS International (MI) signed a contract valued at \$3.4 billion equivalent U.S. dollars (EUSD) and a 110-month schedule for the MEADS D&D Phase. This international joint venture led by Lockheed Martin that includes, Matra Bae Dynamics Alenia (MBDA) Italia and MBDA Deutschland, is a model for collaborative transatlantic development (MEADS International Page, 2014).

The MEADS program successfully completed the System Requirements Review in 2005, Preliminary Design Review in 2007, and Critical Design Review in 2010 (MEADS International Page, 2014). In February 2011, however, events began to signal the likely end of the program. At that time, the U.S. was committed to spending another \$804 million under the current MEADS MOU (Nuclear Threat Initiative (NTI) Page, 2011).

From a question provided by Senator McCain during General Dempsey's confirmation hearing, "Let me specifically mention one program to you, as I conclude my questioning, that I don't understand, and maybe you could provide us with some written response, because you may not know a great deal about it. But, the title is, "U.S. to spend \$800 million as it leaves MEADS program." It goes on to say, "Over the next 3 years, the U.S. Government plans to spend more than \$800 million on a missile defense proof of concept that Army Secretary John McHugh has

little confidence will even work.’’ In this article, it says the termination costs would be very high. I still don’t quite understand why we would negotiate a contract that, if a contractor fails to meet its goals and we have to cancel the contract, we have to pay off the contractor. Do you know very much about this particular program, General?’’ (Senate Armed Services Committee (2011, March 3), p. 106).

Why would the U.S. end its involvement in MEADS? While the Army is attempting to achieve greater capability to become expeditionary, agile, lighter and responsive to new threats; the decision to cancel MEADS, a system that reinforces all of these goals, appears unusual (Goure, 2013). The Army said that MEADS was behind on cost and schedule targets, and that a recent restructuring proposal would have reportedly added another 30+ months to the existing 110-month development period, and another \$974 million to 1.16 billion EUSD funding to the program. Furthermore, the Pentagon estimated that another \$800 million would be needed to certify MEADS and integrate it into existing U.S. air-defense systems. A secondary impact of MEADS schedule slippage was the Army would have to spend more money than planned for extending the life of the Patriot missile system (Stewart & Shalal-Esa, 2011).

According to Army officials, substantially rising MEADS costs and lengthy schedule slippage pushed the Pentagon to end U.S. participation in the tri-national program. A consequence of the exit decision; the U.S. demanded that all the technical scope must be completed within the original 110-month schedule and that no additional funding be added beyond the MOU requirements. Major program changes included a drastically reduced flight test program, which resulted in only two successful intercepts. (MEADS International Page, 2014).

LITERATURE REVIEW

Open Source Information Related to MEADS Cancellation

In general, adequate information revealing why the Army exited the MEADS program is not available from a general internet search. An open internet search of “MEADS cancellation” returned approximately 1.7 million hits and “MEADS termination” returned 83 thousand hits. This may appear to be a substantial number; however, the vast majority of these hits were unrelated to the MEADS defense system. Outside a few press releases and internet articles, there was little substantive information applicable to this research.

It became clear that open internet searches lacked the information necessary to accomplish the research. After consulting with Defense Acquisition University library professionals, a list of potential sources evolved:

- Army Budget
- Army Fact Files
- Army-Technology.com MEADS page
- Brookings Institution
- Centre for European Reform
- Congress.gov/
- Council on Foreign Relations
- University of North Texas Digital Library
- FAS
- Open CRS
- GPO FDSYS

- Center for Strategic & International Studies
- Defense and International Relations Agencies and Organizations Defense Daily
- Defense News
- Defense Procurement and Acquisition Policy
- Defense Science Board
- Defense Technical Information Center (DTIC)
- DOD Appropriations/Authorizations/Military Construction
- DOD Contracts Archive
- DOD Missile Defense Agency
- EBSCOhost
- Federal Procurement Data System
- FedSearch Suite
- Global Security Newswire
- Government Accountability Office (GAO)
- HASC
- IHS Jane's 360
- IHS Jane's Defense Weekly
- Institute of Defense Analysis
- Inside Defense
- Lockheed Martin MEADS page
- MEADS-AMD
- Military.com
- Military Times

- National Defense Magazine
- Office of the Clerk-House of Representatives
- Office of the Under Secretary of Defense (Comptroller)
- Proquest
- Rand
- Reuters
- SASC
- SEC Filings
- Thomas

Searching for germane information from the list provided above proved a more prudent approach to obtaining the required information. These sources fall into a few general categories, including official government publications and websites, press releases, defense magazines and journals, news media publications and contractor websites. Many of these sources are included in the Reference Section of this research.

Previous Research on MEADS Cancellation

An assessment of previous research on this topic resulted in two research papers that address MEADS program cancellation. One paper focuses mainly on Army Air-and-Missile Defense (AMD) implications of the recent cancellations of both the MEADS and the Surface-Launched Advanced Medium Range Air-to-Air Missile (SLAMRAAM) programs; as both were planned as key contributors to the Army's future AMD strategy. Williams, 2012 postulates that

the Army cancelled both programs as an opportunity to purge redundant capability. Conversely, Williams, 2012 suggests that the loss of MEADS and SLAMRAAM contributes to a gap in AMD capability, particularly against cruise missiles and un-manned aerial vehicles. Williams, 2012 specifically raises the question as to why the DOD would cancel MEADS. According to Williams, 2012, “Herein lies the substantial risk and raises the question as to why the Department of Defense would cancel systems such as MEADS and SLAMRAAM and only rely on limited capability to defeat cruise missiles and manned and unmanned aerial systems” (p.15). Williams, 2012 summarized by agreeing with the Army’s decision to cancel because of budgetary and schedule issues and suggests improvements to existing systems such as Patriot.

The second paper, titled “The End of Acquisition Reform: Creating Guidelines to Reduce the Cost of the Weapons System Program Closeout Process” employs a case study approach to assess the Medium Extended Air Defense System (MEADS) closeout actions (Chatterton, 2012). The primary focus of this research was how lessons learned from the MEADS shutdown could create better guidance and make subsequent DOD program closeouts more efficient or less expensive. Chatterton, 2012 was less concerned with what led the Army to cancel MEADS, beyond the general environment of reduced defense spending. However, Chatterton, 2012 does reference that in 2009 the Army attempted unsuccessfully to transfer the MEADS program to the Missile Defense Agency (MDA). The late planned production date of 2018 provided MDA the rationale to forgo the opportunity to acquire MEADS from the Army (Chatterton, 2012).

The Chatterton, 2012 highlights several alternatives available to the Secretary of Defense complicated by the difficulty of withdrawing from the international Memorandum of Understanding (MOU). These alternatives range from immediate withdrawal to continued funding through the MOU requirement; each choice with its own unique set of political

implications. The Army chose to continue funding through the D&D Phase mainly because the cost of termination was roughly equivalent due to MOU unilateral withdrawal penalties.

According to the OSD MEADS Fact Sheet (2011),

“Terminating the program now, just after successful completion of the MEADS Critical Design Review, would force the nations to devote significant funding to contractor termination costs instead of using this funding to bring MEADS development to a viable level of maturity” (p. 2).

Termination costs are those costs’ paid to contractors to end a contract early, after the contractor has invested in facilities and personnel to execute the program.

Report

The General Accounting Office (GAO) published a report to the Congressional Committees entitled Defense Acquisitions Assessments of Selected Weapon Systems in March 2011. The report determined that

“All five of the MEADS critical technologies—launcher electronics, multifunction fire control radar exciter, multifunction fire control radar transmit/receive module, slip ring, and spray cooling system—are mature” (p. 112). In addition, the report concluded, “The MEADS program completed a system-level critical design review in August 2010 with its technologies mature and design stable” (p. 111).

The GAO report also indicated that over 98% of MEADS drawings were released, demonstrating advanced developmental maturity. GAO released this report less than a month after the official Pentagon announcement of the U.S. decision to exit the MEADS program demonstrating the Army’s desire to cancel the program regardless of technical maturity.

METHODOLOGY

An extensive literature review was conducted of Congressional, DOD and Army publications, government websites, GAO reports, defense press releases, defense magazines and journals, news wire publications and contractor websites. However, a detailed survey instrument was the predominant methodology employed to gather data and information for this case study, both quantitative and qualitative.

This author designed the survey for a selected number of senior acquisition professionals with detailed knowledge of the MEADS program; many of which were/are decision makers during program development. The author sent the survey to only U.S. participants, both Government and industry, having connection to the MEADS program, using Opinio Software.

The author consciously excluded German and Italian program participants from the survey in order not to bias the results with responses from individuals with little or no specific knowledge of the U.S. MEADS decision process. The Government respondents consisted mainly of U.S. Army military officers and civilians; however, the author also included a select number of OSD program participants. Industry respondents consist entirely of Lockheed Martin senior managers and engineers in addition to senior contractors supporting the U.S. MEADS program component.

A survey cover letter provided in Appendix A describes the intent of the research; to investigate reasons why the U.S. Army exited the MEADS program in order to capture lessons learned toward future international involvement decisions. The anonymous survey, provided in Appendix B, depicts twenty-three questions designed to capture data on reasons the Army cancelled the MEADS program. In addition, the survey includes a single question regarding the respondent's role while engaged in the MEADS program and a final question to capture lessons

learned for subsequent cooperative programs. The questionnaire also encouraged a narrative qualitative response in conjunction with each question. The survey was vetted by experts in the area of survey questions from the Defense Acquisition University.

Limitations

The survey sample size, questionnaire methodology and anonymity obligations of the replies constrained the analysis to statistics, presented in chart form, and to narrative replies. Therefore, specific replies are not attributed to any particular respondent.

FIELDWORK AND FINDINGS

Research Process

The author employed a sequential research approach. Firstly, an in-depth literature review resulted in available open source information related to the U.S. Army decision to exit the MEADS program. Secondly, the author developed and subsequently disseminated a survey questionnaire designed to collect information in addition to those available through open sources. The survey captured personal data about individual experiences concerning the decision to cancel MEADS. Opinio software was the selected tool to capture responses via an online anonymous survey.

Literature Search

The literature search, depicted earlier, reveals available information from open sources on why the Army cancelled MEADS. The literature addressed broad rationale for MEADS program cancellation such as budget limitations, requirement deficiencies, other priorities, cost overruns and schedule delays.

Survey

The questionnaire survey consisted of an online set of questions to query senior acquisition leaders within Government and industry, to include respondents not currently engaged in the MEADS development or decision process. The author sent the survey questionnaire to 52 senior acquisition professionals knowledgeable of the MEADS including:

- 3 OSD Undersecretaries for AT&L
- 5 Army PEOs
- 1 Army Deputy PEO
- 2 NAMEADSMA General Managers
- 2 NAMEADSMA Deputy General Manager & Controller
- 5 OSD AT&L and International Affairs
- 1 Professional Congressional Staffer
- 4 LTPO Program Managers
- 1 LTPO Deputy Program Manager
- 6 U.S. NPO Product Managers
- 1 U.S. NPO Deputy Product Manager
- 2 U.S. NPO Senior Engineers
- 2 U.S. NPO Support Contractors
- 4 AMRDEC Senior Civilians
- 2 Senior Army Civilians from the User Community at Ft. Sill
- 4 MEADS International Presidents
- 7 Lockheed Martin Executives, Program Managers, Technical Directors

In total, survey recipients included 39 U.S. Government personnel and 13 contractors, as the author desired both a government and industry perspective. Individual government ranks include Undersecretaries of Defense, Army General Officers, Senior Executive Service civilians, Colonels, senior General Service civilians and Lieutenant Colonels. Presidents, vice presidents, program managers, technical directors and chief engineers represent industry. The author chose

survey recipients based on their knowledge of the program, which limited the number of participants. In addition, the author selected the study population from Army, NATO and OSD organizations and a congressional staffer in attempts to receive the broadest variety of responses.

Of the 52 total survey recipients, 27 answered most of the questions on the survey, or 52%. 26 respondents answered between one and ten of the questions. The survey tool does not track answers by recipient, assuring the anonymity of each respondent.

The questions vary in format regarding; mainly positive or mainly negative, yes or no, multiple-choice, and open-ended responses. All questions allow space for respondents to provide written narrative comments to augment their quantitative responses. Appendix C includes pertinent comments from all respondents.

ANALYSIS, FINDINGS AND DISCUSSION

Introduction

In this section, the author analyzes the collected data derived from the literature search and the survey results. The questionnaire results represent data, providing both quantitative statistics and anonymous qualitative opinions in support of the research. Collectively, this information provides both a quantifiable assessment, depicted generally in graphical form, and a qualitative evaluation capturing the unique thoughts of each respondent addressing the general question:

Why the U.S. Army exited the Medium Extended Air-Defense System (MEADS) program?

The literature review disclosed published information regarding the Army's rationale for exiting the MEADS program following a \$2.5 billion U.S. taxpayer investment. In generalized summation, the available literature indicated that the Army exited the program mainly due to current and future budget constraints, past technical and managerial program challenges; including schedule delays and cost overruns, and MEADS capability redundancy with current air-defense assets.

General Perception & Assessment

The online survey results provide a richer understanding of the underlying reasons for the program's cancellation directly from a cross section of senior-level MEADS participants and decision makers. The initial set of questions, numbered 2-4 in the survey questionnaire, focused

on the high-level perception of various aspects of the MEADS program, including the overall program in general, the acquisition strategy and program execution.

Question #2 of the survey asks, “What is your overall perception of the MEADS program?” The data depicted in Figure 3, indicates that approximately 55% of respondents hold a mainly positive perception of the overall MEADS program; higher than anticipated given the Army’s demands to exit the program, as noted by respondents. While 30%, hold a mainly negative perception of the program and the remaining 15% have neither a positive nor a negative perception of the MEADS program.

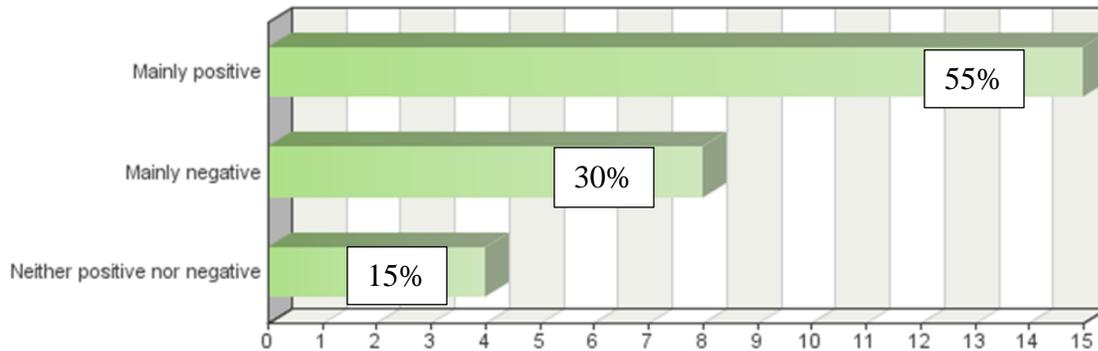


Figure 3. Overall perception of the MEADS Program

The narrative comments provided in Appendix C, also depict a varying perception of the program. Positive remarks revolve around urgently needed capability, technical breakthroughs, good international cooperation and making continual progress in a complex program. While the negative comments point to inferior leadership, a poor and complicated management structure, a cumbersome and slow decision process, organizational conflicts of interest, political headwinds, budgetary uncertainty within all three nations, and a flawed technology transfer/release process.

Survey question #3 asks, “What is your assessment of the MEADS acquisition strategy?” The data presented in Figure 4, denotes that approximately 44% of respondents assess the

MEADS acquisition strategy as mainly positive, while 41% view it as negative and 15% as neither positive nor negative.

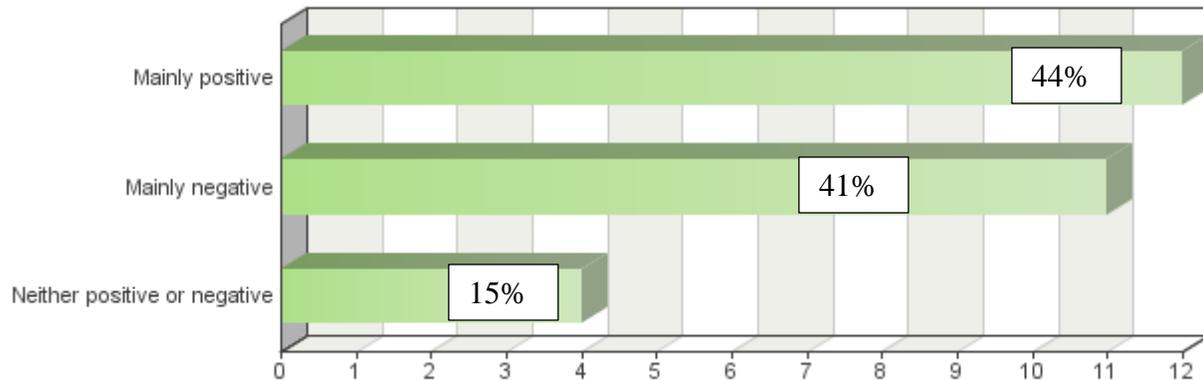


Figure 4. Assessment of the MEADS Acquisition Strategy

The narrative comments do not correlate strongly with the quantitative data, as most narrative comments are more negative than positive. The minority positive remarks from respondents describe a sound, cost-sharing, co-development strategy. Conversely, the majority negative comments focus on:

The lack of Army support and commitment, lack of a consistent funding stream, the poor “committee” management and decision process, execution inefficiencies, overly optimistic funding and scheduling estimates, security constraints, and other Army priorities.

Respondents also mention “noble” workshare requirements, political fighting, the MOU driving a bad acquisition strategy, organizational conflicts of interest, country funding and decision mismatches, late introduction of the PAC-3 missile, and restricted U.S. involvement in critical radar activities as acquisition strategy issues. Respondents mentioned poor requirements; a major issue cited in many acquisition programs. “Noble” workshare is defined as work of quality and challenge and not described as non-technical work such as building trailers and tires.

Survey question #4 asks, “What is your assessment of MEADS program execution?” The statistics presented in Figure 5, indicated that 56% of respondents assess MEADS as underperforming relative to other U.S.-only program, while 7% felt that the program over performed and 37% thought MEADS executed on par with U.S.-only programs.

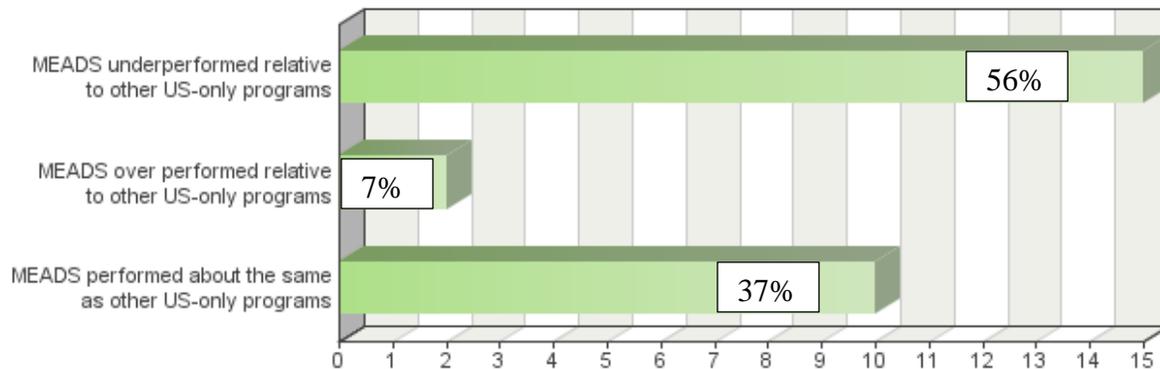


Figure 5. Assessment of MEADS Program Execution

As rationale for underperformance, respondents cite government and industry management complexity, early poor management, lengthy schedule delays relative to initial planned fielding, cost overruns, onerous oversight from the Steering Committee and Board of Directors, slow decisions particularly for cost trades, lack of empowerment and international desires for technical work. In addition, they mentioned technology transfer restrictions, political scrutiny, protection of underperforming industry partners, workshare based on politics, inadequate cost/benefit analysis, lack of sound engineering, internationally imposed bureaucratic processes and design churn as further rationale for underperformance.

From a positive perspective, respondents mentioned the recent successful flight tests held on schedule, overcoming tri-national inefficiencies and performance beyond that of Patriot and other U.S. systems, as proof of good program execution.

Exit Decision Process & Rationale

The next set of questions, numbered 5, 17, 20 & 21 in the survey questionnaire, focused on the Army's rationale for exiting the MEADS program. The data in this section addressed; the reasons for cancellation such as program execution, funding, and politics; whether the Army made the correct decision for its soldiers and taxpayers; whether the respondent himself or herself would have made the recommendation to cancel; the factors that led to cancellation; and a strategy to avoid cancellation.

