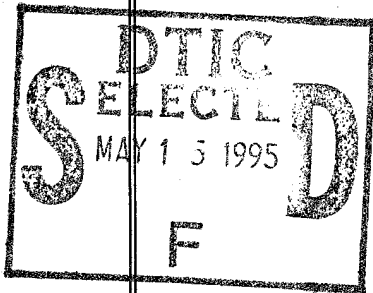


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Weapon System *Jeopardy!* The Answer is: "The C-17"



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Weapon System *Jeopardy!*
The Answer is: "The C-17."

by

Mrs. Barbara A. Westgate

This paper examines the requirements generation process and how requirements, once developed, can be perpetuated and remanifested across a myriad of weapon systems. Requirements and commitment to the weapon system program have great influence in the success or failure of the acquisition program.

By probing the chronology of the C-17 program, insight into who had control of the program, who influenced requirements and the impact lack of commitment had on the C-17 program will be evident. These issues/challenges had to be resolved during all acquisition phases of the program.

After reviewing C-17 programmatic events, five impediments to successful acquisition program completion were identified: competing values; complacency/short time horizon with a desire for instant gratification; uncertainty; dispersed decision-making; and, competing interests. The resultant impact on the C-17 and future acquisition program implications are summarized.

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Introduction

As in the popular game show *Jeopardy!* (110), the contestant must now come up with the correct question. After ringing in, I would respond: "Alex, what are the AMST, the YC-14, the YC-15, the C-X, the C-5N, the KC-10 and the C-17?" I would be ruled correct. Why you ask? All of these aircraft shared requirements from, or impacted the development of--the C-17.

This research paper examines the requirements generation process and how requirements, once developed (not accounting for goodness or badness of the requirements), can perpetuate and remanifest themselves across a myriad of weapon systems. Requirements and commitment to the requirements, or, for that matter, the weapon system program, have great influence in the success or failure of the program.

By examining the chronology of the C-17 program, from its inception, will show great insight into who had control of the program (it was not the program office), who had influence over the program requirements (again, not the program office, nor the user!) and the continuing influence lack of program commitment has had on the C-17 program.

The chronology displays the event and may include a vignette to amplify information. The event may also include my commentary on the event, the vignette, or, the integration of several events. My comments/opinions are generally at the end of the event.

After reviewing thousands of pages of documents, to include: Program Management Direction (PMDs); memoranda; meeting minutes; requirements documents; published articles and videotapes; I am amazed that the aircraft performs as well as it has in flight test and field operations.

A recent lecturer stated five impediments to successfully performing his job. At the conclusion of the lecture, I realized these same impediments influence program manager's performance. These impediments are listed in Figure 1 and should be used as a point of

reference when reading the chronology. These obstacles are not systemic to the C-17 program, but to acquisition programs in general. However, at the conclusion of the timeline, I will summarize these points as they relate to the C-17.

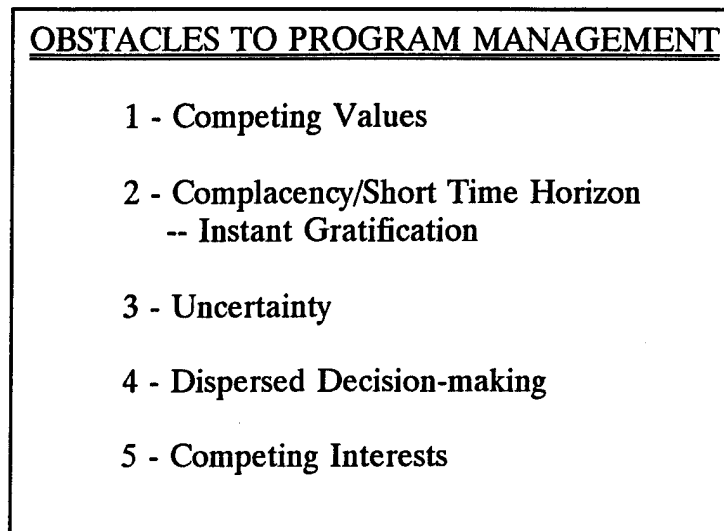


Figure 1

This paper assumes that the reader has a working knowledge of acquisition processes and acronyms, therefore lengthy process explanations will not be provided.

Lets see how the game show proceeds...

In The Beginning...

The question launching this 25 year saga was: Can the best attributes of jet aircraft and propeller aircraft be combined into one airplane powered by jet engines, yet have the ability to land on short runways?

A 1963 symposium sponsored by the New York Academy of Sciences addressed this very issue. At the conclusion of the proceedings, NASA, in conjunction with several research laboratories, began studying propulsion lift. This technology and other proposed technical solutions laid the groundwork for the initiation of the Advanced Medium Short Take-Off and Landing Transport (AMST) program in 1972. (41:26; 80:16)

The AMST program was a new approach for acquisition programs. It instituted the prototype, fly-before-you-buy policy invoked by the former Deputy Secretary of Defense David Packard in 1971 as a remedy to Total Package Procurement, a trouble plagued contracting method in vogue during the 1960s. (76:23) The principal objectives of the AMST were to design, build and evaluate prototype aircraft to demonstrate new, tactical airlift technology. Intended for deployment in the 1980s, the AMST was to modernize the tactical airlift force with a C-130-class, low cost Short Take-off and Landing (STOL) aircraft. The AMST was to have eliminated the payload size and weight constraints of the C-130s and save the expensive C-5s from missions to austere runways. The AMST's tactical, or intra-theater, mission was to fly outsize cargo (like the M-1 tank which was in development) and personnel to the battle area, or close by.