Survey question #5 asks, "Did the U.S. Army exit the program mainly for technical, acquisition strategy, program execution/funding, political or a combination of reasons?" The statistics presented in Figure 6, indicates that the majority, or 63% of respondents, feel the Army exited for a combination of program execution/funding and political reasons. The statistics show that few respondents assess the Army's exit decision to consist of a single factor or category. These are expected results given the complex nature of the MEADS program.

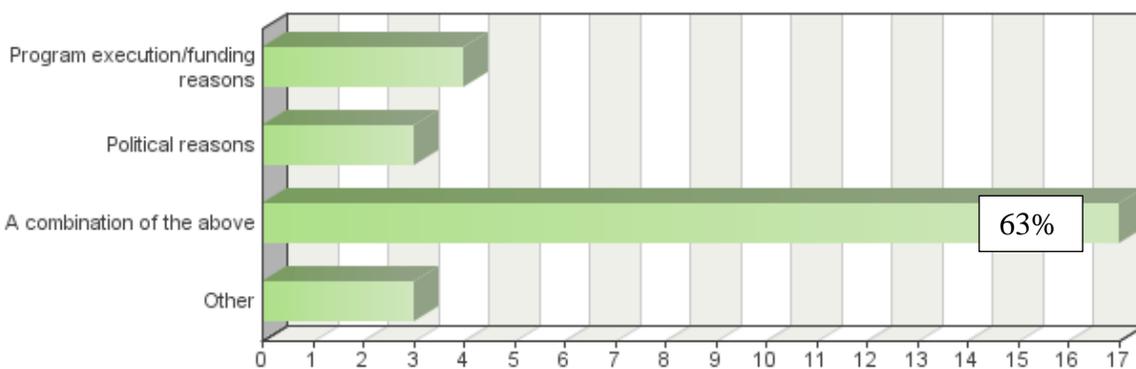


Figure 6. Main Reasons for Army Exit

Within the comments, some respondents took a more parochial approach stating funding constraints and other Army priorities, particularly the Integrated Air and Missile Defense (IAMD) program, as chief rationale for cancellation. Other comments provide more insight into the underlying reasons for cancellation such as the Army's lack of control within the program, schedule delays and MEADS radar performance versus Patriot. Some indicated that the Army grew tired of wasting money on a failed program and others suggested an Army desire for a U.S.-only program with Raytheon as the prime and contracted through what respondents titled "Patriot mafia." Lastly, respondents addressed the political component suggesting undue pressure driven by the Massachusetts Congressional delegation and Raytheon.

Survey question #17 asks, "Do you think the U.S. Army made the best decision for its soldiers and the U.S. taxpayers by exiting the program, after the design and development phase?" The data presented in Figure 7 depicts that 58% of respondents disagree that the Army's decision to exit MEADS was best for U.S. soldiers and taxpayers, while 27% felt it to be in their best interest. Only four respondents indicated a preference for "other".

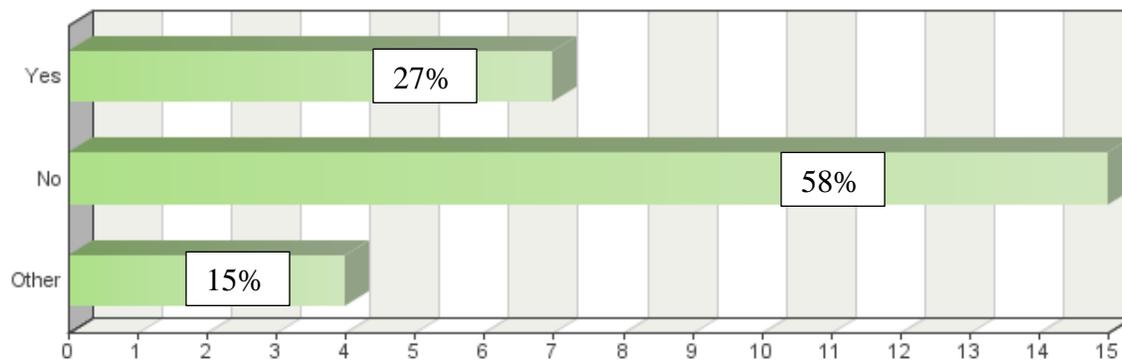


Figure 7. Exit the Best Decision for U.S. Soldiers and Taxpayers

The narrative comments from the survey, suggest strong emotions and absolutes. Either absolutely "yes" cancellation is long overdue for this terrible program, or definitely "no" as

decision makers were hoodwinked and the Army will re-spend billions to upgrade an aging Patriot system to meet MEADS-like capability. Some neutral comments suggested that time will judge the decision. One survey comment suggested that “white collar welfare” contributes to the economy, therefore the MEADS past funding is not without benefit. Technology harvesting from MEADS is one of the most significant enduring benefits.

Survey question #20 asks, “Would you have recommended cancelling the MEADS program?” Figure 8 provides feedback concerning whether “you” recommend MEADS cancellation. Results from this question indicate an almost 70% recommended against cancellation.

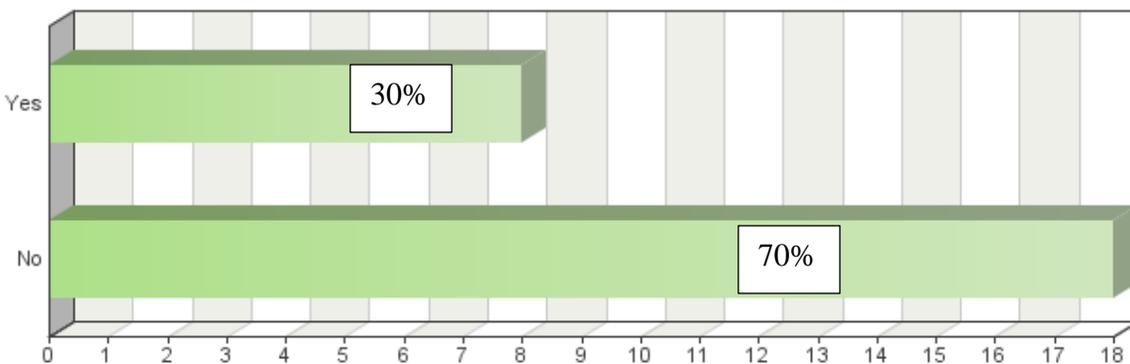


Figure 8. Survey Respondent’s Recommendation to Cancel

Within the comments section, respondents recommending to exit, point to time, affordability, poor relationships, and inferior technology as reasons to cancel, while responses against cancellation mention Patriot obsolescence, MEADS superior operational capability, flexibility and cost savings as rationale to continue the program. Others suggested re-evaluation and restructure as alternatives to cancellation.

Survey question #21 asks, “What factors led to the cancellation of MEADS?” Figure 9 indicates that funding and politics played the two largest roles in the cancellation decision. Over

81% of respondents selected “funding”, while 70% included “politics” as being a factor in the termination decision. The contractor performance selection revealed that 41% of respondents felt that contractor performance contributed to cancellation.

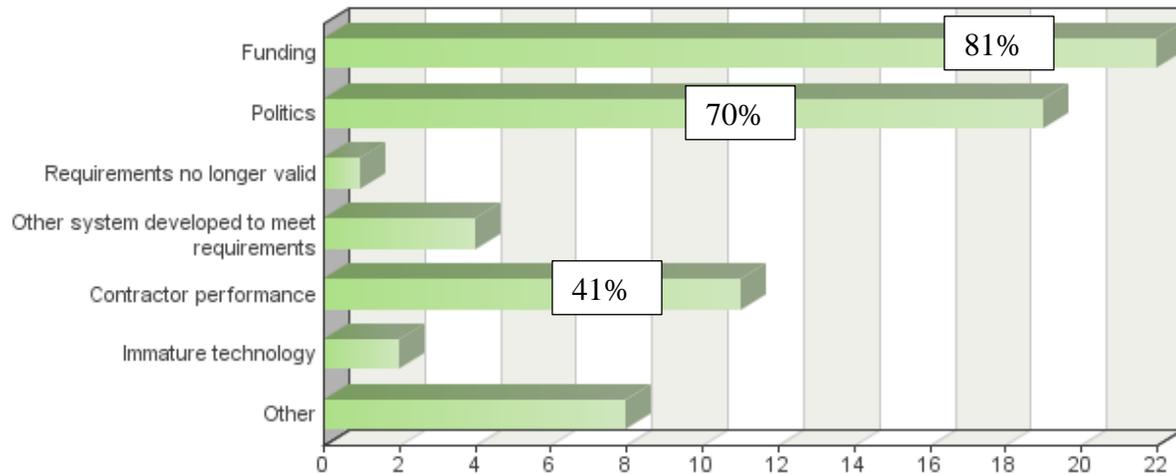


Figure 9. Factors that Led to Cancellation

Respondent comments include the Army’s inability to fund multiple AMD programs, a flawed acquisition strategy, bad execution, poor management, a poor vision, Patriot competitive agendas, the massive historical investment in Patriot and lack of Army control related to the 1/3rd voting rights spelled out in the international agreement. One comment indicated that politics and funding adversely impacted contractor performance, somewhat of a self-fulfilling prophecy hypothesis.

The online questionnaire included question #22: “Why do you believe MEADS was cancelled?” This open-ended question drew responses previously provided such as;

- constrained budgets
- politics
- dependence on foreign designs

- compromise on technology release
- political frustration
- poor contractor performance
- desire for a U.S.-only solution
- having a future system imbedded in a legacy project office
- other priorities such as IAMD
- technology transfer issues
- political pressure driven by Patriot and Raytheon and,
- incompatibility with IAMD.

An additional question #23 asked; “Was there a strategy that would have helped keep MEADS Funded?” Suggestions from respondents include;

- remove Patriot funding
- adopt the Joint Strike Fighter (JSF) management model where the U.S. leads the program
- acquire strong Army support
- fire non-supportive U.S. Army generals
- make the U.S. NPO a direct report to the PEO
- cancel IAMD
- add new NATO countries
- align requirements with IAMD architecture, and
- move the program to OSD.

Requirements & Capability

The following set of questions, numbered 6, 7 & 12 in the survey questionnaire, focused on MEADS' system requirements and capabilities specifically as they pertain to the Army's rationale for exiting the MEADS program. The data in this section address whether the requirements that drove the need for MEADS are still valid, how best the Army meets future AMD requirements sans MEADS, and a technical assessment of MEADS versus Patriot.

Survey question #6 asks, "Are the requirements that drove the need for the MEADS program still valid today?" Figure 10 reveals that over 85% of respondents feel that MEADS-driven requirements, such as 360-degree coverage, transportability and mobility remain valid. Only a single participant indicated that current U.S. assets fulfill the need. This data highlighted the Army's desire to exit the MEADS program without an alternative near-term capability available to fulfill critical requirements.

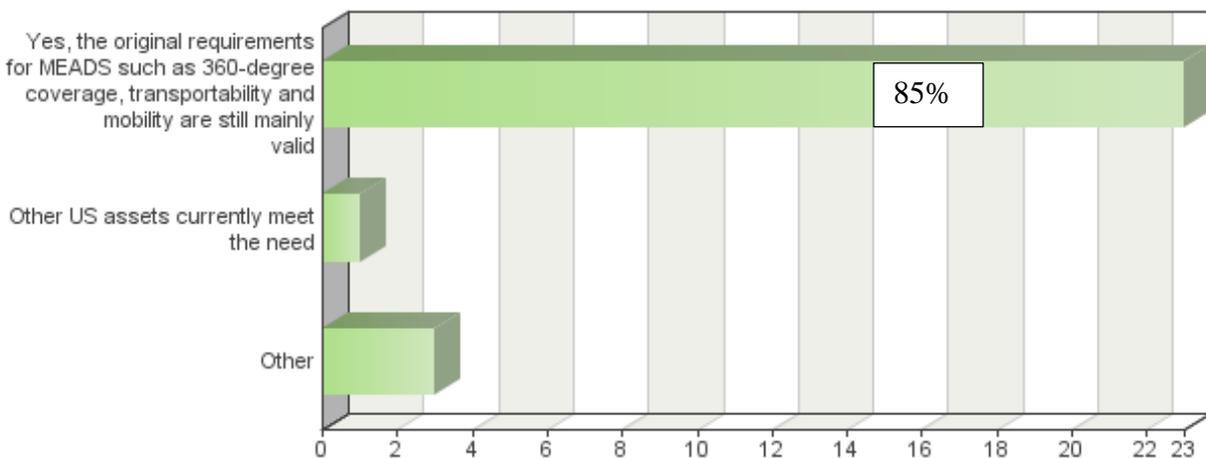


Figure 10. Valid Requirements

Figure 10 and the narrative comments confirm the graphical data as the majority of responses point to valid requirements and how best the Army can meet them. Respondents suggest new Patriot upgrades to counter advanced Theater Ballistic Missiles (TBMs) and the

Sentinel radar attached to Integrated Air and Missile Defense Battle Command System (IBCS) to counter Air-Breathing Threats (ABTs) in the absence of MEADS; however, many mobility, flexibility and transportability requirements remain unfulfilled according to the comments. One respondent added that MEADS successfully continued development due to its requirements-driven nature, and not a technical solution seeking a requirement.

Survey question #7 asks, “In your opinion, how can the Army best meet future air-and-missile defense requirements without MEADS?” Building on the previous results, Figure 11 results indicate that 65% of respondents suggest that the Army meets future AMD requirements, in the absence of MEADS, by something other than an upgraded Patriot system or a completely new system. Only 15% of respondents suggest an upgraded Patriot can meet future requirements, while 20% feel needs warrant a new system development

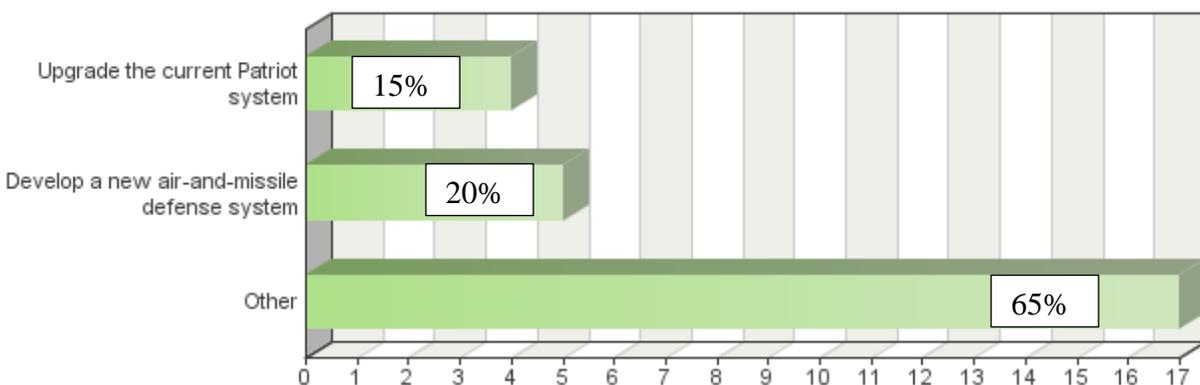


Figure 11. Best Way to Meet Future AMD Requirements without MEADS

Several comments indicate Patriot’s inability to provide 360-coverage, its “stove-piped” architecture, its lack of mobility and transportability and its high Operations & Sustainment (O&S) cost. Others mention the need to harvest MEADS pieces or reconsider the MEADS cancellation decision and the IBCS ability to mix and match elements such as sensors and shooters.

Survey question #12 asks, “Technically, in your opinion, do you believe that MEADS was better than Patriot, was worse than Patriot or was neither better nor worse than Patriot?” According to the results presented in Figure 12, 63% of respondents view MEADS technical capability superior to that of the Patriot system. Engineers designed MEADS to replace Patriot and the inherent technology is more modern. One third of responses suggest MEADS is neither better nor worse than Patriot. The narrative comments located in Appendix C provide additional detail. A single response indicates a technical preference for Patriot.

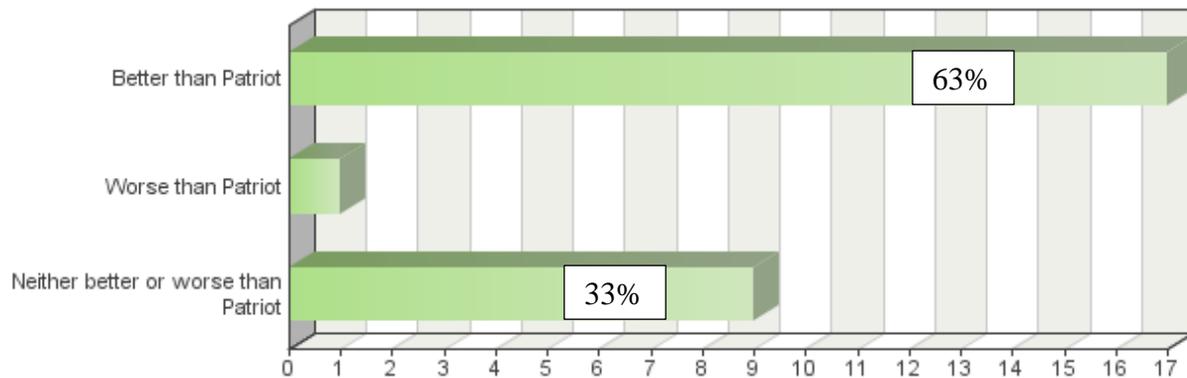


Figure 12. Technical MEADS/Patriot Comparison

Respondents mentioned the difficulty in comparing a mature older system with newer relatively immature technology. Positive comments relate to MEADS interoperable Battle Management Command, Control, Communications, Computers, and Intelligence (BMC4I) and its Actively Electronically Scanned Array (AESA) radars and lightweight launchers. Some suggested that Patriot garnered the software edge due to many new capability builds over a 40-year period and thousands of testing hours, while MEADS held the hardware advantage.

Technology Transfer

Survey recipients received a single question on the survey questionnaire, pertaining specifically to technology transfer. Survey question #13 asks, “Concerning technology transfer; do you believe that the U.S. should have shared more or less technology with the European partners?” Respondents indicated that technology transfer/release is one of the single most significant issues in the program. The results shown in Figure 13 indicate almost half or 48% of all respondents feel the correct amount of technology sharing existed in the program. Almost 41% advocated additional sharing, while only 11% proposed less.

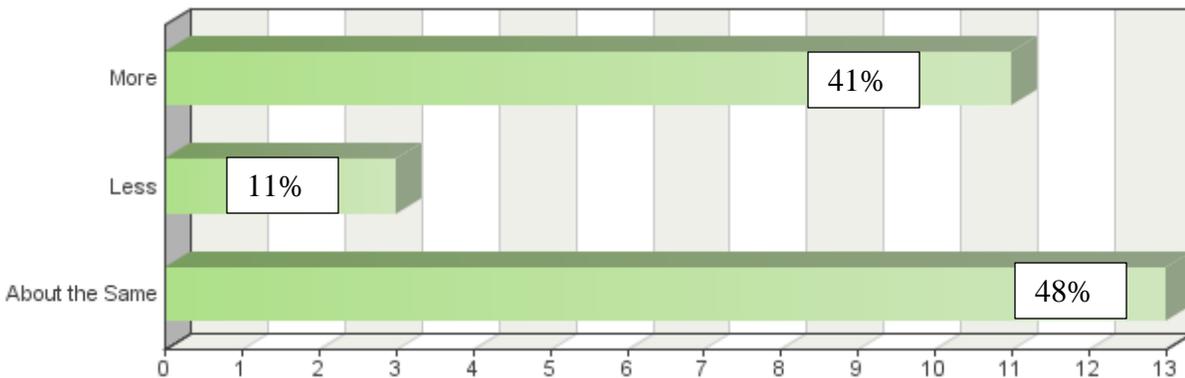


Figure 13. Correct Level of European Technology Transfer

Most respondents recognized there was an adverse impact to the program of withholding technology; however, most pointed out that the balance between sharing and protecting is difficult. Some comments revolved around whether the U.S. ever intended to produce the system for our soldiers, and if so, additional sharing becomes necessary. It is difficult to envision the U.S. embarking on a multi-billion dollar program without the intention of procuring it for our troops. Many point to the over-protection and unnecessary protection by Lower Tier Project

Office (LTPO) and OSD as a concern. Others acknowledged the slow process of release and adverse effects on a development program.

Harvest Opportunities

Survey question #18 asks, “Should the U.S. Army harvest any pieces or technologies of the MEADS program?” Survey recipients received this single question on the survey questionnaire, pertaining to the potential harvesting of MEADS components. Nearly 90% of respondents suggested that the U.S. Army should harvest elements of the MEADS program (Figure 14). Only a single response indicated that the Army should not harvest any of MEADS, while two participants in the survey marked “other”.

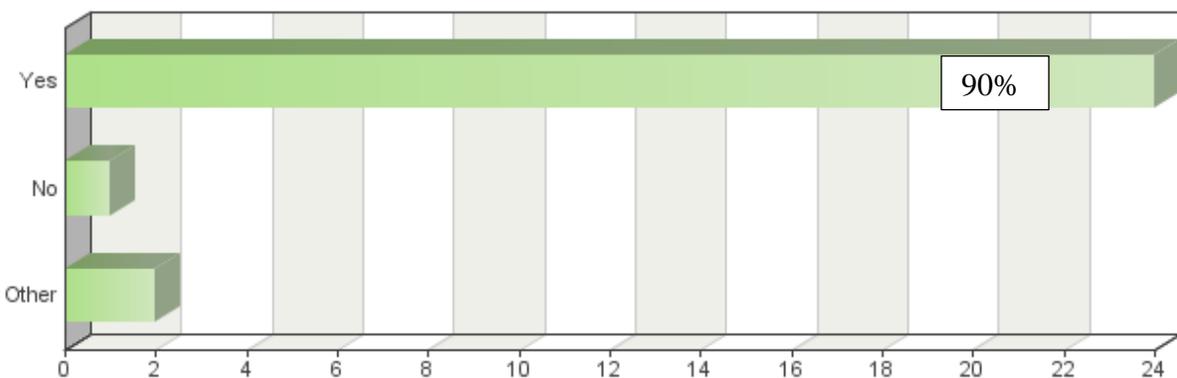


Figure 14. Harvest MEADS Pieces of MEADS

Most respondents, in their comments, indicated that the MEADS Surveillance Radar (SR) represents a significant improvement in capability for U.S. AMD, particularly within the IAMD network. The comments included the term “no-brainer” as related to harvest of the SR. Other harvest candidates mentioned include the BMC4I, the MFCR and the launcher, according to the responses.

Partner Relations & Future Cooperation

The following section analyzes MEADS partner relationships and the impact of cancellation on potential future cooperation. Survey recipients addressed three pertinent questions, numbered 14, 15 & 19 in the survey questionnaire; how would they characterize relationship between the partner nations, how could those relations be improved and given MEADS termination, how likely is the Army to encourage future cooperative programs.

Survey question #14 asks, “How would you characterize the relationships between the three MEADS partners (U.S., Germany & Italy)?” Over 65% of responses indicate mainly positive rapport between the three partners (Figure 15) and only three respondents indicated mainly negative relationships and the remaining 27% maintained a neutral stance.

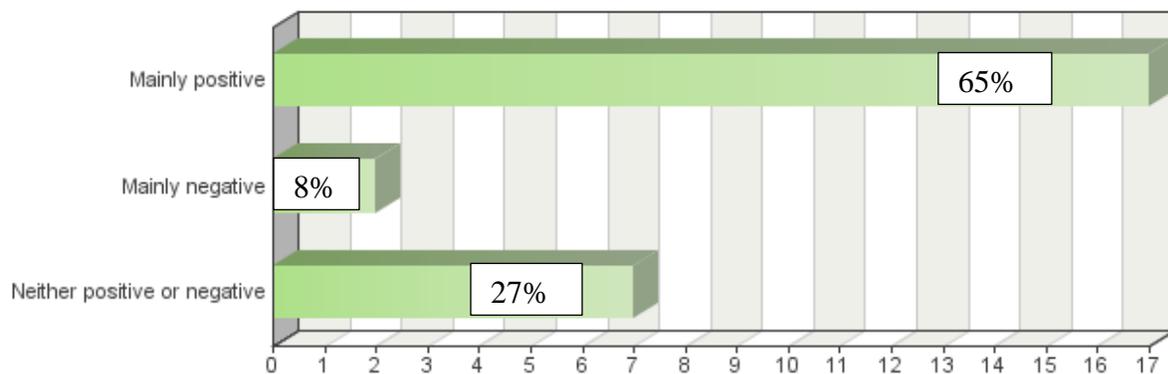


Figure 15. Partner Nation Relationships

Recorded in the written comments, relationship quality depends on the organization, as feedback indicated positive rapport between the U.S. and Germans, but not as favorable between the Italians and the other two nations in the partnership. One respondent suggested similarities between German and U.S. technical and business process as rationale. In general, bonds appeared better within industry, partially due to European government distrust after the U.S.

withdrew support, according to the respondents. In addition, relationships fared better at the working level than the executive level, according to the comments.

Additionally, a question solicited ideas for improvement opportunities. Survey question #15 asked, “How could relations between the MEADS partners have been improved?” Some respondents felt better relationships could result if the U.S. or a single country led the program and received voting rights consistent with cost sharing. Others pointed to the need for stronger partner nation leadership as an avenue to improve relations. One respondent recommended less teaming and more contracting as a way to improve, while others mentioned better communications, including being honest and frank.

Survey question #19 asks, “Given the withdrawal from MEADS, will the U.S. Army be less likely to encourage cooperative international programs?” Approximately 62% of respondents feel that the Army is less likely to engage in future cooperative international programs given the withdrawal from MEADS, while the balance of 38% suggested no impact (Figure 16).

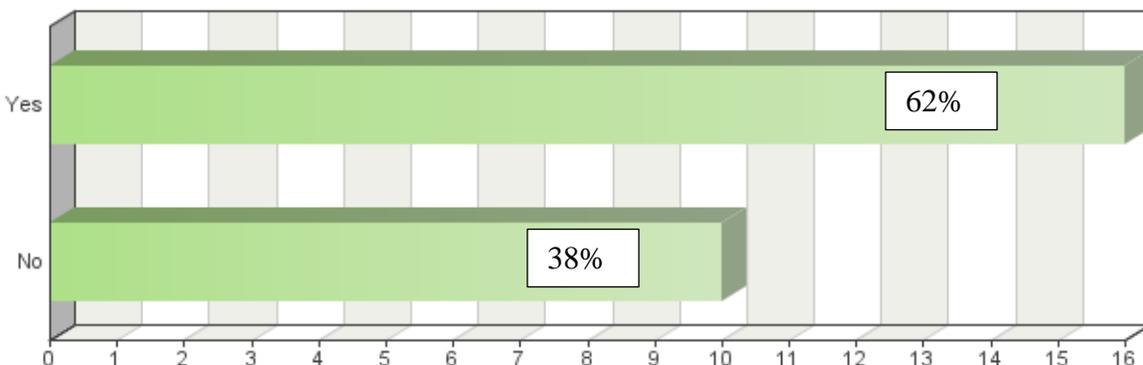


Figure 16. Less Likelihood of Future Cooperative Programs

In the written comments, some mention the animosity created by the U.S. withdrawal as general rationale for allied nations, not the U.S. Army, to pass on future opportunities. One

respondent pointed out that the U.S. did not withdraw from MEADS and merely completed financial obligations for D&D per the MOU, by allowing the contract to run to termination. The same respondent also indicated that declining budgets are already negatively affecting cooperative development. Others suggested declining budgets have the opposite effect; encouraging the U.S. to share design and development expenses with our allies. Additional suggestions included avoiding cooperative development in favor of Foreign Military Sales (FMS) or adopting the Joint Strike Fighter (JSF) model as discussed earlier.

Key Stakeholders & U.S. Support

This section, questions numbered 24, 9 & 11 in the survey questionnaire, looked at the impact that key MEADS stakeholders had on cancellation. In addition, it provided a more in-depth analysis of two of these key Army organizations on the success of MEADS. The initial question focused on which stakeholders contributed to MEADS termination. The second question asked is whether the Lower Tier Project Office (LTPO) either aided or hindered the MEADS development. The third question asked is whether respondents assess Program Executive Office (PEO) Missiles and Space (M&S) support to the MEADS program as being mainly positive or negative.

Survey question #24 asked, “Who were the key stakeholders that led to MEADS cancellation?” Figure 17 depicts an assessment concerning which key stakeholders influenced Army’s exit from the MEADS program. The U.S. Army takes the top spot with 78%, followed closely by the LTPO with 74%. The PEO M&S and Congress tied for third at 55% each, with OSD closely behind at 48%. All other stakeholders fall below 30%. Comments focus on the Army’s desire for a U.S.-only program, Patriot and IAMD support. Subsequent sections cover

both the PEO M&S and LTPO in more detail. Respondents also cite the requirements community for providing unrealistic requirements with little or no trade space driving cost and schedule.

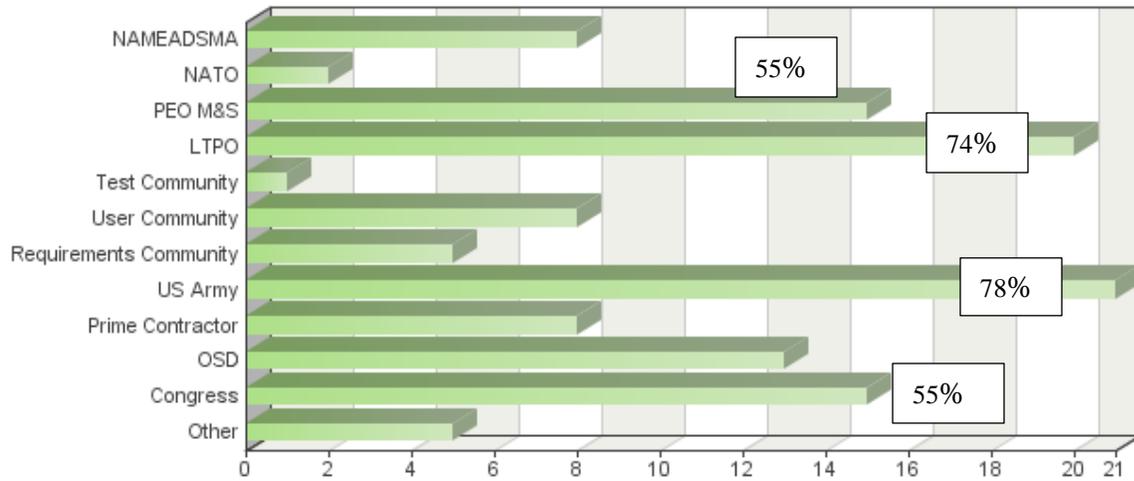


Figure 17. Key Stakeholders Contributing to Cancellation

Survey question #9 asks, “Do you think the Government Lower Tier Project Office mainly aided MEADS program development, mainly hindered MEADS program development or neither aided nor hindered MEADS program development?” As shown in Figure 18, roughly 60% of respondents felt that the LTPO mainly hindered MEADS development, while only 15% said LTPO mainly aided MEADS.

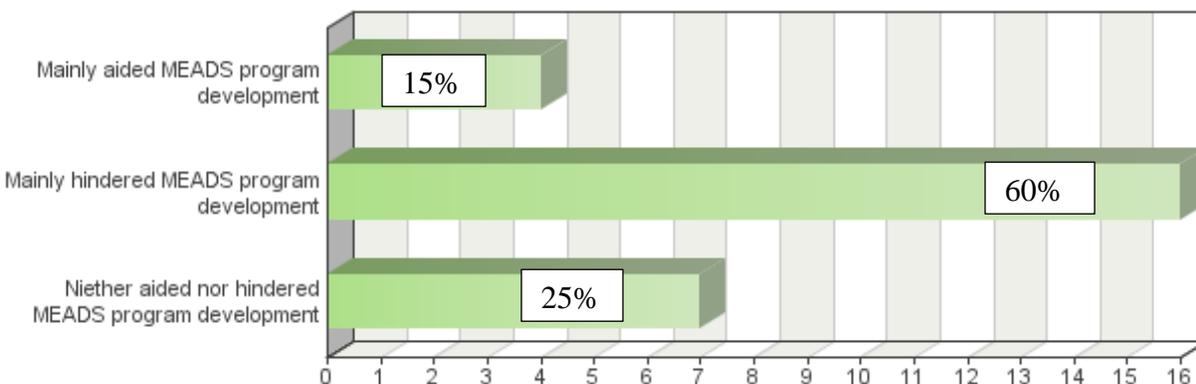


Figure 18. Lower Tier Project Office Support to MEADS

Many of the comments provided in Appendix C reveal an organization with an agenda to hinder MEADS development. Many comments point to specific cases where the LTPO hindered development through intentional delays or dissent, particularly related to technology release. Several respondents point to the Patriot priority within the LTPO as a major negative contributor. Still other respondents suggest the organizational conflict-of-interest created by having a competing missile-defense system subservient to another, presented an insurmountable challenge and perhaps the single worst decision in the implementation of MEADS.

A few outliers suggested that the LTPO did not hinder the program and MEADS benefited from the LTPO's technical expertise. Others commented that the user community at Ft. Sill, the G-8 Resource Office and Assistance Secretary of the Army for Acquisition, Logistics and Technology (ASA(ALT)) also worked to undermine MEADS development. Others suggested that LTPO employees merely followed orders and harbored no real animosity against MEADS.

Survey question #11 asks, "What is your assessment of PEO Missiles and Space (M&S) support of the MEADS program?" Over 44% of respondents assessed PEO M&S support to the

MEADS program as mainly negative; a similar 41% assessed support as neutral and 15% as positive (Figure 19).

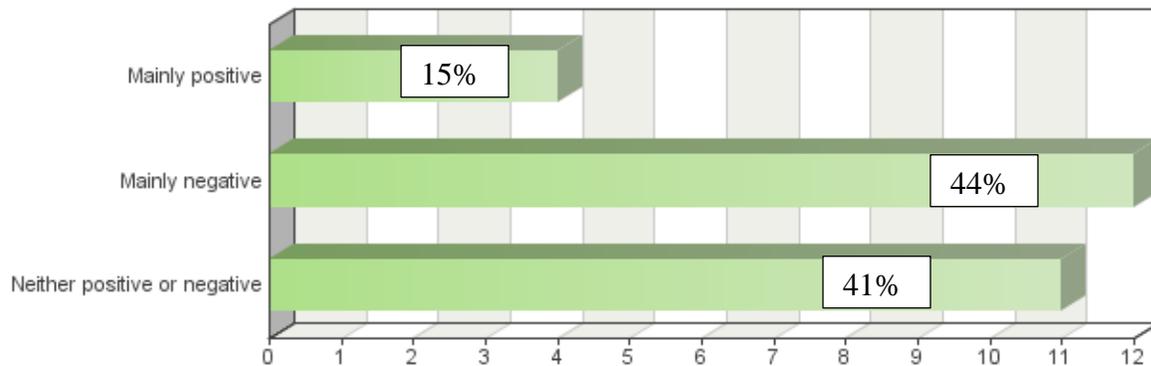


Figure 19. PEO Missiles and Space Support of MEADS

The written comments suggested a general lack of support from the PEO M&S. Respondents reported that support from the PEO varied during different phases of the program. During the early part of the MEADS Design and Development (D&D) phase, survey respondents generally felt that the PEO provided strong support, which diminished significantly, as the program progressed. Some suggested that the PEO was ill equipped to handle the program and therefore failed to provide adequate support to MEADS. Others mentioned the bad relationships between the recent PEOs and their international counterparts as issues and the inability to control LTPO “mischief”. Still others suggested OSD should manage MEADS as a special program and that the Army PEO was at the incorrect level to deal with complex international issues such as technology transfer and conflicts of interest discussed earlier.

Personnel

This section includes a single question on the survey questionnaire, posed to respondents concerning how key personnel decisions affected MEADS execution. Survey question #16 asks, “How do you believe key personnel decisions, government and industry, impacted MEADS program execution and reputation?” Figure 20 indicates that the preponderance of key personnel decisions rate as neutral or mainly negative by survey recipients, with only 19% rate personnel decisions as mainly positive.

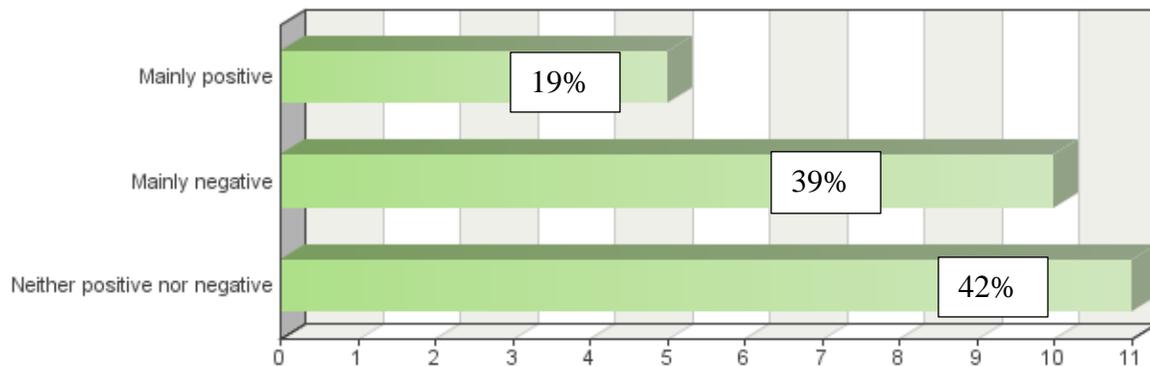


Figure 20. Impact of Key Personnel Decisions

Most respondents agreed that personnel quality, within the government and industry improved as the program evolved. Furthermore, respondents mentioned low staffing concerns early in the program. Some saw industry providing a “B” team early on. In addition, respondents made multiple mentions of the long program distraction and inefficiencies created by an Italian Senior Executive taking extended leave to avoid termination. Considerable time, energy and resources were consumed by MEADS participants for approximately two years, until the situation was resolved by NATO courts.

Lessons Learned

The final question on the questionnaire solicited respondents to provide lessons learned from the Army's involvement in the MEADS program. Survey question #25 asks, "What are the most important lessons learned from the Army's involvement in the MEADS program?" This author provides a complete listing of these lessons learned in Appendix C. Some of the highlights include the following:

- Address technology concerns BEFORE embarking on an international program
- The U.S. should lead, no more equal votes
- Don't involve allies in development; wait for production
- Service component (Army) must be committed for success
- Provide funding to other contractors to reduce fighting
- Bring in stakeholders early; do not keep decision makers at arm's length
- Elevate technology transfer decisions to a very high level; not at the working level
- Politics and people matter more than technical achievement
- Cooperative development is like marriage; don't say "I do" unless you will stay together through sickness and in health and for better or worse
- Uncomplicate the management structure
- Never put the future investment at the mercy of the legacy project office
- U.S. should not do cooperative development with foreign partners
- Align industrial workshare with tech transfer realities
- Believe the Cost Assessment and Program Evaluation (CAPE) estimates
- Think through all the aspects first; Italy developing the MFCR and replacing the entire inventory of PAC-3 and GEMs

- Strong consistent sponsorship; focus on keep sold strategy
- Avoid international cooperative development if you can't share the technology
- Avoid fixed-price development contracts
- Get all agreement in writing, follow-up face-to-face, know the decision maker at each site
- Replace weak performers early
- Organizational structure and decision making are critical
- Only works if all participants are fully vested in the program's success
- Give the Program Manager (PM) more authority over the program
- Conduct independent advisory panels early on
- Commitment, stable funding and understanding each nations' requirements
- Fully understand benefits versus costs upfront
- Engage the user community early to ensure requirements tradeoffs
- Don't allow inherent conflicts of interest to nibble away at the program
- Provide clear guidance to industry
- Base program on sound operational requirements

CONCLUSION

After conducting the research, evidence supports the assertion that the Army cancelled MEADS for more complex reasons than what is obvious from the literature search, such as affordability, poor program performance and schedule delays. An appropriate question resulting from the data may now be: “Did MEADS fail the Army or did the Army fail MEADS?”

As part of this conclusion, the top five lessons learned from this research are included in summary form. The number one lesson learned from the data is to avoid institutional conflicts-of-interest. This was selected as the top lesson due to the devastating effect it had on the MEADS program, as seen in the survey comments. It seems intuitively obvious that decision makers would understand that placing the new MEADS program under the old Patriot Office would create significant conflicts-of-interest and serve to make an already difficult and challenging program almost impossible to execute. According to the responses, Patriot employees generally saw MEADS as a threat and never embraced their role to help make the program successful. This is the most valuable lesson from the MEADS failure that can be taken away for future cooperative developments.

The second key lesson involves dependency on foreign assets and technology transfer. According to the survey responses, the U.S. Army is not adept at sharing technology and relying on foreign nations for assets. The Army prefers protection over production as a means to retain technological leads. The key lesson is to make the decision prior to either share the critical technology necessary for development or if it is too important and requires extreme measures for protection, then international cooperation should be avoided. Basically, either go all-in with the required technology or don't go at all. This is a significant lesson from the MEADS program as the U.S. held on to seemingly benign technology and limited interaction between international

partners and U.S. engineers to the point where execution was jeopardized and costs escalated. This lesson was repeatedly suggested in the survey feedback.

The third lesson is to obtain an accurate and honest cost estimate early on before starting an international program. The survey results confirmed this as a critical lesson learned. MEADS suffered from various cost estimates that were wildly different and most were overly optimistic.