Design-to-Cost was a key element of the AMST program. DoD was looking for a unit flyaway cost of \$5 million for the 300th aircraft (in 1972 \$). (76:24)

According to Hans Mark (former Secretary of the Air Force), midway through the AMST development program the Air Force asked two crucial technical questions: "Might it be possible to meet both strategic (inter-theater) and tactical (intra-theater) airlift requirements with one aircraft? And, could propulsion lift technology provide both good range-payload performance in-flight and short runway performance on the ground?" (41:27)

It is those two questions that have always and continues to haunt the C-17 program.

Chronology

10 Nov 1972 AMST contracts awarded to Boeing and McDonnell Douglas for 2 airframe prototypes (using existing engines - see lower paragraph), as a potential replacement for the C-130. Both contractors were given broad design latitude and encouraged to develop design ingenuity in meeting the aircraft's performance goals (performance goals will be discussed in 1973). The contracts awarded emphasized design-to-cost (DTC) efforts to reduce cost and performance risks for the production aircraft. First flight scheduled for 1974. Requirement for 20,000 pound thrust engine.

Engines for AMST 3 years behind airframe. Congress felt airframe funding should be delayed until the approximately \$70M engine was developed. After considerable "funding" bickering between congressional committees - USAF stated existing engines could be used at an approximate funding increase of \$170M for development program. (74:14)

The McDonnell Douglas YC-15 contract provided for cost sharing with a ceiling of \$123.9M. The USAF's limit of government obligation (LOGO) was \$100.3M. The remainder was to be covered by McDonnell Douglas. In return, McDonnell Douglas was entitled to one aircraft to explore technology application in the commercial sector. (76:24)

The Boeing YC-14 contract was a cost plus fixed fee (CPFF) arrangement for \$105.9M.

AMST program had two-phased approach:

Phase I - (\$2.5M to each contractor) to perform in depth design performance and cost analyses. USAF to review results against its own cost validation to decide whether or not to proceed with Phase II. (6:6)

Phase II - The Packard "Fly-Before-You-Buy" procurement strategy. (\$95.2M to Boeing/\$85.9M to McDonnell Douglas) 44 months long to design, build and test two prototype AMSTs each. After extensive testing, a decision would be made as to which aircraft meets operational and cost requirements and a full production contract would be issued. (6:6)

Important Note: Boeing design had 2 high thrust engines above wing while McDonnell Douglas design called for four engines mounted below wing. Historically USAF has always preferred 4 engines -- A design solution bias from the beginning? How "free and open" was the competition?

Contractors asked to respond to RFP for AMST - Lockheed, Rockwell, McDonnell Douglas, General Dynamics, Boeing, Grumman, LTV, Bell Aerosystems, Fairchild.

May 1973 Numerical designations given to AMST prototypes. Boeing YC-14, high-wing, two engine aircraft utilizing upper surface blowing to produce lift. Boeing YC-14 - 132 feet long; 48 feet high; wingspan 129 feet. First flight (modified) was expected in Aug 76. USAF felt the two engine design was more susceptible to battle damage. (80:16)

McDonnell Douglas YC-15, a high-wing, T-tail, utilizing four engines and externally blown flaps (a concept investigated since the mid-60s and previously mentioned). McDonnell Douglas YC-15 - 124 feet long; 43 feet high; wingspan 110 feet. First flight (modified) was expected in Apr 76. (76:26; 80:16)

Performance Goals - The central, non-negotiable performance element of the AMST was the dimensions of the cargo box -- 11.3 x 11.7 x 47 feet; large enough to accommodate Army Howitzers and tanks. A contract goal was the ability to handle 27,000 pound payloads from an airfield no longer than 2000 feet in hot day conditions. Conventional take-off loads from 3500 foot runways increased to 53,000 pounds. The mission radius was 400 nautical miles and a ferry range of 2600 nautical miles. Both contractors announced they could meet or exceed these specification requirements/goals. (76:25)

End of 1973 Both contracts had to be renegotiated due to congressional funding reduction from \$65M to \$25M for FY 74. Reduced funding led to a 10 month slip for first flight and attendant program cost increases.

Original USAF cost estimates projected total program costs of about \$200M, with program completion expected by Nov 1975. Program estimates were updated to \$229.1M total cost and a new program completion date of October 1977. (76:24-25)

After congressional funding reduction, USAF considered cutting the program in half, selecting a single company to complete design and went as far as to request a proposal from both contractors in Feb 74 for single contractor program completion. No further action taken. (73:567)

Late 1974 Service emphasis began to turn to strategic airlift; the tactical AMST could take on a new role. Could programmatic support be waning? What is the "real" requirement? General David C. Jones (former USAF Chief of Staff) stated, "...we realize that AMST can provide an added capability to augment strategic airlift while still meeting our tactical airlift requirements. Therefore, AMST becomes much more important now than when originally considered in only its tactical role." (76:23)

March 1976 Lockheed Georgia claims their stretched STOL version of the C-130 would cost half of the projected YC-14/15 costs; burns less fuel; has the capability for in-flight refueling (increased range to over 3200 nautical miles). Their most

interesting claim is their version can lift 30,000 pounds of cargo off a 1530 foot runway. (This equates to 3,000 pounds more cargo and 470 feet less than the AMST spec.) (37:202)

- Aug 1977 AMST flight tests completed. Each plane completed 950 short take-offs and landings and had a combined flight time of just over 1400 hours. (22:46)
- 26 Oct 1977 Lockheed submits unsolicited proposal to Dr. William J. Perry (Director of Defense Research & Engineering (DDR&E)) to buy additional C-5s (this purchase would be in lieu of AMST). Lockheed is persistent and we will hear this proposal again.
- Mar 1978 Army re-endorses the need for intratheater lift and the need for the AMST to carry the XM-1 tank. When informed that the per copy cost of the AMST was approximately \$25M (increase from original program projection of \$5M), Senator Nunn retorted that instead of AMST, a tank that can fly should be developed.(54:12) This was a golden opportunity for an early, potential expanding roles and missions for USAF--all flight vehicles--including flying tanks!?!