According to the survey responses, Government officials knew the estimates used to initiate the program were low, but MEADS management and other proponents chose to provide quotes that could be accepted by bill payers. Accurate initial cost estimates are critical for all programs, but particularly so for international programs as each separate nation bases funding on these estimates. International programs suffer from funding uncertainty of multiple nations, many of which find it difficult or impossible to go back and ask for additional funds, further amplifying the need for accurate cost estimates.

The fourth lesson is that politics and people matter more than technical achievement in an international program. Nations get involved in international programs for a variety of reasons from desiring the product to building their industrial base to providing jobs for their engineers. The people part of this lesson focuses on as one respondent said, “Entering into a cooperative agreement is like a marriage, if you are not prepared to stay together in sickness and in health, for better or worse; then don't say I do.” Agents and national representatives who commit and sign their nations up to international agreements should know the people they are marrying. Trust and commitment are paramount in an international program.

The final lesson is since the Army doesn't place a high priority on missile defense as demonstrated through numerous budget drills, move the responsibility to the Missile Defense Agency (MDA), the Air Force or a combination of the two. Moving development from the Army

to MDA where missile defense is “the” priority and moving fielding and sustainment from the Army to the Air Force has merit. Almost every other technically advanced nation retains missile defense within their air force; the U.S. is the rare exception. Advantages, beyond priority, include potentially reducing fratricide as communications between aircraft and missile defense are isolated to a single service.

The Army did not cancel MEADS on Valentine’s Day in 2011; it started the process not long after the program formed. It has been “death by a thousand cuts”, and is evident from the survey comments. Over protection of technology, conflicts-of-interest with LTPO, lack of support within the Army and the PEO, lack of execution by the contractor, particularly early in D&D and lack of qualified foreign partner personnel all contributed to the Army’s exit from the program. In the end, it was the U.S. taxpayers and soldiers who suffered the most as a result of yet another failed DoD development.

Hopefully, some enduring benefits will be gained from MEADS technology harvesting and our taxpayers will not have contributed \$2.5 B in vain.

Recommendations

These suggestions generally apply to most large acquisition programs; however, there exist additional considerations leaders must address and assess when embarking on a new international program. Additional recommendations include the following:

1. Never place your new investment in an organization under its legacy competition; to do so is to guarantee failure.
2. Harvest mature MEADS MEIs and plan to integrate them into IAMD as soon as possible.

3. Harvest the MEADS Surveillance Radar immediately. The Army must acquire a true surveillance asset to augment Patriot and provide 360-degree coverage previously proven during MEADS second intercept test.
4. The Harvest Team should take their job seriously and do what is best for our Nation.
5. In any new program, focus on “getting the right people on the bus and the wrong people off”, which is even more critical in an international program (Collins, 2001).

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GLOSSARY OF ACRONYMS

ABT	Air-Breathing Threat
AD	Air Defense
ADA	Air Defense Artillery
AESA	Active Electronically Scanned Array
AIAMD	Army Integrated Air and Missile Defense
AMD	Air and Missile Defense
AMRDEC	Aviation and Missile Research, Development, and Engineering Center
AS	Acquisition Strategy
ASA(ALT)	Assistance Secretary of the Army for Acquisition, Logistics and Technology
AT&L	Acquisition, Technology, and Logistics
BMC4I	Battle Management Command, Control, Comms, Computers, and Intelligence
BMD	Ballistic Missile Defense
BoD	Board of Directors
BOS	Battlefield Operating System
C2	Command and Control
CAIV	Cost as An Independent Variable
CDI	Classification, Discrimination, and Identification
CDR	Critical Design Review
CFE	Contractor-Furnished Equipment
CMDS	Cruise Missile Defense Systems
CMR	Certified Missile Round
COE	Center of Excellence
COL	Colonel
CONOPS	Concept of Operations
Corps SAM	Corps Surface-to-Air Missile
COTS	Commercial Off-The-Shelf
CRI	Cost Reduction Initiative
CRS	Congressional Research Service
CVN	Carrier, Vessel, Nuclear
D&D	Design and Development
DAB	Defense Acquisition Board
DAE	Defense Acquisition Executive
DDG	Guided Missile Destroyer
DOD	Department of Defense
DT&E	Development Test and Evaluation
DT/OT	Developmental Test/Operational Test
DTIC	Defense Technical Information Center
EADS	European Aeronautics Defense and Space Company
EC	European Community

ECCM	Electronic Counter-Countermeasures
ECM	Electronic Countermeasure
EFoFP	European Follow-on Foundation Plan
EMD	Engineering, Manufacturing, and Development
EO	Engagement Operations
EV	Earned Value
EVM	Earned Value Management
EVMS	Earned Value Management System
EXCOM	Executive Committee
FCR	Fire-Control Radar
FD	Foreign Disclosure
FLCC	Financial, Legal, and Contractual Committee
FMS	Foreign Military Sales
FMTV	Family of Medium Tactical Vehicles
FO	Force Operations
FoFP	Follow-on Foundation Plan
FRP	Full Rate Production
FU	Fire Unit
FUE	First Unit Equipped
FW	Fixed Wing
GAF	German Air Force
GAO	Government Accountability Office
GE	Germany
GEM	Guidance Enhanced Missile
GFE	Government-Furnished Equipment
GFI	Government-Furnished Information
GFP	Government-Furnished Property
GO	General Officer
GOTS	Government-Off-The-Shelf
GPO FDSys	Government Printing Office Federal Digital System
GS-15	General Service 15
HASC	House Armed Services Committee
HAWK	Homing All the Way Killer
HW	Hardware
IAMD	Integrated Air and Missile Defense
IBCS	Integrated Air and Missile Defense Battle Command System
IFF	Identification Friend or Foe
IFPC	Indirect Fire Protection Capability
IPT	Integrated Product Team
IT	Italy
JLENS	Joint Land-Attack Cruise Missile Defense Elevated Netted Sensor System

JSF	Joint Strike Fighter
JV	Joint Venture
KPP	Key Performance Parameters
LACM	Low Altitude Cruise Missile
LFK	Lenkflugkörpersysteme GmdH
LM	Lockheed Martin Corporation
LMMFC	Lockheed Martin Missiles and Fire Control
LNC	Launcher
LRIP	Low Rate Initial Production
LTC	Lieutenant Colonel
LTPO	Lower Tier Project Office
M&S	Missiles and Space
MBDA	Matra Bae Dynamics Alenia
MDA	Missile Defense Agency
MDAP	Major Defense Acquisition Program
MEADS	Medium Extended Air Defense System
MEI	Major End Item
MESC	MEADS Executive Steering Committee
MFC	LM Missiles and Fire Control
MFCR	Multifunction Fire Control Radar
MI	MEADS International
MLRS	Multiple Launch Rocket System
MOU	Memorandum of Understanding
MRDM	MEADS Requirements Driven Missile
MS	Milestone
MSE	Missile Segment Enhancement
MTRA	MEADS Technology Release Agreement
NAD	National Armaments Director
NAMEADSMA	NATO Medium Extended Air Defense System Management Agency
NAMEADSMO	NATO Medium Extended Air Defense System Management Organization
NATO	North Atlantic Treaty Organization
NPO	National Program Office
NRO	National Reconnaissance Office
O&S	Operations and Sustainment
OAG	Operational Advisory Group
OIF	Operation Iraqi Freedom
OSD	Office of Secretary of Defense
OUG	Operational User Group
PAC-3	Patriot Advanced Capability – Phase 3
PATRIOT	Phased Array Tracking Radar to Intercept On Target
PD/V	Project Demonstration/Validation

PDR	Preliminary Design Review
PEO	Program Executive Office
PM	Program Manager
R&D	Research and Development
RDT&E	Research, Development, Test and Evaluation
RF	Radio Frequency
RFP	Request for Proposal
RFU	Reference Fire Unit
ROM	Rough Order of Magnitude
RRE	Risk Reduction Effort
SAC	Senate Appropriations Committee
SAM	Surface-to-Air Missile
SASC	Senate Committee on Armed Services
SC	Steering Committee
SEC	Securities and Exchange Commission
SES	Senior Executive Service
SETA	Systems Engineering and Technical Assistance
SLAMRAAM	Surfaced-Launched Advanced Medium Range Air-to-Air Missile
SME	Subject Matter Expert; Standard Military Equipment
SoS	System of Systems
SR	Surveillance Radar
SW	Software
T/R	Transmit/Receive
TAA	Technical Assistance Agreement
TEG	Test & Evaluation Group
THAAD	Terminal High-Altitude Air Defense
TOC	Tactical Operations Center
TPM	Technical Performance Measure
TR	Transmit/Receive
TrG	Transceiver Group
TRM	Transceiver Module
TSC	Technical & Support Committee; Tri-Service Committee
TT	Technology Transfer
UAE	United Arab Emirates
UAV	Unmanned Aerial Vehicle
UHF	Ultra-High Frequency
USNPO	United States National Program Office
USAADACSH	U.S. Army Air Defense & Artillery School
USAF	United States Air Force
USG	United States Government
USN	United States Navy

APPENDIX A – SURVEY COVER LETTER

Dear Madam or Sir,

My name is Steve Hammonds and I am currently enrolled as a Fellow in the Defense Acquisition University's Senior Service College. As part of the curriculum, we are required to complete a comprehensive research paper on an acquisition-related topic. I have chosen to investigate the reasons why the U.S. Army exited the MEADS program in order to capture lessons learned toward future international involvement decisions. The attached set of survey questions are critical part of my research. In addition, please provide written comments, as they are vital to understand the context of each selected choice. The information provided will not be attributed to the respondents. If you would like a copy of the completed research paper, please provide your contact information.

Very Respectfully,

Steve Hammonds

Fellow, DAU SSCF

APPENDIX B – SURVEY QUESTIONS

MEADS Research Survey Questions

(Please Explain Your Answers in each Comment Box)

1. What is or was your role in the MEADS program? (Note: Data will not be attributed to respondents)
 - a. PEO
 - b. Project Manager
 - c. Product Manager
 - d. Deputy Project Manager
 - e. Functional Lead
 - f. Contractor
 - g. Other, please explain
2. What is your overall perception of the MEADS program?
 - a. Mainly positive
 - b. Mainly negative
 - c. Neither positive nor negative
3. What is your assessment of the MEADS acquisition strategy?
 - a. Mainly positive
 - b. Mainly negative
 - c. Neither positive nor negative
4. What is your assessment of MEADS program execution?
 - a. MEADS underperformed relative to other U.S.-only programs
 - b. MEADS over-performed relative to other U.S.-only programs
 - c. MEADS performed about the same as other U.S.-only programs
5. Did the U.S. Army exit the program mainly for
 - a. Technical reasons
 - b. Acquisition strategy reasons
 - c. Program execution/funding reasons
 - d. Political reasons
 - e. A combination of the above
 - f. Other
6. Are the requirements that drove the need for the MEADS program still valid today?
 - a. Yes, the original requirements for MEADS such as 360-degree coverage, transportability and mobility are still valid
 - b. No, the MEADS requirements are no longer valid
 - c. Other U.S. assets currently meet the need
 - d. Other
7. In your opinion, how can the Army best meet future air-and-missile defense requirements without MEADS?

- a. Upgrade the current Patriot system
 - b. Develop a new air-and-missile defense system
 - c. Other
8. Do you believe that the Army would have continued with MEADS if it was a U.S.-only program?
 - a. Yes
 - b. No
 - c. Other
9. Do you think the Government Lower Tier Project Office (Patriot)
 - a. Mainly aided MEADS program development
 - b. Mainly hindered MEADS program development
 - c. Neither aided nor hindered MEADS program development
10. Do you believe that the Army would have continued MEADS if the Raytheon-led team had been selected as the prime contractor?
 - a. Yes
 - b. No
 - c. Other
11. What is your assessment of PEO Missiles and Space support of the MEADS program?
 - a. Mainly positive
 - b. Mainly negative
 - c. Neither positive nor negative
12. Technically, in your opinion, to you believe that MEADS was
 - a. Better than Patriot
 - b. Worse than Patriot
 - c. Neither better nor worse than Patriot
13. Concerning technology transfer; do you believe that the U.S. should have shared more or less technology with the European partners?
 - a. More
 - b. Less
 - c. About the same
14. How would you characterize the relationships between the three MEADS partners (U.S., Germany & Italy)?
 - a. Mainly positive
 - b. Mainly negative
 - c. Neither positive or negative
15. How could relations between the MEADS partners have been improved?
16. How do you believe key personnel decisions, government and industry, impacted MEADS program execution and reputation?
 - a. Mainly positive
 - b. Mainly negative

- c. Neither positive nor negative
17. Do you think the U.S. Army made the best decision for its soldiers and the U.S. taxpayers by exiting the program, after the design and development phase?
- a. Yes
 - b. No
 - c. Other
18. Should the U.S. Army harvest any pieces or technologies of the MEADS program?
- a. Yes
 - b. No
 - c. Other
19. Given the withdrawal from MEADS, will the U.S. Army be less likely to encourage cooperative international programs?
- a. Yes
 - b. No
 - c. If yes, what?
20. Would you have recommended cancelling the MEADS program?
- a. Yes
 - b. No
21. What factors led to the cancellation of MEADS? (please check all that apply)
- a. Funding
 - b. Politics
 - c. Requirements no longer valid
 - d. Other system developed to meet requirements
 - e. Contractor performance
 - f. Immature technology
 - g. Other
22. Why do you believe MEADS was cancelled?
23. Was there a strategy that would have helped keep MEADS funded?
24. Who were the key stakeholders that led to MEADS cancellation? (please check all that apply)
- a. NAMEADSMA
 - b. NATO
 - c. PEO M&S
 - d. LTPO
 - e. Test Community
 - f. User Community
 - g. Requirements Community
 - h. U.S. Army
 - i. Prime Contractor
 - j. OSD

k. Congress

l. Other

25. What are the most important lessons learned from the Army's involvement in the MEADS program?

APPENDIX C – SURVEY COMMENTS

What is your overall perception of the MEADS program?

1. Program was complex both politically and technically, but made continuous progress
2. It was a noble goal to try and make MEADS the first true International Cooperation but the time and money invested in the program could of been better spent on U.S. only Patriot replacement.
3. A system to meet the MEADS requirement was and remains vitally needed. PATRIOT is old and needs to be replaced. However the way the U.S. went about doing it was doomed to failure from the outset. Involving the Allies in the development of the system and then purposefully diluting the product by not allowing the best technologies available in the U.S. to go into the system due to releasability concerns was stupid and should have been anticipated from the outset.
4. In this particular case made sense to leverage two of our closest ally's resources (1.6B out of @4B program) to modernized our aging air defense system.
5. It was an innovative cooperative construct which tried to change too many paradigms at once: trying to break a long-held industrial monopoly by "aggregating programs"; trying a true cooperative development on a program requiring advanced technologies under strict export control; trying to compel a Service to support a program they really didn't, even though the international construct made possible cost sharing and made the program much more affordable for the Service. It ultimately became a victim to external perceptions of the program and any successes were lost in the noise.
6. Think i would prefer to say, BOTH positive and negative. Some excellent technical breakthroughs. Some terrible leadership - at all levels, from all countries.
7. I think the three companies came up with the right recipe for doing transatlantic business, and all three pursued the course faithfully and enthusiastically. The employees assigned were superb and all rose to the occasion when needed.
8. It has been an interesting experience in an international co-development undertaking. The technical requirements dictated new/modern science & engineering approaches.

9. Senior leaders should have known that "Consensus Management" was an approach doomed to delays and failure. MEADS division of work with international partners was very complicated and made cost effective development nearly impossible.
10. I think there are very positive aspects and very negative. Given the differing nature of how each country does Air Defense, I always viewed it as very difficult to get requirements that were agreed to by all three nations. However, those types of issues exist in most projects regardless of the number of countries or services involved. Even single service Army programs have that issue. The biggest problem I saw was the continual political and budget issues. Had the politicians and the budgeteers just left well enough alone, the program would have been fine. Dealing with those uncertainties and challenges continually only detracts from the actual mission.
11. Worst management structure imaginable for a major acquisition program primarily since all major leadership responsibilities rotated between countries every 2 years.
12. System requirements meet U.S. Army needs. Industry workshare flawed due to U.S. technology constraints. International cooperation agreement flawed between partner nations preventing NAMEADSMA to manage program effectively. Partner nations did not provide proper oversight due to political and funding concerns.
13. The program seeks to develop technology and solutions that are needed to counter very real threats that will soon surpass existing systems. Program staff is generally committed to this end and display good cooperation.
14. Positive: Extremely complex system with many challenging technical designs (Engineer's dream). System is greatly required by our warfighters to overcome capability gaps with existing systems fielded today (lessons learned from past conflicts). Outstanding opportunity for trans-Atlantic collaboration - NATO allies stepping up and funding development at a time when defense budgets are being squeezed. Negative: Decision making process is far too cumbersome and NAMEADSMA authority is circumvented by frequent requirement to achieve unanimous consensus by all three participating nations through approval by the Government Board of Directors. Individual countries began disruptive practices to achieve singular objectives versus team objectives. Behavior worsened after United States decision not to procure MEADS in production.
15. Given all the obstacles, it seemed as if the path with most resistance was always selected, making it difficult to remain positive. In addition to the technical challenges, being a tri-national co-development imposed a number of additional obstacles to the MEADS program including the management structure, political and budgetary process, and U.S. technology transfer limitations.

16. The cumbersome management structure of the international development program, with a the PM at NAMEADSMA subject to a complex oversight structure (composed of the NADs, Steering Committee, MESC, and later a BoD which attempted to operate on a consensus basis) and MI functioning much as a Lead System Integrator. In addition, the role of the U.S. NPO was not clear with respect to NAMEADSMA. The NPO and NAMEADSMA were often at odds with one another, especially after the NPO was absorbed into the LTPO.
17. The budget process of the individual countries imposed uncertainties and opportunities for politics, both within each country (such as MEADS being viewed as competitor to PATRIOT rather than a replacement or diplomatic agendas/State Dept. concerns being in conflict with programmatic/Defense Dept. concerns), and between each country (noble workshare, introduction of PAC-3, etc.) to disrupt the program.
18. To achieve noble workshare with the international partners meant that significant portions of the MFCR had to be developed in GE and IT. This, coupled with the decision to not use the best technologies available (such as U.S. T/R modules) because of technology transfer concerns (to maintain the U.S. lead in T/R Module technology, perversely, had the effect of advancing the foreign technology and closing the technology gap with the U.S.) had a negative impacts and hindered the development and capabilities of the MFCR.
19. It is frustrating to see the U.S. Army exit the MEADS program without better explanation to the U.S. taxpayers and our European partners. The MEADS system has made significant progress in meeting all critical technical milestones and the U.S. has decided to upgrade an aging system as our future (possibly having the Europeans with a more advanced Missile Defense system).
20. Program had good (may be too ambitious) objectives in the beginning.
21. The PD/V and D&D phases have taken too long so that the operational requirements and the system threat may have become obsolete.
22. Management structure did not appear conducive to streamlined execution.

What is your assessment of the MEADS acquisition strategy?

1. The partnership approach resulted in negative response within U.S. Military, and resulted in inefficiency in execution, but it provided both political and industrial commitment to sustain program. Pros and Cons
2. The strategy was good but the three country commitment to funding caused unusual delays. Italy dragged their feet for three years followed by Germany the

next 2 years which caused the program to never be fully funded to the program plan. Because of the funding issues, the program kept slipping to the right.

3. There should be a book written about how not to acquire a major weapon system and MEADS should be the showcase system. Managing anything by committee dooms it to failure. When no one is in charge and no one has the ability to make decisions that are in the best interest of the program (versus political interests) nothing good can result. The years that an Italian and a German were the Directors of NAMEADSMA were essentially wasted years. The U.S. should have never allowed the system management structure to get so screwed up and should have never allowed MEADS International to form as the Prime Contractor.
4. Top down (OSD) directed program without full support of the Army was probably doomed to failure from the beginning.
5. The international program office strategy to develop the capability was fine, though it appears the initial funding and schedule estimates were too optimistic. The U.S. strategy to combine program oversight of MEADS and Patriot (the program MEADS was to replace) under the Patriot program office was a bad idea and a clear conflict of interest. MEADS had little chance of succeeding within this Army structure.
6. But I would not lay all the blame for that at the feet of the AS. I believe it was driven by the MoU which set the course for the program and drove the direction of the AS.
7. Not a positive avenue to meet U.S. requirements.
8. The acquisition strategy was to develop a new air and missile defense system to replace PATRIOT, which turned out not to work! Not yet, anyway.
9. "Mainly" might be too strong, but I think it was an excessive challenge to co-develop an advanced air defense system with foreign nationals, due to security constraints and releasability gymnastics that were part of the process. The workshare arrangements and politics involved in that were probably also significant, but maybe no worse than a large company like LM dividing work up between their divisions, just more visible because it was between sovereign nations and companies of those nations.
10. It was almost setup for "political" (contractor) in-fighting from the beginning.
11. The MEADS acquisition strategy was sound but the U.S. decided to pursue other air and missile defense priorities (like IBCS) and backed out of the program.