At this same congressional hearing an alternative to AMST was presented. It was the Advanced Tanker Cargo Aircraft (ATCA) which was a DC-10 derivative (program initiation FY 79). Later, SECDEF Harold Brown wrote that the USAF should test the B-747, L-1011, C-5 and AMST against the ATCA prototypes to become a wide-body platform to carry cruise missiles (another new requirement?).

- Oct 1978 FY 79 appropriations bill directs USAF to complete source selection for the AMST, but not to start full-scale engineering (\$5M). (Carter administration eliminated program from FY 79 DoD budget.) Language also directed DoD to investigate alternatives to AMST. A pattern of lack of commitment is starting to emerge. (24:18)
- Dec 1978 Merry Christmas. AMST program killed. Originally funded at \$25M in the proposed FY 79 budget, the White House and OMB zeroed funding in final deliberations prior to Christmas.(20:15) President Carter's efforts to cut military spending won support in the Pentagon where they were having second thoughts about developing an airplane with a one-dimensional mission (tactical airlift). USAF and both contractors hoped to enter full scale engineering development (FSD) in FY 79 (target production run - 277 aircraft). DDR&E had performed an independent study and determined that the actual cargo to be carried and the number of austere fields required was questionable. This will become a recurring theme, regarding to the two crucial questions previously mentioned. (Sixteen years later the Project Air Force Rand study and the NDAA program are still trying to answer this question.)

In killing the AMST, analysts (who's in charge?) convinced DoD and OMB that the USAF had no AMSTs and the only reason the C-5 had no airdrop capability was because the Army and the USAF had decided not to exercise that capability which had been built into the aircraft in order to preserve the C-5s limited wing life.

Contractors hoped to license AMST aircraft to European countries when program was cancelled (limited funding killed their chances of recouping development costs because licenses would not be granted for on-going programs). Contractors felt they could sell to Europeans on the original schedule USAF had planned -- contracts by mid-78, production deliveries in 82 and IOC in 84. (20:16)

Critics of the AMST program believed it was a program in search of a mission based on the widely divergent requirements through program evolution:

Initiation: Carry 27,000 pounds of outsize cargo on a 400 nautical mile radius in hot weather conditions;

Mid-program: Military Airlift Command takes over the tactical airlift function -- expanded mission -- now carry 53,000 pounds on a 2,600 nautical mile mission. It should be noted that the design weight of the M-1 tank was 53K pounds, yet during development the weight hovered around 60K lbs. This aircraft could not meet either the inter- or intra-theater lift requirement!

Finally: Carry 120,000 pounds on a 500 nautical mile mission (20:16)

At the time the AMST was cancelled, the Soviet Union began flight testing its new STOL aircraft, the An-72, which looked exactly like the YC-14. (20:15) (The An-72 was subsequently fielded with a military, commercial and Arctic version. The Soviets were the first to actually implement dual use technology! Since the An-72 is still in service, the Soviets must have been comfortable with our blown flap propulsion technology--yet we are compelled to still study it!)

Aug 1979 Military Airlift Command Statement of Need (SON) released for intertheater airlift vehicle; there was no reference to intratheater transport which had been the original Army requirement.(105) The role of User and Customer is becoming a little more clouded in relation to the requirement for an airlifter. Now looking for a replacement for C-5 and C-141 aircraft in the 1990s. No longer requiring a replacement for the C-130s?

Nov 1979 USAF and Army leaders are pressing to begin AMST FSD (full-scale engineering development) for an Initial Operating Capability (IOC) ahead of the scheduled FY 90-91 timeframe.

USAF Chief of Staff (CSAF), Gen Lew Allen tells staff to find \$90M in FY 81 to complete AMST source selection for a higher payload, longer range aircraft

even though the SECDEF reduced funding, stating a critical need for airlift capacity. CSAF tasked AFSC to develop a C-X/AMST acquisition strategy to expedite the program. (65:48)

\$205M+ spent on program prior to suspension at the completion of flight test in mid-1977. The USAF had requested \$25M for FY 81 to begin FSD, which was cut by Program Budget Decision (PBD) to \$15M. Other funding options held in abeyance to evaluate other expanded mission roles (cruise missile carrier). A continuation of the "study" cycle.

These actions present the USAF with a dilemma--ignore Congress' directive to complete source selection; or, proceed with an unapproved program to acquire an aircraft with no definition. Since July the USAF was pursuing an aircraft with a "strategic airlift augmentation capability" for the AMST which extended its range and payload while maintaining its original tactical design requirements.

Change--again: the C-X/AMST is a bigger plane than either prototype and of course, the ever-changing mission parameters:

Old AMST: 120K payload for XM-1 tank, carry 500 miles;
NEW: carry same load 1300 miles

Alternative Mission Old AMST: 40K lbs 2600 miles;
NEW: carry same load 3300 miles

The result: C-X/AMST will require bigger wings, more powerful engines and have a significantly higher gross take-off weight.(65:48) Do these significant mission requirements require source selection to be reopened and negate the previous program developments since the baseline requirements are so significantly changed? What is the possibility for contractor protest? What impact do these changes have on program schedule and risk? Do we see legacy requirements being articulated that will haunt us later?

Dec 1979

SECDEF Harold Brown directs USAF to terminate AMST source selection (against congressional direction) and to begin on a new *strategic* airlifter, the C-X, which has *some* tactical capability. The old AMST was a tactical airlifter with *some* strategic capability. The SECDEF said that \$80M would be provided in the FY 81 budget to initiate the program. The SECDEF said that approximately \$1.2B would be programmed FY 81-FY 86 for program completion. Program direction and requirements were: IOC, FY 87. (63:12) Be prepared to brief program plan to Congress Jan/Feb 80 showing firm IOC date. Of particular interest were requirements not provided by the SECDEF. Requirements like cargo and mission range.