12. Noble workshare "desires" by Nations/Industry should not have been priority for industrial workshare break-out. Tech Transfer realities should have been acknowledged openly/honestly.
13. An example of how to do acquisition reform.
14. Although it is challenging having 3 nations involved, i viewed the workshare and the division of technology across the nations as a very innovative approach.
15. Primarily reflected the compromises necessary for a major cooperative development program that required significant sharing among the participating nations.
16. Fixed price development contracts prevented mid-course corrections. Priority placed on schedule and cost which degraded overall technical capability and robustness of all system elements. Focus of program leadership (partner nations, NAMEADSMA, and industry) was on meeting contract requirements rather than initial program objectives and requirements.
17. It is hard to separate strategy that is not supported and tactics. The initial 3-party strategy may have been sound. I joined the program after it was clear that the U.S. would not continue with MEADS and was acting against the best interest of the program's success. Too many technical decisions or support actions required review and approval by the U.S.G. The U.S. program office (LTPO) had the appearance of ethical conflicts relative to PATRIOT, so another organization should have been selected.
18. The acquisition strategy was sound. Co-development with NATO allies is a cost-effective way forward in the future when developing expensive, complex, state-of-the-art systems. The improvement that is necessary is a more sound business decision making process. A team that is led by committee will always be less effective than a team with a single leader. Evolving to a team structure of Big Brother/Little Brother where Big Brother has 51% of the vote might be more effective, but a disputes/resolution process must be in place to ensure Little Brother has a voice and his concerns are being addressed or factored into decision making process.
19. The initial acquisition strategy may have been sound. However, the U.S. entering a multi-national cooperative development, and funding 58% of the development costs for only 33% of the control, in hindsight, seems dubious. Then, after the decision to forego the MEADS Requirements Driven Missile (MRDM) and to opt instead for the PAC-3 interceptor, the notion of noble workshare was at odds with U.S. technology transfer restrictions and resulted in the MEADS Technology Release Agreement (MTRA). The RRE phase, ostensibly to address the implications of incorporating the PAC-3 interceptor delayed the start of the D&D phase and introduced the MTRA seriously limited U.S. cooperation in the design

and development of the MFCR (the exception being the U.S. only developed and GFEd MFCR exciter). The effect was to seriously hinder the program, especially the development of the MFCR.

20. In general, the acquisition strategy of sharing development cost between nations is a good concept but does add areas of concern that need to be managed. There is the aspect of U.S. only data or requirements and technology transfer that causes development inefficiencies and potential shortcomings of the system. Improving in these areas, may still result in a successful co-development program that helps the U.S. and its allies lower military defense spending.
21. Tri-national operations requirements were too stringent. Developer did not appear to work with the user(s) to balance requirements with affordability. Decision to use PAC-3 missile without corresponding changes to system requirements diluted the program.

What is your assessment of MEADS program execution?

1. Not severely underperforming, but management complexity on government side and contractor side did reduce efficiency.
2. I believe the results speak for themselves. MEADS was supposed to in production and fielded to operational air defense units in the U.S., Italy, and Germany almost 10 years ago.
3. Program initially poorly managed under Allied leadership. Program turned around. Successful missile tests validate viability of the system.
4. The Steering Committee/Board of Directors oversight at times hamstrung the program execution. When faced with requirements vs. cost trades (like radar weight for example), the oversight was unable to respond in time to avoid negative execution impacts. The GM was not sufficiently empowered to manage the program. Conversely, when the program was de-scoped as a demonstration of capabilities/proof of concept, removing more challenging development and test, the program performed very well.
5. I'm answering this from the traditional Cost/Schedule/Performance viewpoint. Yes, there were great things done from a technical standpoint. But the very nature of the program was going to drive cost higher and create schedule delays. I believe the very design of the NAMEADSMA and the structure of the contract set an approach that almost guaranteed cost over-runs and schedule delays.
6. MEADS met its milestones in spite of some millstones around its neck put there by some obstructionists in the U.S. Army acquisition corps and technical corps.

7. My perspective of this is that the NAMEADSMA was set up mostly like a typical (if there is such a thing) U.S. MDAP project office, and therefore probably behaved like one. If the question relates to execution in the sense of spending money according to the plan or versus OSD goals, I don't have knowledge of that process.
8. Some in-efficiencies were experienced due to international desires for "significant" technical work and many technology transfer issues.
9. MEADS execution was better than Patriot (which required three Follow on Evaluations and still didn't meet all ROM requirements), and similar to HAWK, and Aegis. THAAD started out with multiple flight test failures and large overruns (more than \$1B) but emerged from EMD a success. MEADS had issues but executed as well or better than most U.S. systems.
10. Executed concept development, restructured D&D awarded, source selection executed, protest denied
11. There were challenges associated with co-development for U.S. industry but overall I believe MEADS performed same as other U.S. only programs at the same phase of development.
12. Decisions and contract guidance delayed by need for Govt consensus.
13. MEADS was taking longer to develop and costing more than expected
14. NAMEADSMA and the MEADS NPO performed on standard to what I have seen in other programs. However, MEADS suffered much great political and media scrutiny than most.
15. Everything was wrong with this program but especially the management structure and the requirement to rotate leadership positions among the participating nations every 3 years. This, coupled with the contractor's leadership not understanding EVMS and not appearing to be in charge of all the moving pieces, led to very poor program performance.
16. Difficult comparison due to difference due to fixed price acquisition strategy and international workshare agreements. However, it appeared MEADS tri-national program placed more emphasis on protecting workshare rather than replacing underperforming industry participants with other industry partners within MEADS program, which would not be an issue in a U.S. only program. Also, U.S. technology transfer restrictions hindered program execution.
17. Three factors led to my perception of underperformance- lack of strong 3-nation support eroded morale and prevented proper trust and cooperation - some workshare decision were based on politics vs. excellence. Protected suppliers on

any contract rarely provide outstanding service. - The program did not transition from a common capture vision to a common execution vision soon enough.

18. Growth on most major development programs in the U.S. is ~30% or greater. The primary cost growth driver on MEADS was a team unable to complete a cost/benefit analysis relative to key technical design aspects, make sound engineering decision and move forward. Instead the team stayed in a mode of design iterations for 1.5 years burning money at a high monthly expenditure rate with very little return. This resulted in both schedule delays and cost over-runs. There were issues on both the Industry and Government side of the equation and multiple factors that drove inefficiency.
19. My impression is that it underperformed compared to some other U.S. only programs, mainly from the additional bureaucratic inertia and friction imposed by the international elements.
20. Due to the complexity and management structure, the program was limited in ability to execute in a timely manner.
21. Some of the inefficiencies caused by a tri-national program (both government and industry) are likely to occur. I think the MEADS program improved throughout the years in adapting to these inefficiencies and improved throughout the course of the program. The last two years have been very productive with the program having two successful flight tests on schedule. Maybe the question or evaluation should be against other multi-national programs and do the benefits outweigh the inefficiencies? How does the U.S. do a better job at technology transfer and establishing U.S. only requirements that can be implemented separately?
22. The GM appeared to lack authority to make key program decisions in a timely fashion. The steering committee was too far removed from the program and introduced unnecessary delays. The use of the NATO contracting system appeared to reduce the authority of the GM. The Technology Transfer restrictions introduced a lot of confusion and delays in the program.
23. If put into context of having to deal with additional complexities of international decision making and reluctant U.S. technology transfer, the technical and programmatic execution was somewhat better than in many U.S.-only programs today. Compare to U.S. Patriot from early 70s to mid-80s.

Did the U.S. Army exit the program mainly for program execution/funding reasons, political reasons, a combination of the above or other?

1. Funding constraints, lack of direct program control, and concerns regarding protection of U.S. only technologies combined to provide impetus to revert to U.S. only approaches.
2. Political (U.S. ran out of patience) and Program funding.
3. The U.S. got tired of wasting the money on a program approach that was doomed to failure from the outset.
4. Army decision to commence new start command & control (IAMD) system vice MEADS dedicated TOC and decision to not field the MEADS System soured Congress on the program and lead to severe budget battles in the waning years necessary to complete the D&D program of record. U.S. has met its financial commitments under the D&D MOU.
5. The main reason was affordability -- the Army realized it could not afford to procure enough MEADS to replace Patriot within any reasonable timelines. The Army today, still realizing a need for a MEADS-like capability, doesn't plan to begin trying to upgrade radars until nearly 2020, and launchers into the mid-to-late 20's. IBCS will likely be delayed a few years as well. All due only to lack of funding. If political pressure had not been so great against MEADS, it is possible that the Army and OSD could have worked with the Partners to find a way to extend negotiations for Production and structured a program that might have been affordable, but those additional delays would only have added to the negative political pressure.
6. The Army (specifically the Air Defense BOS) could not afford to keep all the programs (PATRIOT, IAMD, JLENS, MEADS, etc.). There is already too much invested in PATRIOT and it is deployed and viable for years to come. The Army Air Defense community has stated that IAMD is their number 1 priority. So, it was the remaining programs that had to be impacted.
7. I think the U.S. Army exited the program because they preferred an all-U.S.A solution to their AMD needs. With that as a basic premise, the U.S. Army and their partner Raytheon worked together to exit the program using the full gamut of tools and skills at their disposal: technical, acquisition, execution, and political.
8. I believe that fielding a developing and fielding a capability like MEADS is an expensive proposition, and the Army "lost the stomach" for following through. Also, I've been told by others that MEADS, when it was Corps SAM was originally developed to replace HAWK, not PATRIOT, as it turned out. So, it would seem that when the Army shifted to replacement of PATRIOT, then introduced the AIAMD project, this became a difficult strategy to reconcile, so infighting within Army Air and Missile Defense probably became significant. It would be curious to know if the transition of the U.S. Army Air Defense Artillery Center and School from Ft Bliss to Ft Sill and falling under the Fires COE had a

significant part. It is my understanding that U.S.AADACSH Ft Bliss was historically a very strong proponent of Corps SAM and MEADS, and I wonder if that fell away after the move to Sill and the traditional Field Artillery folks.

9. The entrenched "Patriot mafia" is and has been very strong. There has been a very long history in U.S. Army Air & Missile defense arena. The ability of the Patriot basic system to be reasonably modified to be compatible for many of the MEADS-specific requirements of coverage areas, transportability, and, especially life-cycle costs seemed to be not recognized by the Army.
10. There were clear Patriot shortcomings identified by the Army after OIF and MEADS addressed these concerns. The program was initiated to answer the shortcomings and replace the aging Patriot. But shortly after the MEADS D&D program started Ft. Bliss (the user) decided to focus on IBCS and the Patriot supporters worked hard to convince people MEADS was flawed and that Patriot could do the job.
11. Questionable capabilities were also a large factor for U.S., but Affordability was #1.
12. MEADS was going to cost a lot more and take a lot longer to complete, and then procure, than originally expected. The Army leadership was in a budget cutting mode and MEADS problems made it a prime candidate to be killed (and it did not have strong U.S. Army User support)
13. I think the political nonsense and continual budget churn was the biggest issue.
14. The U.S. Army would have liked to exit the program earlier but fiscal liabilities prevented this from occurring. There was also some significant political risk as well as this program was a darling for OSD. The U.S. already had this capability in Patriot and really didn't need this program.
15. It appeared U.S. Army lost confidence in MEADS program due to flawed acquisition strategy that resulted in concerns in all phases of program (schedule, cost, technical).
16. The reasons for U.S. opposition to MEADS may be sound, but the stated reasons are not clear or believable. The reasons likely include: protection of the primary program-of-record (PATRIOT), budget pressures, changing U.S. requirements, unwillingness to work new requirements with the current contractors.
17. The Army left the program for two primary reasons: (1) The Army was not going to let our European partners have an equal vote on key decisions related to the U.S. AMD path forward for the future and (2) The Raytheon political machine influenced key stakeholders in the Army, Congress, Senate, and OSD. The U.S. Army hid behind a cover story of cost/schedule. If this was truly the case - add up

how much the Army has spent on Patriot upgrades and obsolescence over the same time period as the MEADS D&D contract (2004-20013) and you will find that it is more.

18. As for technical reasons, there were two U.S. sensor panels and a list of Big Rocks maintained by the U.S. NPO that itemized the main U.S. technical concerns. In addition, inevitable comparisons to the PATRIOT system seemed to favor PATRIOT, especially in areas where capability has to be developed over time with extensive testing (such as ECCM where PATRIOT was touted as mature rather than dated or obsolete). These arguments seemed to hold sway with the Army users and Dept. of the Army. One question that should be addressed is did the stakeholders inflate the number of MEADS FUs? The Army user may have seen the advantage of larger quantities in maintaining its force structure (i.e. a MEADS MEIs require significantly less manpower, so more MEIs are needed to keep manpower at PATRIOT levels). The NPO/NAMEADSMA, in the desire to reduce MEI unit costs, would see the advantages of larger quantities and the contractor would see the opportunity to sell more units and make more profits. Did the inflated number of MEADS MEIs significantly increase the procurement costs of MEADS and cause it be deemed unaffordable?
19. In the end the Army left due to prioritization of requirements, acceptance of current capabilities and the associated risk, and painfully slow execution - original IOC was to be 2005.
20. In my opinion, all aspects above had something to do with the U.S. exiting the program. The more frustrating one might be the political reasons. I have been on this program since 2004 and it has always been under attack from the Massachusetts political contingent. Not sure if the U.S. Army would be exiting MEADS if Raytheon would have won the competitive procurement.
21. The MEADS plug-and-fight architecture has been superseded by IAMD for the U.S. Army. The only MEIs of interest are the two radars. The MFCR is mostly a European product and is perceived to be of inferior quality (perhaps "not invented here" syndrome). Significant part of MEADS cost saving is in reduced personnel requirements, but the U.S. Army does not appear to be conducive to reduced force structure.

Are the requirements that drove the need for the MEADS program still valid today?

1. If anything the requirements continue to mature regarding the need for 360 degree coverage for self-protection in addition to asset protection. Threats continue to mature.
2. The requirement now is being replaced by the Patriot upgrade program.

3. And the PATRIOT system is based upon 50 year old technology. While it's a great system, and has been upgraded to keep pace with the threat over the years, it still needs to be replaced with a new, more robust, more capable, more affordable system.
4. I am not an Army Air Defender, but looking at the gaps and limitations of the Patriot Missile System it appears to me that the requirements are still valid.
5. Army strategy calls for essentially the MEADS capability, albeit not until the mid-2020's
6. The threat that drove the requirements is still valid. I believe the requirements community piled too many requirements on a single system - thus driving cost. The U.S. Army has decided that a combination of other U.S. systems already does or will meet many of the MEADS requirements. Other requirements, although valid, were victim of trade-offs necessary due to funding constraints.
7. I think all AMD developers agree on the requirements, which have been validated by the U.S. Army march toward a plug- and-fight system via IBCS. Failing to sell three PATRIOT 120-degree sector radars to the U.S. Army, Raytheon will eventually offer, or take over, the MEADS designs or at least their concepts. The continued funding for improvements of PATRIOT also corroborate that the current system does not meet the needs of the Army.
8. Yes, but I think affordability is a big deal too. Or the flip side is that the Army doesn't seem to invest in expensive acquisition programs like the U.S.N (DDG 1000, CVN, V-22) and U.S.AF (F-22, JSF, NRO)
9. I don't see other assets which will meet those requirements and the likelihood of the U.S. military being in situations where those will be necessary seems high.
10. Yes, even under an AIAMD scenario/architecture, MEADS requirements are still valid.
11. With addition of Army IAMD (IBCS) and the integration of Sentinel radar, IAMD can provide 360-degree surveillance coverage for ABTs (it is not needed for BMD threats). With addition of MSE and its additional maneuver capability, it can practically mitigate the 360 engagement requirements. The addition of an improved ABT shooter that is planned through Army IFPC program will also partially handle the 360 threat w/o the very high costs of completing MEADS development and procurement (including buying an all MSE inventory)
12. In my opinion, they may be more valid today than they were when originally envisioned.

13. Other U.S. assets can most likely fill some MEADS performance gaps through a netted Army AMD architecture, but these assets will require periodic upgrades to stay relevant. However, they cannot address the improved transportability and mobility capability that MEADS would have provided.
14. The primary requirements are still valid, especially for the non-U.S. partners and candidate customers. The target set may evolve, but the need to be agile in engaging these threats remains.
15. Multiple U.S. Army studies re-affirm this position.
16. I believe the requirements are still valid and the system has just demonstrated the 360-degree performance during FT-2.
17. Operational requirements (e.g., 360 coverage, mobility) remain valid. Threat may be obsolete and needs to be revisited. Technical requirements may not be consistent with the needs of IAMD architecture.
18. The U.S. CORPSAM and MEADS programs faced numerous occasions of potential cancellation over the years. The single most significant reason they continued was the vision and validity of the requirements. MEADS was a requirement driven system not a technical solution looking for a requirement. Much of the strength of the system is its flexibility that was envisioned in the requirements for a fully netted and distributed architecture.

In your opinion, how can the Army best meet future air-and-missile defense requirements without MEADS?

1. Harvest technology & integrate component capabilities
2. Combination of Patriot Upgrades and harvesting MEADS technology
3. Harvest MEADS
4. IAMD
5. Both approaches can work, and both ultimately will end with a system that looks much like that envisioned for MEADS. Very significant investment and essentially all new hardware will be required on either path.
6. Given the limitations of the Patriot Missile System and increased capabilities offered by MEADS (360 degree radar, significantly less personnel, transportability, lower O&S costs, etc.) there is no question in my mind that

harvesting the technology and/or major end items from the MEADS D&D effort could be a cost effective way to modernize our air defense system.

7. At this point, it should be a mix. The Army should field IBCS, which will significantly improve the C2 capabilities, training, and operational flexibility. It will also give the Army the chance to "mix & match" elements like launchers, sensors, and shooters which in theory should foster more competition and prevent future monopolies in air defense providers. In the interim though, the Army will have to upgrade Patriot. It should consider however, not upgrading all 16 Bns/60 fire units, but perhaps half of them, putting the other half of the upgrade funding into new systems, maybe even the harvested MEADS radars and launchers that the U.S. and partners have invested nearly \$4B in.
8. PATRIOT has the ability to be improved incrementally to address many of the needs. But the development of other capabilities (e.g., IAMD) are required to tie everything together.
9. Use IAMD and Patriot for a while then develop a new radar
10. The current PATRIOT system is not upgradable to a 360-degree AMD system and needs to be replaced, as was the acquisition strategy in the first place for MEADS! The Army would best open the new system to a U.S.-only competition lest it run up against the very thing that cause the MEADS strategy to fail. Either do a U.S.-only acquisition or get new leadership in the U.S. Army, something that should have been done long ago to get the Army in lock step with the MEADS team.
11. It appears that when you componentize PATRIOT and upgrade its components, is it still PATRIOT? If task force organizing and being able to mix and match sensors and weapons is an important thing to the user, IAMD might be a reasonable strategy. But when the sensors and weapons are PATRIOT components with a few Sentinels thrown in the mix, will that provide the capability that the user needs? I can see the benefits of traditional "stove piped" and network-centric weapon systems, so I struggle with knowing the answer to "best". I also worry about the ability of the "network" to do everything people ask of it and is it fragile?
12. Re-evaluate the MEADS procurement decisions.
13. Utilize the investment on MEADS by incorporating the sensors and launcher on the IBCS network. That way there would be multiple surveillance, fire control, and launchers on the network and no single point failure.
14. Within affordability constraints, both upgrades and MEADS leveraging would be beneficial.

15. The combination of PATRIOT upgrades, IAMD/IBCS, sentinel and IFPC (for ABTs) will provide much improved ABT coverage. With the addition of MSE missile, PATRIOT BMD coverage is greatly enhanced (MSE was developed by the U.S. Army externally to the MEADS program - it has proved to work very well in testing thus far)
16. Reconsider withdrawal from MEADS.
17. I would say to stick with MEADS to completion. However, if this question assumes that is off the table, then upgrade to PATRIOT would be the best path.
18. There was not a significant up-tick in capability by going to MEADS.
19. Based on today's fiscal constraints, upgrades to existing systems like PATRIOT appears to be the best approach to meeting near and far term needs. However, if you look out to FY30 and beyond, one would think the development of a new AMD system would provide more robust solution regardless of current funding issues.
20. I doubt that any element of the current PATRIOT other than the missile could be part of an effective, objective system. PATRIOT upgrade would be a compromise that allows the U.S. to avoid any admission of the PATRIOT capability gap while taking steps toward a more capable system. The total cost of the approach is likely to be higher as a sequential upgrade program will take longer to complete and will constrain the interim solutions to be compatible with any legacy PATRIOT components. An upgrade program would also lack any true competition for major elements, so it is unlikely that the U.S.G could negotiate from a position of strength.
21. Harvest MEADS technology and integrate it into a networked battle management system such as IBCS
22. With short term affordability the driving factor, the only practical option is to upgrade PATRIOT in several phases. This will likely result in a more expensive, less capable system (i.e. 360 degree coverage would require 3 to 4 PATRIOT radars and is not as mobile or transportable as MEADS) in the long run. The Army expects a successful IBCS program, which would replace the functionality of the MEADS TOC and enable a netted 360 degree capability with a combination of multiple PATRIOT and Sentinel radars.
23. Harvest technology from the MEADS program and incorporate into current AMD capabilities.
24. I think either of these options is unacceptable without the U.S. Army providing the U.S. taxpayers a road map that shows the cost for each option including the completion of MEADS

25. The U.S. Army appears to be committed to the IAMD architecture for AMD. There may be a need for a new net-ready sensor or upgraded PATRIOT to meet future needs.
26. Require LM and Raytheon to work together to integrate MEADS elements and architecture into the Lower Tier architecture until PATRIOT is eventually replaced.

Do you feel that the Army would have continued with MEADS if it was a U.S.-only program?

1. We would have been already fielding this system today.
2. I'm convinced that if the DAE had gotten on board MEADS would be in the field today.
3. It became apparent to me that Army did not like the MEADS program from the beginning. If affordable, I think the Army would have pursued the program. Lobbying by Raytheon/Army team hastened demise. A waste of \$2.4B in U.S. taxpayer monies.
4. I think the bigger issue was the conflict of interest with the Patriot and MEADS product offices and the political pressure from industry to prevent any type of competition in this mission area.
5. If it were a U.S.-only, would IAMD have ever come into being? Would the MEADS requirements/materiel solution been driven in such a way that IAMD requirements would be met by MEADS? Would cost increases been identified and mitigated earlier?
6. Absolutely and without question!
7. That points at a different angle to political infighting between IAMD, PATRIOT, MEADS (and CMDS?) and what part the Congress would play.
8. I believe the basic issues would not be very different.
9. If it was a U.S. program it would have had its own program office and LTPO would not have been involved. That focused prepotency is essential to program success.
10. The Army needed primary authority - not necessarily U.S. Only.

11. Due to budget issues I am not certain what would happen to a new U.S. only program.
12. Management structure would not have been so problematic; allowing better control of costs/schedule and incorporation of sensitive U.S. technologies.
13. Maybe... it might have been much more cost effective if it had been a U.S. only program. MEADS appears to have been bogged down in the international aspects.
14. The Capability Portfolio Reviews now conducted in the Pentagon would have led to the elimination of this program - too expensive for the incremental gain in capability.
15. Most likely would have not made it into EMD without some form of FMS assistance. If you assume it made it into EMD without international assistance and needed more funding for completion, then I believe a capability-based program would have evolved and the something short of full system capability would have been completed.
16. They would have restructured the program to fit within annual funding constraints and extend the total period of performance. This approach is seen in almost all major developments.
17. But, they would have forced a role to be defined for Raytheon in the process.
18. Without the foreign disclosure/technology transfer (FD/TT) constraints and the cumbersome management scheme imposed by the tri-national participation (at NAMEADSMA and MI), MEADS chances would have improved significantly. However, in the current climate JLENS and SLAAMRAM suffered similar fates. Apparently the Army couldn't afford IAMD and the other programs, including MEADS, so when it came down to it, the Army chose IAMD.
19. If it had been U.S. only, it would have been much easier to terminate even earlier.
20. Not sure if the political aspects regarding Patriot modernization would have impacted the program in either case. It certainly would have resolved issues related to U.S. only data and technology transfer. However, U.S. data that may be part of industry intellectual property may still have been a challenge causing inefficiencies in developing MEADS.
21. If MEADS were a U.S.-only program, it would either have been cancelled or would have been absorbed into the IAMD program.
22. The Army never appeared to be supportive of Air and Missile Defense funding. The impetus or proponent for AMD always came from the OSD/MDA.

Do you think the Government Lower Tier Project Office (Patriot) mainly aided MEADS program development, mainly hindered MEADS program development or neither aided nor hindered MEADS program development?

1. The overall acquisition strategy and approach from the outset set the stage for the demise of the program. The U.S. PM was powerless to make positive changes given how the program was structured.
2. Goes without saying.
3. I can point to no case where the LTPO aided MEADS. I can note however a number of cases where the LTPO advocated Patriot modernization and upgrades, pointed out their concerns with the limitations of MEADS, and in general advanced a "hands-off" understanding of MEADS ("we don't have any insight into what they're doing", was the usual position). I'd add that this wasn't just a LTPO issue, the user (who approved the MEADS requirements) at Ft. Bliss/Ft. Sill were as much or more anti-MEADS than the LTPO. Most of the PEOs proved more a hindrance than a help (to the point of course that OSD removed the Steering Committee responsibility from the Army for a time), and Army staff, particularly G-8 and ASAALT we're constantly vocal in their dislike for MEADS. So given the corporate Army position, it would be hard to fault the LT PM for not giving MEADS his full-throated support.
4. Before the more detailed interaction that came in ~2003, the LTPO was barely involved in the MEADS program (with the exception of the U.S. NPO, which was forcibly stuck in LTPO by a PEO). It is my opinion that decisions were already made that set MEADS on the path toward cancellation.
5. Most LTPO personnel were slanted toward a Patriot solution and repressed analysis when it showed Patriot was less capable than MEADS.
6. Absolutely and without question, the LTPO was a hindrance to the MEADS program from the day I stepped aboard and the day I left the program. For example, we made numerous sojourns to the Excom to request approval of tech transfer policies and procedures. In the waning years of my work on MEADS, a LTPO member announced that they had been chastised for bringing paltry issues to the Excom for resolution when they were empowered from the start to deal with the issues on a local level. The only reason we went to the Excom was because MEADS requested action on items that LTPO said could not be done at all, which was just one more skillful use of tools at their disposal. If the LTPO has been on the MEADS team, then they would have taken much more initiative in the tech transfer approval process; you can always beg forgiveness later. On

balance, there were some members of LTPO who realized what was going on, but what could they do other than offer encouragement under the table?

7. It is a clear organizational conflict of interest to have the system being replaced as the "gate keeper" for the new system. This structure is hopelessly biased and cannot result in efficiently meeting acquisition objectives.
8. Single worst decision in the lifecycle of MEADS was to put the future R&D program under the legacy project on the U.S. side. That began a process of covert and overt actions by those vested in the legacy program to break the international program. Remember, success of MEADS (NAMEADSMA) would have likely meant fewer jobs in LTPO over the long haul.
9. I do not think LTPO hindered the MEADS program.
10. Although LTPO did not actively oppose program, there is inherent conflict of interest with Legacy program managing its replacement. Believe lack of early/enthusiastic support and inability to share lessons learned were hindrances to MEADS success.
11. MEADS greatly benefitted from the LTPO's technical expertise
12. The influence of Lower Tier on MEADS was limited by the overarching management structure of MEADS.
13. I believe the LTPO wanted to see MEADS succeed until it lost confidence in the program early in the D&D program. Then, they saw a program that would most likely never be able to replace PATRIOT, but was earmarked all the Army AMD RDT&E funds PATRIOT needed to meet future needs. So, they were placed in a difficult position to provide required support to the MEADS program while attempting to keep the PATRIOT program viable and ready for potential conflicts without the required funding. Also, senior U.S. OSD leadership tasked the LTPO to ensure U.S. export guidance was adhered to by the MEADS program which put the LTPO at odds with MEADS program leadership on many occasions. But, the LTPO was just enforcing the export guidance, not defining it.
14. My comments are limited to the past three years. In this period the LTPO has been broadly seen as a program opponent. Problems that might have been easily overcome by a motivated U.S.G PM became hard challenges for industry. Data releases and approvals for various requests were made as late as possible and often after initial deadlines.
15. It was a huge conflict of interest having LTPO operate in the capacity they did over MEADS while managing the program MEADS was selected to replace.

16. The LTPO hindered MEADS development. The MEADS NPO was forced to share SETA support with PATRIOT. Besides an organizational conflict of interest, the PATRIOT mindset prevailed on the technical aspects. It was clear the LTPO chief engineer, among others, was negative on MEADS with respect to PATRIOT.
17. Once the PAC-3 missile was incorporated into the MEADS system, LTPO became a necessary evil. Incorporation as a subordinate PM to LTPO was a step backwards, however, and impacted program priorities.
18. My opinion is that the LTPO felt they had a system to maintain and upgrade (Patriot) and that was the preferred approach. Supporting MEADS would be in conflict with maintaining and upgrading Patriot.
19. LTPO did not appear to have much influence over the execution of the program. LTPO made no attempt to infuse PATRIOT "lessons learned" into the MEADS program. LTPO did not appear to be an active liaison between the MEADS program and the U.S. Army User community.
20. One of the fundamental problems with the U.S. management structure was the inherent conflict of interest created by putting MEADS within the purview of the LTPO. The organization saw MEADS as a direct threat to PATRIOT and resisted any activities that it thought it could accomplish with mods to PATRIOT.

Do you feel that the Army would have continued MEADS if the Raytheon-led team had been selected as the prime contractor?

1. The non-U.S. controlled program approach was not acceptable to Army leadership, either in development, production, or sustainment. Only in a prime sub relationship with clear U.S. control of hardware, and technology would the program have been considered acceptable. Future leadership may have a different approach.
2. With the same acquisition strategy, Raytheon would have failed as well.
3. Hard call, but watching Raytheon's effort to undermine the MEADS to further their bottom line is probably a strong indicator that a Raytheon led effort would be preferable. Lockheed Martin, until most recently, never used their sway with Congress to influence support for the program.
4. It would have eliminated the two biggest hurdles in my opinion
5. I believe it is 99%+ driven by the budget realities and would not have mattered who the prime was.

6. I think the U.S. Army would have continued MEADS but the program would have evolved into one with black boxes everywhere and a lot of tin-bending work share in Europe. In the end, that acquisition execution would have failed too when the Europeans walked away. I really believe that LM, LFK, and MBDA came up with the right recipe for doing transatlantic development, but the U.S. Armament Director failed to get the Army Acquisition Corps and its minions into line, thus wasting millions and the opportunity to field a new, capable AMD system today and not after the horse has gotten out of the barn.
7. I don't know. Does Raytheon have that much power? Lockheed is pretty powerful too.
8. It was the Europeans that didn't want the Raytheon solution so there would not have been a MEADS program based upon the Raytheon proposal.
9. It would have been more likely to succeed, but the international co-development structure would have still been a threat to the legacy U.S. project office.
10. I do not think the decision to withdraw from the MEADS program had anything to do with who the prime contractor was.
11. This would have addressed performance questions and incorporation of lessons learned in Patriot, but Management structure issues would have to be fixed as well.
12. If Raytheon had a more experienced PM available it may have had some positive impact. This would probably still be insufficient to overcome the broken management structure of the program.
13. I don't know. However, I believe the result would have been the same if the current international cooperation agreement was in place using Raytheon rather Lockheed as the U.S. industry participant. In other words, the flawed acquisition strategy related the international program strategy/agreement would have doomed the program regardless of the U.S. prime contractor selected.
14. I cannot say for sure that this would have happened, but a Raytheon team would have benefitted from the PATRIOT program relationship. This relationship may have motivated the U.S.G to work harder to make sure that MEADS was a success and to take quick action to resolve problems. I believe that the Raytheon solution was favored by the Army, but not selected by OSD. As such the Army did not have the typical pressure of making sure that its selected supplier was successful.

15. The Army would still not likely to afford both MEADS and IAMD. Noble workshare and FD/TT would have been even more problematic, especially after the PAC-3 Interceptor was forced into the program.
16. I think that would have resolved some of the political aspects and leveraging U.S. only data.
17. The situation would be no different due primarily to three factors: the decision to use PAC3 as the interceptor; agreement for "noble work share" between the nations; and the stringent technology transfer restrictions.
18. I do believe that one of the major influences toward stalling and eventually cancelling MEADS would have been removed. I also believe that the source selection committee was very professional in its evaluation of the competitive proposals received from the two teams and clearly chose the best system from an integrated and operational perspective. I believe the Raytheon team continued for years after the selection to lobby elements in Wash. D.C. to allow PATRIOT-based solutions to parts of the MEADS requirements. I believe if Raytheon had been chosen it would have supported transition to MEADS similar to how it managed transition from HAWK to PATRIOT.

What is your assessment of PEO Missiles and Space support of the MEADS program?

1. Both support for execution and resistance to the program approach existed
2. Every PEO that I saw involved in the program was poorly equipped to manage the program and allowed the train wreck to unfold. They could have been instrumental in turning the tide but didn't know how or even that they should.
3. Watched PEO after PEO try to marginalize the program.
4. After General X, each successive PEO M&S briefed the U.S.D(AT&L) on MEADS and the messages in those updates to AT&L leadership ranged from pessimistic that the program could succeed to calling for an immediate U.S. withdrawal. As noted above, at one point the U.S.D removed the PEO from MEADS Steering committee responsibilities.
5. Probably BOTH positive and negative. Since there were numerous PEOs during the time of MEADS, they each had their own interest and level of involvement. That drove the direction they provided to the other PMs and, more specifically, the NPO. Some gave guidance that enhanced the program. Others gave guidance that did not or, worse, provided no leadership at all.
6. I think the program was moved to Missile and Space sometime later in MEADS program. I was hopeful that a change of PEO would make a positive difference to

MEADS, but it was too late, and the PEO's plate was too full to take on any but the top crises in his area. The solution to getting the U.S. Army on board was the firing of three general officers to get the attention of their replacements.

7. General X was the last PEO to support MEADS. Each PEO since John felt their direction was to extricate the Army from the MEADS program.
8. It was very difficult for the U.S. Army to get comfortable with embracing the shared authorities and leading through influence rather than direct authority. As such, the tendency was always to break it and default to a U.S. led effort. Importantly, the effect of filtered and modified information reaching the PEO and higher level Army leadership cannot be overstated. Strategic leaders did not know what they did not know.
9. PEO MS decision to establish AIAMD program was major distractor to support of MEADS, and contributed to affordability issue.
10. Provided support to OSD as required.
11. It was the U.S.' turn for leading the program next in hopes of getting some serious acquisition experience injected into the program. Neither the U.S. or Germany could agree with the Italian's nomination of the Systems Engineering lead as he was considered incompetent. This embroiled the Program Office in a soap opera environment that took over a year to resolve. It is unlikely any U.S. intervention could have provided positive support for this Program.
12. Hard to tell impact on program due to the program guidance/restrictions placed on all players by the international cooperation agreement developed and approved by OSD.
13. My comments are limited to the past three years. In this period the PEO has not been an active supporter of the program. LTPO mischief may have been encouraged or supported by the PEO. Relations between the PEO and European counterparts have been strained and unpleasant.
14. Believe much of the direction they were executing came from above that position.
15. Initially positive, but negative thereafter.
16. The support of the program continues to diminish based on my observations over the years with PEO Missiles and Space. Even the aspects supported by the U.S. Army (SR) several years ago has now become less and there is a reluctance to support the SR maturity for further evaluation by the U.S. Army harvesting team

17. The PEO appeared to be an enthusiastic supporter in the PD/V and early D&D phases. The PEO support appeared to wane following the decision that MEADS would be a PATRIOT replacement.
18. An inherent flaw in the U.S. management structure for the program was that it was not managed at the appropriated level for dealing with the political and sometimes parochial elements of an international weapon system development. Due to the complex issues of technology transfer, conflicts of interest (PATRIOT), decision making and control, the program should have been managed as an OSD Special Interest Program. This would have raised the management level to the same as the partners, i.e. MOD. The subordinate service and functional elements of the partner MODs were tasked to SUPPORT the MEADS program and were held accountable to the MOD.

Technically, in your opinion, do you feel that MEADS was better than Patriot, was worse than Patriot or neither better nor worse than Patriot?

1. 360 degree coverage, near vertical launch, networked end items, dual radar approach, and modern hardware made MEADS a more advanced system
2. Better in some respects but worse in other. Using the MEADS program to "teach" Lockheed Martin how to develop radars was stupid of us.
3. At its stage of maturity feel MEADS better than Patriot. Was impressed with the full-up testing I saw in Italy while attending one of the BOD meetings.
4. It's hard to judge. MEADS hardware appears quite capable, but until the software and advanced development is completed it's not clear what the full performance of MEADS can be. It's also not fair to compare a system not yet done with development and testing to one that has had billions spent over the last 15 years in upgrades (to include all the post- deployment SW drops, up to #7 now with more planned). If you stipulate that MEADS would get additional time for equal tests, and a few years' worth of upgrades, I think there's no doubt MEADS would be more capable technically, more flexible operationally, and cheaper and more reliable than PATRIOT.
5. What about MEADS? The concept? The management? The resulting hardware/sw? What HW are we comparing? Can't answer this one. If a system COULD have been designed and manufactured that met ALL the MEADS requirements, it would have been great. But that did not appear feasible - technically and financially. Some of that, again, driven by the rules set out in the MoU. Some of it driven by unrealistic requirements. But it is not right to compare concepts, designs, or prototypes to produced and fielded systems.

6. MEADS has the potential to much better than Patriot, but does not have the maturity that comes from 2,500 search and track tests, and around 1,000 flight tests. Bringing maturity and knowledge is where the Army could have greatly aided the development of MEADS - another opportunity lost for them and "two of our strongest allies who consistently punch above their weight".
7. The technical requirements mentioned above are not reasonably attainable with Patriot, are likely good in future military encounters, and will be long-term much more cost effective.
8. Based upon accredited simulations backed by flight tests MEADS is far more capable. This stems from the 360-degree coverage, separate AESA sensors optimized for surveillance and tracking, open interoperable BMC4I, near vertical launcher, and MSE missile.
9. Patriot didn't meet requirement
10. Over the long haul, there is no doubt that MEADS would mature and eventually eclipse the PATRIOT levels of performance. In the short haul, it would less mature but with an architecture with great potential for evolution.
11. MEADS offers 360 degree coverage but otherwise not sure of the benefit.
12. Believe MEADS would have initially been a step backwards in performance, due to tech transfer limitations and inability to share lessons learned from Patriot over 40 years.
13. One the main improvements that the MEADS program claims is the MSE missile, but that was developed by the U.S. Army and is now used by PATRIOT - so it is the same as PATRIOT in that aspect. Its 360-engagement capability is better, but in a coordinated ABT and BMD attack MEADS would not be much better than PATRIOT because it would probably have to keep its FCR focused on the primary direction of the BMD threats.
14. Technically and from a modernization stand-point it should have been better than Patriot but the hodge podge of components managed by each of the countries caused it to never meet its promise.
15. It is better on paper, but the paper design has yet been demonstrated in HW/SW. And, due to previous program decisions placing priority schedule and cost rather than technical capability, it's doubtful that the current MEADS MEIs will be ready for production and/or fielding without another major development iteration.
16. To the extent that MEADS has been completed and tested it is demonstrating many beyond-PATRIOT capabilities. The system has yet to finish development, so it cannot be fully evaluated. Manuals, training, and reliability growth are

incomplete relative to initial fielding needs. These deficiencies are generally not complex and require straightforward effort to complete.

17. Hard to say objectively which is better. In some aspects, MEADS is clearly better, while in others PATRIOT is better. The ability of the SR and MFCR to operate in a rotating or a staring mode offers a lot of flexibility to adapt to different scenarios while PATRIOT radar can only operate in a staring mode. The low frequency SR is a force multiplier because it is so efficient at long range volume search. The SR and MFCR employ active array technology (which enables a number of state-of-the-art radar techniques) as opposed to the PATRIOT space-fed passive array technology. MEADS is much more transportable and mobile than PATRIOT. PATRIOT, on the other hand, is a fairly robust system with mature software and has benefited from decades of testing and use in two wars, from which lessons were learned, weaknesses identified and addressed to the extent possible. MEADS is still very immature. Given the opportunity, funding and similar levels of testing to that with PATRIOT, MEADS could also be refined and matured to be a very capable system. How to compare the two systems? It's a difficult proposition. A MEADS reference fire unit compared to a U.S. PATRIOT battalion might be the best way (since each could achieve some degree of 360-degree coverage, and/or sector coverage as dictated by the scenario, and each would have a total of 3 radars). A comparison at that level would likely indicate MEADS with a greater capability against most targets. However, in some scenarios, PATRIOT would have the advantage. So from a technical standpoint, it really is hard to say which system would have the clear-cut advantage. However, from an affordability point of view, PATRIOT (even with O&S costs), with a phase or two of upgrades, arguably, has the advantage. PATRIOT will require at least one phase of upgrades to keep it viable until MEADS could be fielded in sufficient quantities. So, those costs must be factored in with the continued development (U.S. only portion), testing, and procurement costs of MEADS.
18. My response is based on the U.S. Army defining the requirements for MEADS as the next generation Air and Missile Defense System. Unless system requirements have changed drastically, the MEADS system should be better than Patriot. This also assumes that MEADS finishes development and meets the system requirements.
19. The two systems use the same interceptor. MEADS is better due to its 360 coverage, mobility and plug-and-fight readiness. MFCR is perceived to be inferior to PATRIOT because certain key functionality were not given adequate emphasis.
20. Undoubtedly. It was by design to be that. The respective requirements documents that were developed by the U.S. User community specifically differentiated the requirements for upgrades to PATRIOT in the near/mid-term and future operational modes of MEADS. The MEADS requirements, by definition, required flexibilities that were not envisioned for PATRIOT. To

achieve these requirements it would be necessary to build a completely new type of architecture. So no matter whether it was MEADS or PATRIOT it would be a new system architecture.