USAF leadership attempt to define a program on extremely vague guidance, yet survive the scrutiny of Congress who demand a Mission Element Needs Statement (MENS) and funding profiles providing great program detail.

USAF hoped to have RFP on street by spring. Industry reaction--snickering. Industry experts felt the only way the USAF could force this program would be for the SECDEF to manage the program; similar to McNamara's personal program management of the TFX effort--a program that was controversial, encountered schedule slippages, massive cost overruns and a myriad of technical difficulties (sound familiar?). McNamara overruled USAF and Navy source selection recommendations. By way of postscript, the Navy withdrew from the TFX program. (63:12)

01 Dec 1979 C-X Task Force established in the Pentagon (precursor to PEO organization?)

10 Dec 1979 PMD released providing direction to begin C-X program. (103) The unique aspect of this PMD, which would have far-reaching consequences, was at the conclusion of Milestone 0 (Concept exploration), program activities would proceed immediately to Milestone II (Full-scale engineering development) thus skipping the demonstration/validation phase. It was felt that the C-X technology had been proved on the AMST program, therefore the C-X was a low risk program. Interestingly enough, years later cost, schedule and performance problems would be blamed on the high risk nature of the program. Hmmm....

17 Dec 1979 Draft Mission Element Needs Statement (MENS) for C-X forwarded to OSD.

04 Jan 1980 System Program Office (SPO) organized at Wright-Patterson Air Force Base, Ohio.

14 Jan 1980 Sources Sought Synopsis for C-X published in Commerce Business Daily (77:16). USAF looking for a highly fuel efficient follow-on to C-5/C-141. Three responses received: Boeing, Lockheed-Georgia and McDonnell Douglas. (Program for 16 aircraft; IOC FY 87)

The Boeing plane resembled the AMST YC-14; Lockheed's looked like a smaller version C-141; and McDonnell Douglas' was a larger version of the YC-15.

28 Jan 1980 PMD #2, change IOC to Sep 86 (one year earlier than SECDEF requirement) and revises program activities leading to FSD. (103)

05 Feb 1980 Lockheed letter to USAF states they will require 6 months of pre-contractual engineering work in order to meet IOC date. (34:82) (Translation: give us a head start so we can be ready on time--we hope.)

- 28 Feb 1980 Draft C-X RFP released to industry. PMD #3, changes IOC to Sep 85. (62:31; 102; 103)
- 03 Mar 1980 ASD (PA&E) sends letter to USAF questioning C-5 vs C-X. (9:A4) 15 years later we are still asking the same question.
- 13 Mar 1980 SPO sends letter to the three contractors requesting an increase in the DT&E/IOT&E aircraft from 3 to 5, while decreasing the time to IOC and keeping FSD on the same schedule. Interesting risk management technique.
- 20 Mar 1980 HASC R&D Committee votes to kill C-X program in favor of sealift (33:174-175).
- Mar 1980 YC-14 and YC-15 complete last mission; arrive at Aircraft Maintenance and Regeneration Center, Davis-Monthan AFB, Arizona (aka - the Boneyard). (9:A1)
- 15 Apr 1980 Aeronautical Systems Division restructured. System Program Director (C-X) becomes Deputy for Airlift and Trainer Systems.
- 18 Apr 1980 PMD #4, changes RFP requirements so that contractor can submit alternative proposals for existing aircraft, derivatives, or new aircraft that can meet C-X requirement, if more advantageous to government. IOC returned to Sep 86. (103)
- 26 Apr 1980 New PMD (#5), revising previous PMDs and requires RFP to be released by 01 June. (103)
- 29 Apr 1980 HQ AFSC sends memo to HQ USAF/RD-CX stating concern with alternative proposals (requested from contractor via PMD #4) on program schedule. HQ USAF/RD-CX 13 May 80 response states they will make "no change to PMD." (34:117)
- 27 Jun 1980 DoD tasked by Congress to produce Congressionally Mandated Mobility Study (CMMS) to validate need for C-X and evaluate sealift options. Navy participates in study; but not as a voting member. (98)
- 21 Jul 1980 PMD #6, more direction (tweaking); RFP release date now 15 Aug 80. (103)
- 22 Sep 1980 PMD #7, new revision (clarification) to RFP requesting alternate proposals; modifies systems specification. (103)
- 29 Sep 1980 HQ MAC/CV (rather than HQ AFSC?) responds to Lockheed correspondence regarding concern/risk with fixed price contracts and states, in essence "noted, but too bad." This begs the question, why is the User responding to a contractor, rather than the acquisition command who is responsible for determining the contractual instrument to be used based on program risk?