Concerning technology transfer, do you feel that the U.S. should have shared more or less technology with the European partners?

1. This was my biggest issue during my tenure. We wasted a year working TR Modules with the OSD.
2. This is a tough question. We needed to share it all but other U.S. interests would have been adversely affected. So.....in reality, we should not have shared any and we should not have allowed allied participation except in production. That way we would have had the absolute best U.S. technology possible in the system.
3. This was the first U.S. international cooperative development program in which we negotiated what technology would be released upfront and codified it in an Annex to the MOU. Established precedence for cooperative programs that followed. Timeliness of the release of technology from LTPO was often cited by Germany & Italy as an impact on the program. Appeared to improve as program proceeded.
4. The mix seems about right. Anymore and it would have been a U.S. solution...any less and it would have been an international solution
5. There were some items that the LTPO advocated for sharing/release/transfer but they were denied. That was part of the problem with having OSD so deeply involved with the specifics of the program. I personally had a DAE put his finger in my chest (during a MEADS programmatic discussion) and tell me to "make the program successful." Then 15 minutes later walk down the hall to a different conference room and I showed why certain technology should be released in order to help make the program successful and that same DAE denied the request.
6. The LTPO was the gatekeeper of tech transfer and single-handedly tried to protect anything and everything from some very technically capable allies. To corroborate this view, look at how tech transfer turned out in the number of black boxes (1) and in the MFCR software area; compare it to the situation along the way. For MEADS to be successful, the LTPO needed to take more initiative in the

tech transfer area and to lead the charge to Excom only when necessary and as part of the MEADS team.

7. I have a very parochial perspective on sharing classified technology with foreign nationals, but that's probably wrong- headed and arrogant in light of the Tizard mission.
8. It took some time in the beginning, but I believe it finally settled about where it should be. If it settled a little sooner the program may have proceeded a little faster.
9. The U.S. should have stuck to what they promised. But the program would have greatly benefitted from co-development of T/R modules, allowing the U.S. to help in the MFCR system engineering, and more U.S. help in the development of the radar software.
10. Would have led to lower cost better executed program
11. Would have definitely said "More" if U.S. was going into production and system was being fielded to U.S. soldiers, but since it isn't, it was right decision to withhold hard-fought and costly U.S. technology.
12. Very complicated... because of the concern with one of the partners (Italy) on technology export.
13. I think this issue created a lot of problems that should not have occurred. They are our partners or they are not.
14. Always was a bone of contention. Really hampered our effectiveness since there was never a level of trust established.
15. Based on the end result, I believe the technology restrictions protected high investment technologies from being exploited since the MEIs will most likely never be produced or fielded by any partner nation. With that said, I think technology transfer restrictions should be a major consideration when considering entering and/or developing the framework for future international partnership of high tech weapon systems.
16. The level of sharing is about right, but the process was too slow to meet the needs of a development program.
17. It really depends but the premise of not sharing U.S. technology to maintain the U.S. lead in a cooperative development program is not successful because the partners capabilities are enhanced as they are tasked with the design and development, i.e. they advance either way. In principle, if the U.S. enters a cooperative development program, the product of which is a weapon system for

U.S. soldiers (our fathers, mothers, brothers, sisters, sons and daughters) to use and to defend themselves with, then I would expect the best technology should be made available for them. If the best technology is U.S., then I would expect the U.S. DoD could find a way for it to be used. Conversely, if IT or GE technology were better, I would expect a way found for it to be used. Noble workshare be damned. How much noble workshare should be expected for a 17% or 25% stake? If that position would have been adopted at the risk of losing GE and/or IT in MEADS, would we be any worse off than we are now? Would we be better off? I don't know.

18. Transferring more technology enables development more efficiently. I am not an expert in this area, so I am responding from a program execution aspect only. It does appear, the U.S. may be trying to protect technology today that may not be required. This should be a focus area when looking at future tri-national programs.
19. The stringent technology transfer constraints were not conducive to co-development. The transfer process remained confusing and cumbersome, and introduced unnecessary delays. Not sharing PATRIOT "lessons learned" may have affected MEADS system capability.
20. I believe that many of the "owners" of our technologies are overly protective because they believe their existence is threatened if someone else is allowed to know what they are doing. I personally received briefings from GE industry that explained in greater details the engineering behind technologies that were exactly those I was "read-on" in the U.S.. Yet, the U.S. would not admit or share its information with GE. The rationale for not sharing was that level to which the U.S. had brought the technology to physical form---still short of system implementation. This difference was a matter of funding resources as opposed to technical knowledge/understanding. I believe the U.S. could have actually benefitted from an exchange of information, analyses, and discussions in these areas.

How would you characterize the relationships between the three MEADS partners (U.S., Germany and Italy)?

1. Partnership primarily existed at the OSD level, and was generally positive
2. It was mostly terrible and destructive.
3. Despite the ups and downs of funding availability, Congressional disfavor and heated discussions over MEADS developed technology use after program completion, focus on successfully completing the D&D phase prevailed.

4. Despite all the bickering and challenges, the fact that the partnership stayed intact though D&D phase (and looks to continue in the EFOP) means it must have been positive.
5. I felt like the NPOs worked well together. Within NAMEADSMA it seemed to be working well.
6. I was entirely impressed with the managers and engineers who were assigned to work in the U.S. at MEADS International and with those at their companies in the U.S., Germany, and Italy. In most cases, LFK and MBDA were easier to work with than the LM companies in the U.S.! But all the LM companies did a superb job of integrating the Europeans into their organizations and giving them meaningful work assignments. To have done otherwise would have been self-defeating. The managers assigned to MEADS by LFK and MBDA were superb as well, with a couple of exceptions. Whether a farmer has two hogs or a whole herd of hogs, there is bound to be at least one crazy one.
7. Wasn't close enough to the situation to make an assessment.
8. Generally all worked to keep the program sold - some years it was one nation while other years the roles changed. Italy and Germany seemed more desirous to keep the development going.
9. On the government side the Europeans became distrustful of the U.S. because of their lack of program support. The industry side worked well enough together that the key flight test milestones were all carried out successfully.
10. Positive in the beginning but turned somewhat negative
11. U.S. often seemed overly protective of technology while Europeans seemed overly concerned with industry workshare.
12. I did not directly interact with any of the non-U.S. partners on MEADS
13. As in any partnership, there are challenges. No different here. I think a failure to understand each other's culture and a difference in Air Defense doctrine was a problem.
14. U.S. and Germany very positive. The relationship by those two countries with Italy was generally negative and that's especially true of the Germans. They truly believed the Italians brought nothing to the table but money.
15. Positive at the working level. Neutral-to-negative at the senior leadership level.

16. U.S.-GE relationship is strong. It is easy to see similarities in technical and business processes. U.S.-IT and GE-IT relationships are neutral to poor. Italians are often viewed as more interested in maintain workshare than in solving problems. Most expensive, program-level problems were affected by Italian performance or tech transfer limitations that hindered normal U.S. problem solving. The Italians were more likely to directly interact with their NPO outside of program channels. This led to difficulty in managing priorities from government board through NAMEADSMA through MI to the implementing IPTs. Germany and Italy established a joint venture (EuroMEADS) through which scope and funding would pass. This organization was weak and made contracting more complex.
17. Initially, very positive. U.S. decision to leave program definitely had an adverse impact on the relationship. Today - there are a lot of hard feelings the Europeans have toward the U.S. Govt.
18. In my experience, at the working level, mostly positive, civil, and cordial. At the management level though, I think the positions taken on PAC-3, Noble workshare, the MTRA, and country specific security and technical requirements took their toll.
19. From an industry perspective, the teams in general have made tremendous progress over the years on achieving the program milestones. It was recognized early on that face-to-face and frequent communication was critical for program success.
20. Relationships within NAMEADSMA and within MI appeared to be very good. I had no exposure to the relationships at the higher (i.e., NPO, PEO and above) levels

How could relations between the MEADS partners have been improved?

1. Possibly more direct government communications, but in general the relationship at the government level was OK.
2. That's a touchy subject. I still think the vote shouldn't of been equal. The amount of money should of decided the vote.
3. Putting the U.S. in charge and letting the allies benefit from the product
4. I think after the program had a major turnaround the partner relationship improved significantly. Recently signed Letter of Intent codified will go a long way toward protecting U.S. technology concerns and will facilitate

German/Italian desire to harvest the results of the program to build a deployable air defense system.

5. Here I've got no good ideas. I thought it was set up about as well as possible. I guess the SC/BoD reps from all nations could have been staffed with more diplomatic personnel, but it wasn't too bad.
6. Put one country in charge. Period. Then it would not have been a fight to get agreement to appease everybody's little concerns. If one country (any of them) would have had final authority on program decisions, it would have at least made many of the political games less significant.
7. For NAMEADSMA to allow more involvement by the Nations
8. The industrial partners, LM, LFK, and MBDA, did a pretty good job of keeping good relations among themselves. The organization that included a Board of Directors of pretty influential members enabled the officers of MI to get over any bumps in the road that came up. The Europeans had good support from their Armament directors and from the services responsible for AMD, but the failure was with the lack of cooperation of the U.S. Army with the rest of the MEADS team. And that failure has to be traced right back to the U.S. Armament Director.
9. Perhaps a tighter (good) relationship between NAMEADSMA and the nations' project offices may have helped.
10. Had the U.S. supported the program we would be producing the MEADS system today and retiring Patriot providing the three governments with a system more capable and less costly than Patriot.
11. Separate program from Army mgmt structure
12. The greatest difficulty came as a result of inconsistent leadership support in execution. There was almost always one nation that was under attack or pulling back from the program due to domestic funding and/or political challenges. I do believe that having the U.S. as lead nation in decision making may have reduced some of the challenges.
13. Probably would have been better if MEIs were developed by individual countries (not co-development) and integrated by MEADS International. Co-development never seems to work. I think U.S. industry had a hard time adhering to U.S. technology transfer guidance.
14. If everyone truly wanted to field a capable system in an efficient manner, then U.S., as majority shareholder, should have been given majority vote to break deadlocks.

15. Better understand each other's culture and better understand the difference in Air Defense doctrine.
16. Someone has to be in charge and it can't rotate. The U.S. needed to share more technology with the partners.
17. Stronger partner nation leadership was needed from an oversight point of view would have helped. In other words, NAMEADSMA and industry needed to know that they were going to be held accountable for underperforming even if it meant program termination. Also, more direct control of program execution was needed by NAMEADSMA rather than elevating all issues to a nation steering committee for resolution. Finally, industry needed to take more responsibility in defining corrective actions for program issues rather than just presenting problem and requesting guidance for problem resolution.
18. Less teaming and more subcontracting. Teaming often results in a lack of linkage between performance and result. More discipline in planning and tracking earned value EV reports were often insensitive to real problems or responded too slowly. More milestone reviews at which workshare could be reassigned from low to high performing groups.
19. Designate a clear leader in the program that sets the vision and drives decisions to keep the program moving forward (3 countries requiring a unanimous consensus is a model for inefficiency). There are too many obstacles which take far too long to clear that delay progress.
20. Who knows? I think a different management structure may have eliminated some of the friction. Perhaps a stronger international program office with less oversight and more of an advisory board instead of a steering committee may have been more effective.
21. Some additional insight and understanding of the U.S. acquisition process could have been shared, and the obligatory comment that had the U.S. provided more than annual appropriation approval for the program, then there would have been more trust.
22. Better communication and training regarding cultural differences. Additional in country support for development items (however, this may drive some cost)
23. I believe that the fundamental key to a good working relationship is good, honest, and frank communications based on trust and an understanding of a common purpose and objective. I believe the U.S. could have enhanced its relationship by taking the MEADS program out of the shadow PATRIOT influences both technically and in its management structure. There was always doubt that the U.S. was going to follow thru with the program due to the PATRIOT influences.

How do you believe key personnel decisions, both government and industry, impacted MEADS program execution?

1. Generally good personnel assigned to the program. All took responsibility for program success, In some cases individuals assigned attempted to place national interests above the program but this may have been unavoidable in the program approach.
2. Everyone played the cards they were dealt.
3. Choice of PM's in the beginning poor. Perceived direction from PEO (M&S) to NAMEADSMA PM (U.S.) not helpful. Drawn out personnel actions associated with Italian employee significant distraction. Took far too long to fill U.S. positions. Orlando industry team initially appeared to be under lead and under resourced.
4. I think some of the leadership in Lockheed and on the European team at the IPT level was not strong enough. I got the sense that the "B" team was working some of the IPT lead early on. Previous GM (too close to the U.S. SC rep to build trust with partners, too willing to take the negative Army point of view of the program). New GM clearly improved program performance. When new president took over, MI performance improved markedly, so there was obviously something amiss in previous MI leadership.
5. Both positive and negative. Depends on the personnel.
6. Industry kept the Nations at arm's length not allowing for open communications
7. The big positives were personnel assignments made by the industrial partners and by the European armament directors. The big negative was not so much the assignment of personnel in the U.S. Army organizations but the marching orders that had to have been issued to them and the decisions that ensued from those orders. One decision that was particularly negative was having the inmates to run the technology transfer asylum, so to speak. A higher-level board would have been much better.
8. Don't know, but it would be naive to think that it didn't have an impact.
9. The NAMEADSMA was usually well staffed with good, well-meaning people. Sometime the U.S. project office seemed to hinder.
10. This was a mixed bag. There were both positive and negative key personnel decisions on both the government and industry sides.

11. U.S. was at disadvantage in senior Govt management, because U.S. GM, could not or chose not to actively look out for U.S. interests. European Directors and NAM employees actively supported their national objectives.
12. Lockheed chose their program manager for the wrong reasons (opted for operational over experience in acquisition).
13. Other than forcing workshare agreements to meet staffing needs (negative), it was hard to tell how personnel decisions impacted program execution. Main problem I saw was where the international cooperation agreement took the required power to execute program efficiently out of the working level hands within NAMEADSMA and industry. So, it was hard tell how effective personnel decisions were because in many cases they were not giving the authority to make decisions.
14. Some staff at the management level and above were below the normal quality expected at Lockheed MFC. This may have occurred for many reasons: difficulty of GE and IT in staffing a foreign joint venture, U.S. JV staff were taken mostly from Orlando but that site did not "own" the program and may been hesitant to offer up top talent. Some positions were assigned by nation and not selected based on best available candidate.
15. When progress was slowed and the program fell behind schedule - both the Government and Industry teams were strengthened with key changes in leadership both programmatic and technical. Additionally, the makeup of the technical teams was significantly strengthened.
16. In hindsight, since the U.S. decided not to procure MEADS, one could argue than personnel decisions played a role. They probably did, but I don't really have any specific opinions.
17. There will always be changes throughout the course of a large development program. I think industry selects leaders that will concentrate on program performance to ensure the company is successful. Government side may be more complex depending on experience, knowledge and support of the program.
18. Not familiar with personnel decisions.
19. I believe the issue is more related to the structure of the U.S. management more than the individuals themselves. I believe that had the structure been different, the influence or impact of some of the negative elements would have been mitigated.

Do you think the U.S. Army made the best decision for its soldiers and the U.S. taxpayers by exiting the program after the design and development phase?

1. Clearly the system could have been adapted to meet U.S. needs and alleviate U.S. concerns over dependency on foreign assets. These cost would have been less than any other approach to meeting the system performance requirements, but program schedules may have required adjustments to meet funding profiles.
2. It was time to cut our losses.
3. Absolutely not. Army decision to not field the system (affordability supposedly) killed the effort. OSD fought Congress and Army hard to keep the money flowing to complete D&D, but did not push Army to field system.
4. Given the current budget strain, I see no way the U.S. could have continued. If the Army is smart about harvesting and helping with the EFOP, all the sunk costs may not be lost.
5. Driven by finances and other decisions the U.S. Army Air Defense community made.
6. The technology was old for many parts which needed upgrading.
7. The best decision by the U.S. Army would have been to come fully aboard and figure out how to get Raytheon into the mix.
8. Sunk cost issue. If you subscribe to the "white collar welfare" theory of government programs, the money wasn't wasted, it contributed to the economies of all the communities involved where the program dollars were spent.
9. Now the Army intends to spends tens of billions to upgrade an aging Patriot system to a configuration less capable than MEADS is today.
10. Absolutely not. The strategic leaders that made that decision were systematically mislead with bias and incomplete information about competing alternatives for their investment. IBCS as an example promised 2009 delivery of composite tracking capabilities. Really?
11. I don't know; only time will tell. Modernization of aging Patriot will cost billions vs investing same amount in continued development of MEADS.
12. MEADS was going to cost an enormous amount to complete and then procure, and then buy an entire MSE inventory since neither the PAC-3 nor GEM missiles (totally almost 2600 missiles for U.S. now) could be used with MEADS.
13. Would have done so earlier with the fiscal liabilities. This was a terrible program.
14. In my opinion, we should have terminated earlier than we did.

15. The U.S. exited MEADS without a clearly stated strategy to fund and execute an alternative approach. This leaves the U.S. with an aging system that requires too much support and will be made obsolete before a U.S.-only system could be authorized, developed, and fielded.
16. Especially if they opt to not harvest MEADS technology after a \$2B investment.
17. Valid requirements remain on the table but the program extensions resulted in unnecessary cost growth.
18. On the surface it appears that the U.S. Army will not have a state of the art air and missile defense system for many years and at a higher cost. My opinion is that this should be evaluated further to determine the best path forward or to prevent this type of situation from happening again.
19. The U.S. Army should have made a serious attempt to refocus the program much earlier (e.g., after the decision to go with PAC3 interceptor, decision to adopt IAMD) or exited the program much earlier.

Should the U.S. Army harvest any pieces of the MEADS program?

1. Virtually every end item is superior to any currently in inventory. And due to the modular design they can be individually integrated into a control and management system for any nation.
2. The radar may be useful for various platforms.
3. The BMC3 system is the low hanging fruit followed by the surveillance radar.
4. Understand they are already looking at the MEADS radar as potential upgrade to Patriot.
5. Launchers, both radars. Absolutely. Should be a no-brainer.
6. Absolutely. the SR is very, very capable and could be integrated into the IAMD network and provide great early warning and/or situational awareness.
7. The SR would be of great benefit to other programs.
8. The U.S. Army should harvest as much as they can; however, they should have been in MEADS' knickers starting with the decision not go into production. As it is, MEADS will likely shut down before the U.S. Army has harvested jack - another not- jack situation.
9. Especially the two radars

10. All elements of the MEADS system can be incorporated into the IBCS network and used for networked IAMD. This would provide a much more robust capability than just having Patriot and Sentinel on the network.
11. U.S. Army should leverage technology it has rights to.
12. I think there is tremendous opportunity in this regard. What I am not sure, is how the decision to withdraw from the co-development will impact the executability of such options.
13. Within affordability constraints, a 360 degree, long-range Search Radar could augment U.S. AMD operations.
14. The low frequency surveillance radar would provide substantial benefit the Army's IAMD capabilities. It could free up PATRIOT radar resources from surveillance duty during BMD raids and could provide much improved long range 360 ABT surveillance for higher altitude targets (it is not much better than current radars such as Sentinel for low attitude ABT targets since they are terrain limiting)
15. Too much of a hodge podge with little value now.
16. Only in cases where it makes sense. It should not be forced for political reasons.
- 17.
18. Yes. This would not have to be done at the end item level, but elements of these items could be harvested and enhanced to meet U.S. needs.
19. The SR, possibly the MFCR and/or elements of the TOC (depending on the fate of planned PATRIOT upgrades and the IBCS).
20. Radar
21. The U.S. Army has expressed some interest and you would like to see the U.S. investment be used for elements of the system.
22. The two MEIs that are candidates for use in U.S. AMD are the launcher and the surveillance radar. The harvesting of component and algorithm technologies is problematic.

Given the withdrawal from MEADS, will the U.S. Army be less likely to encourage future cooperative international programs?

1. Probably not, however, the international partners will be much less willing to invest in joint programs with an unreliable U.S. partner.

2. I certainly hope we have learned our lesson. Allied development programs are doomed to failure; allied production programs will succeed.
3. The U.S. did not withdraw from the MEADS Program. The U.S. completed all of its financial obligations under the D&D MOU. MOU remains in effect until 2017. MOU Provisions for Third Party Transfer, Protection of Intellectual Property, Security, etc., stay in affect indefinitely. U.S. failure to go to the Production, Follow-on Development and Sustainment phase for MEADS coupled with declining defense budgets has already had a negative effect on future cooperative programs.
4. I think OSD writ large will be hesitant, but the Army will push back on any truly cooperative program (they'll still do FMS and U.S.-led cooperative programs)
5. Again, the nature of "cooperative" programs tends to make them more expensive. And when the U.S. isn't the final say on requirements, programmatic decisions, etc., I do not believe they will sign up for something like that again.
6. There are other cooperative international programs, such as JSF, but I doubt the partners have any substantive role in the technology unless they brought it to the table to start with. MEADS has the template for a true cooperative program but it requires major adjustments in the technology transfer area. Changes in tech transfer process are talked about all the time at high levels, but I doubt the low-level technocrats will ever relinquish their strangle-hold on the power the wield.
7. I don't know, maybe less likely. However, if money is what drove the original teaming/international arrangement, I don't think the U.S. is getting any "richer" to afford large programs, at least the Army seems like it isn't.
8. The Army will be less likely to encourage future international cooperative programs and the allies will be less likely to want to cooperate with the U.S. Army.
9. Army doesn't want to give up control of the programs
10. I don't think they will avoid encouraging them. I think they will insist on U.S. overall leadership.
11. Don't believe U.S. will support management by consensus with equal votes ever again.
12. Unknown...many of the international aspects of MEADS seem to have been poorly thought though such as having Italy responsible for the FCR (which required high technology derived the from the U.S. that could not be shared)

13. Too many compromises must be made in cooperative development programs. The best example of a good cooperative development program is MLRS and that's because the U.S. is firmly in charge.
14. With the shortage of funds, U.S. industry will continue to push Army program offices to leverage R&D funds through cooperative programs. They will continue to argue their technologies are not innovative and should be exported even though the technologies will be marked proprietary.
15. I do not know of any enthusiasm at the U.S. Army for joint development. This applies to Army-Europe, Army-Navy, and Army-Marines. Joint development appears to be driven from the top down (OSD to Army). The U.S. Army does support FMS of long-fielded products and focused modernization programs funded by foreign governments to enable such sales. This will likely continue.
16. Their decision created much animosity within the NATO community.
17. They certainly should or have a much better plan to address technology transfer, U.S. only data, etc. If you believe that the inefficiencies due to a cooperative international program cannot be managed, the U.S. cannot afford to waste our taxpayer dollars in the future.
18. It is unclear that the U.S. Army ever wanted a tri-national co-development program. U.S. Army is unlikely to enter another co-development program unless it is in charge of execution.
19. In part, I do not believe the Army is at all interested in "cooperative" programs. The Army is only interested in allowing other "partners" to participate in programs that it alone controls. Partners would be those that can provide funding in return for designated amounts and types of work. The concept of "cooperative" program decisions and control is not attractive to the Army. Again, this is the argument for OSD level management.

Would you have recommended cancelling the MEADS program?

1. Although the program may have benefited from changes in contract structures and addition of U.S. only activities.
2. Too much time and money invested with no return on investment.
3. We were not going to put the best available technology in the field to protect our troops.
4. Warfighter and American taxpayers deserve this system.

5. Technically we didn't cancel the program. We completed the de-scoped proof of concept and completed our obligations under the D&D MOU. We just chose to forego any follow-on production program.
6. We couldn't afford it - and all the other programs - more specifically, IAMD.
7. The relationship between the U.S. and industry was so poor with the contractor providing no solutions on how to meet cost and schedule the program was doomed.
8. I have already laid out my solution: fire three Army generals to get the attention of their replacements going forward. It should have been done long ago, but seeing that it was not, I would have recommended joining up with the Evil Empire and going forward with integration of MEADS MEIs into Patriot. Firing three Army generals would likely be necessary still.
9. We know PATRIOT is getting old and needs upgrading. However, the implication of cancellation is that the Army didn't like (or didn't understand) the way MEADS was going about the upgrade.
10. Re-evaluate the procurement decisions and/or, at a minimum, explore use of technology/engineering from MEADS.
11. Performance shortfalls could have potentially been addressed in U.S.-Only programs, although they would have required significant additional investment/testing.
12. Primarily based on current acquisition strategy and cooperative international agreement. If either of those changed, then I would have been opened for further discussion.
13. No. I would have restructured it.
14. In hindsight, yes. The program should have been terminated after PDV or restructured at that point. Most of the problems which would eventually doomed the program were known or could be predicted at that time. However, since it wasn't, I would have liked to have seen the U.S. honor its commitments and completed D&D as originally planned.
15. Since I am on MEADS this is probably the obvious answer I would provide. With my limited knowledge on the surface it appears the MEADS program could be completed in a shorter period of time and less money than upgrading Patriot or starting over.

16. I believe the U.S. is at a point of almost realizing a big step forward in operational capability and flexibility. To complete the program would allow it to incorporate these new methods of operation and save both money and force structure.

What factors led to the cancellation of MEADS?

1. Extremely poor management
2. Management
3. Affordability and competing with IAMD and PATRIOT
4. Although other factors were claimed, they were really not the causes.
5. Bad acq strategy, bad execution, needed more companies and their technologies involved, poor management, poor vision,
6. Contractor under performance just opened the door to all the other factors.
7. I'm answering why I believe the U.S. decided to end its involvement in MEADS after D&D. The Army (specifically the Air Defense BOS) could not afford to keep all the programs (PATRIOT, IAMD, JLENS, MEADS, etc.). There is already too much invested in PATRIOT and it is deployed and viable for years to come. The Army Air Defense community has stated that IAMD is their number 1 priority. So, it was the remaining programs that had to be impacted. The U.S. Army has decided that a combination of other U.S. systems already does or will meet many of the MEADS requirements. Other requirements, although valid, were victim of trade-offs necessary due to funding constraints.
8. The U.S. Army wanted a U.S.-only solution to their AMD needs and were hell-bent to stay that course, shots in both feet or not. The Armament director oversees so much waste in his acquisition process that he obviously just let the Army go their own way without providing the adult supervision that the Army Acquisition Corps needs so badly.
9. The combination of the Army wanting a U.S. only IBCS program and the Patriot program/Raytheon fighting for the preservation of their work killed MEADS.
10. Cost to transition over 15 years from Patriot to MEADS was huge. Cost to upgrade MEADS to U.S. standards was significant.
11. Keeping program sold and sponsorship within U.S. was lacking.
12. Other - U.S. Army did not want EU Allies influencing or having a say in their decisions related to AMD moving forward.

13. Funding and politics led to unstable program funding - which impacted Contractor performance.
14. I think funding, politics and program performance played a big aspect. Unfortunately some of the yearly funding and delays were not caused by industry and had some impact on the performance of the program. There may be some new driving requirements that i am not aware of but i think the fundamental reqts for MEADS have not changed. Technology maturity has been demonstrated during the FT-2 event.
15. I believe the main factors for MEADS cancellation are all fundamentally grounded in PATRIOT competitive agendas and a management structure that allowed them to dominate politics and resources over the course of the program. I believe the level of performance in the MEADS program has been comparable or better than that of other U.S. program that are continued.

Why do you believe MEADS was cancelled?

1. The reluctance of the U.S. Army to fund significant Missile Defense work within their more constrained budgets, the concerns of the U.S. Army over the dependence upon foreign design and production of assets, the concerns of the U.S. Army over possible compromise of U.S. only technological edge.
2. Political frustration and return on investment.
3. Driver was politics and undercutting by Raytheon/Patriot mafia. Funding cuts result of the aforementioned.
4. U.S. couldn't afford the production, so couldn't in good faith sign on for the Production MOU.
5. Poor performance by the contractor in both cost and schedule, poor relationship between the U.S. and NAMEADSMA, and poor relationship between the U.S. and the contractor.
6. The U.S. Army wanted a U.S.-only solution to their AMD needs and represented the MEADS program so shoddily in front of Congress that Congress had little recourse but the cancel it. Surely you remember the Army General who went to one of the meetings in Europe and recommended canceling the program then and there. He would have been my third general to fire, the other two having been long gone before him.
7. Politics.

8. Mostly "political" with the funding as a catalyst
9. Funding, program structure, management structure, technology transfer, GFE requirements
10. I believe it was an ill informed decision biased by the future system being imbedded in the legacy project office. That was a bad idea.
11. I can't be sure what all contributed, I was told funding.
12. Affordability and performance shortfalls during a major U.S. recession. Politics.
13. Politics and funding churn.
14. Lack of progress and a window was open allowing the U.S. to gracefully exit the program. It would have happened sooner without the liabilities.
15. U.S. lost confidence in program and funding increment to salvage it was too high.
16. The Army was sold on IAMD and could not afford it, JLENS, Sentinel upgrades, SLAMRAAM, and MEADS. So, the Army chose IAMD and to upgrade PATRIOT and Sentinel. As we know, the Army chose not to pursue MEADS, JLENS, and SLAMRAAM.
17. Priorities based on available funds for modernization. The U.S. decided to accept the risk associated with not fielding new AMD capabilities.
18. Several factors: Delay to program requirements, government yearly funding and technology transfer created inefficiencies and delayed program milestones (placed U.S. Army in difficult position to maintaining Patriot in parallel with MEADS completion). U.S. future defense spending profiles created a situation that both programs could not be maintained. Political pressure to maintain Patriot (Raytheon) as contractor going forward.
19. The U.S. Army has embraced the IAMD program and MEADS is not consistent with IAMD. The MFCR is net-ready for IAMD, but is a European product. It is also perceived to be lacking in certain key functional areas. One of the key cost-reducing attributes of MEADS, i.e., need for fewer personnel, is not consistent with the U.S. Army's desire to maintain force structure.

Was there a strategy that would have helped keep MEADS funded?

1. U.S. Led with Italy and German participation.

2. I think the Department led by OSD made a valid argument for continued funding of the MEADS program. Only hammer that would have worked would be to withdrawn the money from the Patriot line to fund MEADS. Not enough political will.
3. If U.S. could have convinced partners to stop the BMC4I work and rely on IBCS we might have had a chance, but not likely.
4. Not anything formal that I know of. Any strategy would have, by necessity, involved the cancellation of IAMD. And the U.S. Army was not going to let that happen.
5. The strategy by the U.S. Armament Director to fire as many U.S. Army generals as need to get the program on track would have worked. Leadership comes from above as well as the lack thereof. Lower-ranking officers want to succeed in their careers and will do what their superiors expect of them.
6. A basic decision to procure at the expense of constant and long-term rework on Patriot. Also NAMEADSMA and MEADS International should have worked better (in the beginning) with the IMSD efforts.
7. Strong Army support throughout D&D and an organizational construct that excluded LTPO from MEADS decisions would have gone a long way. Had the Army found a way to architect a networked system comprised of both Patriot and MEADS elements so one program wouldn't go away there wouldn't have been institutional opposition to MEADS from the beginning.
8. U.S. control of management decisions, and key technology developments.
9. Keeping the U.S. MEADS Project as a direct report to the PEO would have ensured a balanced perspective on performance and program issue resolution.
10. I have no idea.
11. Not in 2011 when decision was made; fundamental management structure changes would have to have been made at beginning of D&D; as well as workshare changes to reflect realities of U.S. tech transfer concerns.
12. Going to test more quickly rather than Big Bang theory.
13. Not close enough to know.
14. Only if the partner nations agreed to pick up the lion's share. Even so, the U.S. would have had to push for a much more tenable management structure.

15. Acknowledgment of program issues and technical concerns discussed with partner nations when they occurred along with a willingness of three partner nations to re-look at acquisition approach and needed capability to address those concerns. Strong prime contractor team that would be willing to lead and suggest alternative solutions to program issues rather than just blindly following their contract.
16. Unknown. I came too late.
17. When John Young recommended the JSF model. Prime/Sub relationship should have been implemented for the post CDR Phase. That strategy may have kept U.S. in game, but Raytheon politics would have still factored into the game.
18. Worked to have gotten IAMD canceled and defeated the PATRIOT FMS sale to UAE. Short of canceling IAMD, worked to persuade that MEADS was the best fit for the IBCS instead of PATRIOT.
19. Accelerated delivery of capability.
20. Early changes to program plan and yearly funding profiles needed better understanding to determine U.S. and European impact to existing system maintenance. Potential to add other NATO countries during development to offset some of the development increase so that the U.S. could continue both Patriot maintenance and MEADS finalization. Better look and technology transfer to avoid development inefficiencies and delays.
21. Change the management structure to bring it under U.S. control (outside LTPO). Realign the requirements to be consistent with the current threat and IAMD architecture. These changes may not have been palatable to European partners.
22. I believe that the overall U.S. acquisition strategy should have reflected the requirements defined by the Users and provided a clear differentiation between the future of PATRIOT in the near/mid-term and MEADS in the long-term. This acquisition strategy should have been the basis for all decisions/funding relative to PATRIOT, BMC4I, etc. This acquisition strategy should have been managed at the OSD level and not allowed to morph into multiple competitive programs that diluted resources. Once this was done the strategy should be to practice the Art of Adherence--Sticking to It as long as the program execution is reasonable.

Who were the key stakeholders that led to MEADS cancellation?

1. Raytheon
2. Army Staff
3. Enough said. Industry lobbyists

4. OSD - negotiated an MoU that tied the hands of the developers and provided workshare based on politics rather than capabilities.
5. Requirements Community - I believe they piled too many requirements on one system without allowances for trade-offs. This drove design costs, test costs, etc.
6. NAMEADSMA - I believe the very senior leadership, while visionary in some cases, refused to accept that concepts and designs either could not be developed affordably; and if developed, could not be produced. Example - the MRDM. When I have a senior leader stating how much better the MRDM was than anything the U.S. was offering, and the basis for that was the MRDM requirements themselves (and only that since there was no HW to support it), that shows what I consider blind commitment. I'm sure I have some of that as well.
7. The U.S. Army and its LTPO are the reasons for MEADS being cancelled. The U.S. Army decided that it wanted a U.S.-only solution for their AMD and it kept LTPO's nose to the grindstone to make it happen, which necessarily required MEADS to be cancelled.
8. Lack of support from the user and clear opposition from Patriot supporters (Raytheon and LTPO) were the key reasons why the U.S. Army lost interest.
9. It's all about priorities and money.
10. The establishment of the Army IAMD program as the Army's Air Defense number one priority along with overall Army funding cuts doomed the MEADS. These were in addition to the already poor program execution and the inherent technology problems from the international arrangements (FCR with Italy).
11. I'm too far removed to know for sure. Had I remained PEO up to the point of cancellation, I would have led the charge.
12. All were responsible including partner nations due to their unwillingness to change program direction when needed. All chose to meet contract schedule and cost metrics over technical requirements. All chose to adhere to cooperation agreement and workshare restrictions even when program issues needed a different solution.
13. My knowledge here is indirect. The U.S. had made its decision prior to my arrival on the program. I include the Prime Contractor because the contractor had poorly managed portions of initial development.
14. Program schedule and cost growth were a convenient excuse as the cover story for a U.S. exit. If you want to factor the cover story stakeholders into the mix add NAMEADSMA and the Prime Contractor.

15. I think the primary stakeholders that led to MEADS cancellation was on the U.S. side. Either due to difficult decisions on trying to maintain both programs with limited U.S. future defense budget

What are the most important lessons learned from the Army's involvement in the MEADS program?

1. Concerns over dependency on foreign assets and design, and concerns over technology control must be adequately addressed up front before embarking on a joint international development program.
2. Never have a cooperative program where each country has an equal vote. Should be U.S. Led with international participation.
3. Don't do systems development of mainline U.S. systems with allies; wait until production starts to involve them.
4. The Service component must be fully on board for an international cooperative program to succeed.
5. It's difficult to force a service to do something they don't really want to do. Sad as it is to say, you probably have to give a little funding (some kind of partnership) to all the major industry teams to keep them from fighting with each other -- the Missile Defense National Team is an example, but a bad one. We spent a lot of money on that and not sure what product came out...but it did stop a lot of the industrial noise for a while.
6. Do not give away responsibility for management/development/leadership of a program unless you're also willing to give away cost/schedule/performance.
7. Bring in the stakeholders early with a voice. Do not keep decision makers at arm's length
8. The U.S. Army demonstrated a failure in leadership in that it did not carry out the directions of the Armament Director. Or did it? Lesson learned is that OSD cannot allow any of its services, especially the Army with its not-jack record, to march to its own agenda and squander funds and OSD's integrity. Technology transfer has to be addressed at high enough level to be effective, not at nit-pickier level. Leaders in the service responsible for the use of the product must be assigned and properly instructed, monitored, and corrected in a timely manner.

9. Development of a major weapon system is never easy and politics and people matter more than technical achievement.
10. When you enter into a cooperative agreement with our allies it's like a marriage. If you are not prepared to stay together in sickness and in health, for better or worse, then don't say "I do".
11. The current program structure is not a model for future cooperation
12. I would offer two: One - The U.S. Army needs to have primary authority in the program. Two - Never put the future investment at the mercy of the legacy project office.
13. The U.S. should not be a partner in co-development of a system with foreign partners.
14. Have a clear leader in joint programs. Align industrial workshare to tech transfer realities.
15. When CAPE says it will cost \$6B, don't budget for \$4B to get buy-in and then act surprised when it overruns.
16. When establishing an international program, fully think through the technology aspects (such as having Italy develop the FCR) and all of the associated costs (such as having to replace the entire U.S. inventory of PAC-3 and GEM missiles).
17. Need strong consistent sponsorship and focused keep sold strategy.
18. Don't enter cooperative DEVELOPMENT programs with multiple nations. International cooperative programs on mature systems are okay but there's too much at stake and too many complexities to try and develop a major acquisition program with that many cooks in the kitchen.
19. Developing and fielding an advanced weapon system via an international cooperation agreement is more expensive than it appears initially. Careful consideration should be given to technology transfer limitations before entering into binding international agreement. If the U.S. feels the technology required is too important to transfer, then international development programs should be avoided. Fixed priced contracts for development programs should be avoided. Equal authority by all nations regardless of funding contribution should be avoided.
20. Get agreements in writing. Follow up face-to-face. Know who the real decision makers are at all sites. Make sure that the org structure meets the program need, enforce it, and maintain it. Replace weak performers early. They are unlikely to get out of and stay out of trouble.

21. 1. Organization Structure and Decision Making Process are critical to the success of a trans-Atlantic cooperative development program. 2. Reporting structure of a program should not be burdened by the conflict of a new development program being placed under the direct control of the program office for the existing program of record that it is targeted to replace.
22. An international co-development will only work if the participants are all fully invested in its success (over time, not just when funding is plentiful, but over the life of the development when funding becomes scarce). This is at odds with the concepts of noble workshare, the FD/TT (which have to be reconciled at the outset and no major changes forced on the program after that), legacy systems and organizations (i.e. the U.S. Army User, PATRIOT, etc.) and with other new programs competing for scarce funding (i.e. IAMD). The bureaucratic inertia and friction imposed by the complex management structure, both on the government side and on the contractor side increases costs and lengthens schedules. A program manager should have more control over his program. Finally, independent advisory panels (i.e. sensor panels) should be conducted earlier in the PDV phase, perhaps prior to source selection, to insure that some major requirements are not overlooked. This may be a problem rooted in the capability based acquisition approach. MEADS may be as much a casualty of capability based acquisition approach as anything else.
23. Program commitment, stable funding, executive management with understanding of partner requirements and processes are critical for a successful international program. Should not have consolidated management under a legacy program like LTPO - loss to the program due to prioritization of current capabilities over future.
24. 1. Tri-national programs are complex and aspects due to technology transfer, U.S. only data, government funding profiles, etc. are critical to understand up front and plan for to enable achieving the benefits of a co-developed international program. 2. U.S. accountability in communicating cancellation and replacement programs (are the U.S. taxpayers paying more at the end). 3. How does the political front really impact the decisions being made and are they in the best interest of the U.S. taxpayers?
25. Tri-national management structure with authority vested in the steering committee rather than the GM may not be effective. The implications of technology transfer restrictions need to be explored in detail before embarking on co-development of an advanced technology program. The user community needs to be fully engaged with the program to ensure proper trade-off between operational requirements and affordability.
26. Base major programs on sound operational requirements---done. Incorporate program acquisition strategy into overall mission area acquisition strategy--not done. Don't allow inherent conflicts of interest to continuously nibble away at the

program--not done. Provide a management structure that maximizes success by controlling all subordinate layers--not done. Provide clear and unequivocal guidance to industry.