- 15 Oct 1980 C-X RFP formally released to industry (4 1/2 months late).(102) Contractor responses due to government by 16 Jan 81. (PMD #8 changes RFP release to this date.) (103)
- Oct 1980 After the RFP is released, Dr. Perry (DDR&E) and Verne Orr (SECAF) personally call the contractors to make constructive changes to the C-X RFP proposal responses. They want commercial derivatives to be investigated. To clear up the confusion, the CSAF calls derivatives an "interim" solution (separate proposal) and the C-X source selection is to continue. 25 years later the NDAA will wonder if commercial derivatives are an interim solution or in lieu of the C-17. (64:23)
- 27 Oct 1980 PMD #9, revises mission scenarios in RFP (note this is two weeks after the RFP was released).(103) This is the eighth PMD this calendar year. Most acquisition programs are lucky to receive annual PMD updates! No amount of management attention is too good for this program!
- Nov 1980 Congress authorizes \$35M for C-X program, but states, "this does not mean we are committed to the C-X." (34:461)
- 28 Nov 1980 Milestone 0 (concept exploration) approved. (99)
- 16 Jan 1981 Proposals received; government begins evaluation of 9 tons of contractor documentation. (9:A4)
- April 1981 USAF notified Lockheed that C-5 proposal to meet C-X requirements is unacceptable (only to purchase 50 C-5s rather than C-X in 1982). Lockheed responds with an unsolicited proposal for consideration outside C-X source selection.
- 22 Apr 1981 PMD #10; clean-up PMD. Changes the definition of IOC; date now Sep 87. (103) (Back to the original SECDEF direction.)
- May 1981 AF Studies and Analysis conducted SABRE CHALLENGE LIFT Project to evaluate several possible alternative solutions to C-X MENS.(104) What could this mean? The Users requirements are not necessarily THE requirements.
- 29 Jun 1981 BAFO responses received from contractors, but the three contractors demanded unusual contract financing, or negotiations could not be completed and contract awarded.
- 15 Jul 1981 All 3 contractors refuse to submit BAFO without unusual contract financing (accelerated progress payments) arrangement. (Are they in charge?) Acting SECAF Russell Hale (SAF/FM) directs Lt Gen Skantze (the Source Selection Advisory Chair) to proceed with the evaluations and proposal analysis, but defer definitive contract negotiation until just prior to contract award with the

selected winner (USAF will worry about contract financing arrangements later (after contract award; negotiate with one contractor rather than all three). (34:236-239) This odd source selection tactic could have backfired in protests by all responding contractors. Another interesting risk management technique.

18 - 21

Aug 1981 AFSARC/DSARC briefings completed.

28 Aug 1981 SECAF Verne Orr selects McDonnell Douglas as winner, but program go-ahead is delayed awaiting airlift study results. Secretary Orr said he selected McDonnell Douglas due to their ability to carry oversize vehicles (like the M-1 tank). He said that Lockheed lost because the plane represented "more C-5" and he did not want to repeat history. Finally, he said that Boeing lost because there was concern over the third engine in the tail section. With the engine so close to the rear cargo door, there were safety concerns for paratroopers and cargo.(9:A4) (Funny, the Soviets haven't had this problem.)

28 Aug 1981 Upon announcement, a USAF spokesman says this selection does not represent a commitment to build the C-X.(78:1) How foreboding...

08 Sep 1981 C-X designated C-17. Next designator number should have been "C-16", but concerns over confusing the plane with the F-16 [?!?] during the stress of high combat radio traffic caused the jump in number. (9)

14 Sep 1981 Lockheed submits unsolicited proposal. 44 C-5s for firm-fixed price of \$4.2B to replace the C-X. (38:115) Lockheed willing to pay USAF \$10M if the maintenance manhours per flying hour (MMH/FH) is not over 40 (interesting incentive). The Lockheed proposal is received after negotiations have begun with McDonnell Douglas.

21 Sep 1981 Not to be outdone, Boeing submits unsolicited proposal for military freighter design of its B-747 for approximately \$55M/aircraft. (7:24; 38:115)

Nov 1981 DEPSECDEF Frank Carlucci commissions NASA to perform independent risk assessment of C-17; their conclusion--low risk program. (27:27)

08 Nov 1981 PMD #11, IOC changes to Sep 88. (103)

07 Dec 1981 SECDEF Caspar Weinberger certifies to Congress the C-17 is ready for development (FSD), but we (DoD) are still considering other aircraft alternatives (83:213) (a day that will live in infamy). This is #1 and he will make this statement again. Stay tuned...

15 Dec 1981 Congress refuses FY 82 C-17 \$ (funding zero); they are not convinced DoD is committed to this transport (wonder why?). The transport cannot compete with other major Cold War weapons like the B-1 bomber and the MX missile.

- 08 Jan 1982 Airlift Alternatives briefing to OSD. (61:18-19) (USAF wants C-17s and KC-10s--NO C-5s!) Note: There have already been over 150 studies; 17 major studies in the last 7 years alone→all state airlift shortfalls. Is the answer the C-17?
- 26 Jan 1982 DEPSECDEF Frank Carlucci decides to re-open C-5 assembly line and procure 50 C-5Ns (the "N" designator stands for C-5 "New")(21:129)); continue the McDonnell Douglas KC-10 line and procure an additional 44 KC-10s; while C-17 is put into very low level development efforts. (57:5) Remember the USAF previously notified Lockheed on 23 Apr 81 that the C-5 would not be considered for C-X program, but now it can meet our airlift needs. I am confused...
- 03 Mar 1982 PMD #12, Production Readiness Review (PRR) guidance; planned FSD start FY 85; production FY 87. (103)
- Mar 1982 Boeing begins lobbying effort on Capitol Hill to sell B-747s at a guaranteed price and challenges the decision to buy C-5s and KC-10s. (25:167-168)
- 06 May 1982 DEPSECDEF Carlucci notifies Boeing (after studying B-747 alternatives) DoD stands by decision to procure C-5s/KC-10s. (84:79)
- 13 May/21 Jul 1982
Congressional votes on C-5B/B-747/C-17 (92)
- 26 May 1982 General Marsh (AFSC/CC) directs C-17 SPO to "...add more generic airlift technology which could be applied to 1990s aircraft..." (90) Foresight; destiny?
- 13 Jul 1982 PMD #13, new direction, additional guidance for C-17 or other advanced airlift aircraft. FSD decision FY 85; production decision FY 87. (103)
- 16 Jul 1982 President Reagan sends letter to House requesting funds for 50 C-5s, 44 KC-10s and C-17 R&D. (90:164) (Appropriations conference will agree to \$60M for C-17; however, \$59M must be reprogrammed from within USAF budget). Surely Congress couldn't be noticing a lack of commitment here?
- 23 Jul 1982 McDonnell Douglas begins 15 month, \$32M (ceiling price \$6.7B) fixed price incentive firm (FPIF) modestly paced engineering program. (96:2)
- 29 Apr 1983 \$59M reprogramming package sent to Congress. (108)
- 25 Jul 1983 PMD #14, restructures program to engineering development effort for FSD in FY 85 ensuring minimum cost and technical risk; changes IOC to FY 92. (103)
- 29 Sep 1983 USAF Airlift Master Plan approved; most likely option - procure 220 C-17s to replace entire C-141/C-130 fleet (to be retired in 1990s). The C-17 becomes the de facto cornerstone of the plan. (96:2)

- Nov 1983 USAF General Officer Steering Group validates need for C-17. Best airlift solution to meet inter- and intra- airlift needs.
- 30 Jan 1984 PMD #15, establishes force structure (210 C-17s) and additional required aircraft equipment (like heads up display (HUD)). Also directs study effort to evaluate EC-17 aircraft variant for use as Worldwide Airborne Command Post. (103)
- 27 Feb 1984 SECDEF Weinberger approves report validating need for C-17 and forwards to Congress. (106)
- 22 Mar 1984 Brig Gen Harbor (Program Director) briefs SECAF C-17 ready for FSD (this is #2!). (34:338)
- 23 Mar 1984 Acting USAF/RD (Lt Gen Russ) forwards letter to Lockheed stating, "...Tests of C-5 will not preclude the need for the C-17...The nation still needs a new/modern airlifter...." (101)
- 01 Aug 1984 PMD #16; FSD to begin FY 85. Air Staff directs SPO to reorganize and become a separate directorate. (103)
- Sep 1984 Date established for DSARC II briefing to determine readiness of program to enter FSD. Excuse me?!?
- 14 Sep 1984 Internal SPO memo states C-17 is ready for FSD! This is now 2½ years after Weinberger's 07 Dec 81 pronouncement that C-17 is ready for FSD!
- 29 Sep 1984 Direction to acquire a total of 210 C-17s. (162 active; 48 Guard/Reserve) (10:27)
- 18 Oct 1984 McDonnell Douglas briefs results of EC-17 study...Just one more added requirement for the C-17? (59:59)
- 02 Nov 1984 Actual DSARC II briefing. Direction to SPO to perform "bottoms up" review of C-17 requirements/scope/content...again. (16:58-59)
- 7-31 Jan 85 SPO performs and briefs results of "bottoms-up" review to OSD. Study identified some cost and schedule savings, and added three new requirements.
- 15 Feb 1985 SECDEF Weinberger approves entry into FSD, again. (He has now said it twice! (This is #3.) So, it took 4 years to actually enter FSD. Also, direction to evaluate C-17 for special ops/covert missions...another new requirement!) (9:A4; 16:58)

By now, a majority of McDonnell Douglas' original, experienced C-17 designers/engineers moved on to other projects or have left company. Struggling to climb exponential ramp to acquire engineers and conquer the

C-17 learning curve. C-17 competing for scarce aerospace workers on McDonnell Douglas' commercial MD-11, MD-90 and military T-45 programs. The labor pool was so sparse, McDonnell Douglas hired engineers prior to college graduation and began training them. They must increase their employment by almost 4,000 jobs (in a single year) to meet workload demands. (10:27; 91:6)

- 19 Feb 1985 Preliminary Design Reviews (PDRs) begin. Four month incremental effort. Five areas identified for further evaluation. Two of the five are wing durability and thrust reversers (to become flap and slat redesign). (91:57)
- 23 Feb 1985 Lockheed submits unsolicited proposal for additional C-5Bs. (34:401) Letter dated 19 Feb 85. Offer later declined because complete support costs not included and would incur higher LCC than the entire complement of C-17s.
- 03 Oct 1985 PMD #17, Milestone IIIa (low rate initial production) scheduled for Oct 86; IOC Jan 92 (5 years after original requirement). (103)
- 31 Dec 1985 C-17 FSD contract restructure approved. (Changes FSD and aircraft delivery schedules and made changes to specification.) Other requirements are added, like satellite comm capability. (103)
- July 1987 Programmatic slips to the T-45 Navy trainer first test aircraft. Slips to this program have a direct schedule impact on the C-17 program. Company is still reeling from reorganization to Total Quality Management (TQM); personnel at all levels continually transferred; program continuity a growing problem. (61;91:10)
- 02 Nov 1987 Fuselage lower frame support corner manufactured -- the first C-17 part. (59:59)
- Jan 1988 Lot I award to McDonnell Douglas for 2 aircraft. Estimated total program cost \$37.5B or \$178M per plane (original aircraft unit cost - \$100M). Over 6,000 people are now working on the program. (36:85; 69:30)
- 18 Nov 1988 Event-based contracting clause invoked in order to incentivize McDonnell Douglas to place more appropriate management attention to the program. (88; 91:56) While event-based contracting was revolutionary and has merit, for this program the wrong events were probably picked and at this point in time there were dual contractual instruments for the program--one event based and the original contract which was schedule based. The second problem was: When is a "P" not a "P"? The "P" in this case are the P-1 thru P-4 aircraft. Were they production aircraft, or were they test aircraft? This becomes a crucial point in journaling cost accounts. I will not delve into the appropriateness of the accounting procedures--the DoD IG will document the official government perceptions. The point is, a contract change and its definitional terms were a significant event to the C-17 program. It was invoked to improve schedule, reduce risk and reduce concurrency and the result was just the opposite.

- 18 Nov 1988 "T-1 Assembly Complete" date established as Jan 90. (59:59)
- 13 Feb 1989 McDonnell Douglas reorganized - new management team at top; all management employees must compete for jobs based on interpersonal NOT technical skills (reorganization takes 6 months to complete). (91:6)
- 21 Mar 1989 C-17 \$471M over budget.
- Jul 1989 Lot II award for 4 aircraft.
- 01 Nov 1989 USAF announces first flight not likely before June 91 (McDonnell Douglas master schedule projected first flight March 90). (10:28; 82:15)
- 26 Apr 1990 SECDEF Major Aircraft Review (MAR). Decision by SECDEF Dick Cheney reduces C-17 buy from 210 to 120 aircraft. (10:28; 91:12)
- 05 May 1990 T-1 aircraft to become separate billable contract line item in order to better capture actual program costs. High numbers of deficiencies are being noted and reported. (9:A5)
- 07 Jun 1990 EAC updated from \$5.9B to \$6.4B
- 12 Jun 1990 Memorandum of Understanding established criteria for T-1. (91)
- 01 Jul 1990 AFCMD reorganized under DCMC. The government plant representative no longer reports through the USAF, but is now part of a defense agency. (91:34)
- 09 Jul 1990 Beach review of A-12 program begins. Several A-12 events will be included in this chronology because the program consumed McDonnell Douglas management attention and resources, thus having a direct impact on the C-17 and other on-going military programs.
- 10 Aug 1990 T-45 claim
- 10 Aug 1990 C-17 cost performance falling - for every development dollar spent, 37¢ of performance received (cost efficiency). (91:14)
- 29 Sep 1990 EAC increased to \$6.5B. This is a government developed EAC because the DPRO felt McDonnell Douglas' EACs had been grossly underestimated. (88)
- 30 Sep 1990 Selected Acquisition Report (SAR) shows 25% cost increase due to reduction of aircraft quantities from 210 to 120.
- 01 Nov 1990 EAC increases to \$7.1B (82:15)
- 19 Nov 1990 McDonnell Douglas notifies USAF of potential wing skin problems - allegation of potential wing fastener problem.

- 28 Nov 1990 A-12 Beach Report released.
- 12 Dec 1990 USD(A) John Betti resigns.
- 17 Dec 1990 McDonnell Douglas submits claim for \$99M. Claim denied.
- 21/22 Dec 90 T-1 Assembly Complete and certified; ready for award of Lot III contract for 4 aircraft (82:15)
- 07 Jan 1991 A-12 terminated for default.
- 24 Jan 1991 John McDonnell requests \$1B in advance payments. Request denied. (82:15)
- 11 Mar 1991 McDonnell Douglas issues interim final report that wings meet spec, problem is mechanical (manufacturing) with Drivmatic machines. Corrective actions developed for implementation.
- 02 Apr 1991 Contract performance specs scaled back; payload reduced from 167K pounds to 160K pounds for 2400 nautical mile trip.
- 28 Jun 1991 First flight delayed.
- 07 Jul 1991 EAC increases to \$7.3B
- 25 Jul 1991 USD(A) approved Lot III contract award and obligation of additional funds for Lot IV.
- 26 Jul 1991 USAF requests consideration from McDonnell Douglas since first flight was delayed.
- 30 Jul 1991 Contract (Lot III) awarded to McDonnell Douglas for 4 aircraft. (82:15) The DPRO feels that an inexecutable contract was knowingly awarded because within 30 days of contract award, a 13 month schedule slip was projected. (91:53)
- 15 Sep 1991 First flight of T-1 aircraft (originally scheduled for Feb 90). This plane represents the culmination of over 19 years of design work and equates to over 19,000 engineering drawings; over 130 miles of wiring; 9,579,187 parts; 131,371 pieces; and 1,300,000 fasteners! (9; 10:28; 82:15) (This was a successful event, so lets not contemplate the number of changes in: requirements; military/contractor management; IOC; EAC; funding; etc.; etc.; etc.)
- 01 Oct 1991 Static testing begins. (10:28)
- 13 Dec 1991 EAC increases to \$7.45B (82:15)
- 17 Dec 1991 USD(A) approves long lead for Lot V (8 aircraft).

- Dec 1991 Appropriations committee zeroes buy in FY 91 and requires a five-part report from SECDEF to Congress.
- 31 Dec 1991 DoD estimates 120 aircraft C-17 program cost to be \$35.8B (82:15)
- 1992 Approximately 1/3 of McDonnell Douglas' C-17 "military" workforce displaced by "commercial" workers due to negotiated labor contract requirements. This has been and will continue to be a recurring problem on the C-17 program. It shows a continued lack of commitment on the part of McDonnell Douglas and displays poor management oversight. (91:54)
- 21 Feb 1992 USD(A) memo released stating contract award contingent upon first flight of P-1 aircraft.
- 17 Mar 1992 USD(A) memo stating full rate production (Milestone IIIB) will not occur until reliability, maintainability and availability testing is completed.
- 18 May 1992 P-1 first flight. (47:22)
- 29 May 1992 USD(A) memo to SECAF directing program cost reduction. I want cost reduced, so do it. Figure 1, rule 2--instant gratification upon direction.
- 18 Jun 1992 DPRO increased EAC to \$7.6B. McDonnell Douglas disputes this increase which further strains government-contractor relationship.
- 22 Sep 1992 Congressionally directed five-part report submitted. (91:61)
- 01 Oct 1992 Wing fails stress test at 125% of maximum load (spec 150%). (66:115)
- 16 Dec 1992 C-17 DOT&E early operational assessment sent to Congress.
- 31 Dec 1992 DoD estimates 120 C-17s will cost \$39.5B, or, about \$329M each. (82:15)
- 1993 Up to 1/2 of C-17 workers displaced by labor negotiations (bumping). Continued labor force instability; lack of adequate management attention.
- Jan 1993 Cost Performance Index (CPI) down to 26¢ on the dollar. (91:53; 91:71)
- 12 Jan 1993 USD(A) program review. OSD & JCS continue to support C-17 as most cost-effective solution to airlift problem. (91:97)
- 14 Jan 1993 DoD IG Report released accusing USAF of program management irregularities, possible anti-deficiency violation and recommends disciplinary action against the perceived key players. (93)

- 31 Jan 1993 C-17 successfully carries 160K pounds during 6 hour mission - meets "real world" requirement, not contract specification. (8:11; 67:25)
- Feb 1993 DPRO estimated EAC at \$7.9B for development contract (\$1B over ceiling price). (91:54)
- 05 Feb 1993 C-17 christened "Globemaster III."
- AMC Commander begins investigating alternatives to meet strategic airlift needs. Significant program changes are possible due to budget cuts, technical and cost problems. Possible solutions include service life extensions to C-141, having another contractor build the C-17, or other aircraft alternatives. (1:1;12)
- 12 Feb 1993 Crack found in test aircraft landing gear; planes grounded for inspection. (14:D2)
- March 1993 Cumulative cost performance index up to 67¢/dollar.
- 29 Mar 1993 Aircraft "stalls" during flight test. (28:1)
- 20 Apr 1993 SECDEF approves proposed actions in response to DoD IG. Punitive action taken against three general officers and one civilian. (9)
- 30 Apr 1993 Former USAF Program Manager (Maj Gen Butchko) relieved.
- 11 May 1993 Formal Pentagon warning to McDonnell Douglas, resolve chronic problems, or be cancelled. (26:29; 44:F1) As an aside, I wonder how serious this threat was since 11 letters of forbearance had already been sent and no show cause or cure notices had been issued. (91:72; 91:154) After 11 threats, wouldn't it appear as though the bark was worse than the bite?
- 14 Jun 1993 First operational C-17 arrives at Charleston AFB, South Carolina. (82:15)
- 27 Aug 1993 C-17 DAB review begins; USD(A) investigating program options including termination. No decisions made - more meetings scheduled. (5:16; 31:10)
- Sep 1993 C-17 survives SECDEF's Bottoms Up Review (BUR); Multi-Role Fighter and A/FX do not. (94)
- 10 Sep 1993 Redesigned wing retested and fails at 145% of maximum load. Contractor program officials state point on wings stressed at 150%--meets spec. (31:10; 56:18)
- 15 Dec 1993 SECDEF Les Aspin announces Pentagon will buy 40 C-17s and places McDonnell Douglas on 2 years probation to fix technical and financial problems by 1996. (81:30)

- 06 Jan 1994 John McDonnell agrees to probation. (42:D14; 45:D5)
- 10 Feb 1994 Unit Flyaway Cost for C-17s are revised from \$255M to \$329M. (Unit cost excludes research, development, training and spare parts.) (79:B7)
- 11 Feb 1994 USD(A) John Deutch calls for study to determine "optimum mix" of C-17s and non-developmental airlift alternative (NDAA) aircraft. (18:223; 47:22)
- 02 Mar 1994 Secretary of Army Togo West and Army Chief of Staff General Gordon Sullivan state, "We need something C-17-like and we need it soon." (4:335) Is C-17 support wavering, again? I'd like to know the definition of "soon" because the Army has been more than patient waiting for this airlifter for 22 years.
- 03 Mar 1994 Congressman Dicks (D-Wash) feels NDAA study is being delayed to give USAF time to produce more C-17s. Boeing is in his congressional district. (2:326)
- 25 Mar 1994 C-17 P-2 aircraft damaged in near-crash during operational flight test. (28:1)
- 06 Apr 1994 Static testing completed.
- 08 Apr 1994 C-17 P-11 aircraft (first a/c in Lot IV procurement) accepted by USAF.
- 11 Apr 1994 NDAA program launched to explore commercial alternatives to the C-17. Boeing and Lockheed are trying to persuade DoD to commit to commercial airlift alternative to C-17. McDonnell Douglas offering MD-11; and, Ukraine An-124 teamed with an unknown U.S. company. (17:2; 18:223)
- 03 May 1994 C-17 completes successful LAPES (Low Altitude Parachute Extraction System) drop. (52:36)
- May 1994 HASC reduces FY 95 C-17 procurement to 4 aircraft creating more program uncertainty. Claims settlement also in jeopardy. (55:241)
- 24 May 1994 House approves 6 C-17s (Clinton's full request). (30:6)
- 17 Oct 1994 C-17 deployed to Gulf with 66K pounds cargo. Mission problem-free. C-17 arrives in Gulf before the B-1 (fleet grounded during the Gulf War). It appears that the C-17 can finally compete against the Cold War machinery.
- Nov 1994 Lt General Barry (former PEO) retires.
- 17 Jan 1995 First squadron declared IOC - 12 planes/48 crews available for world-wide missions. "A major milestone," according to Brig Gen Walter S. Hogle, Jr., 437th Airlift Wing Commander. However, IOC had been scheduled for Apr 92; then to May 93; then to May 94. (10:26-30; 11:3B; 23:70; 48:4)

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Aircraft deliveries are ahead of schedule and unit costs are decreasing on the C-17. Aircraft #18 unit cost \$272.6M (less engines which adds approximately \$20M). Projected unit cost of A/C # 21-26 \$253M. (71:27) But the question is, will the unit cost be low enough to chance sending the plane close to trouble spots? If not, what is the point in building the airplane if you are not willing to utilize it? With the high cost of any alternative solution, commercial or military, would we risk slamming these aircraft into the dirt? The C-5 became too expensive to send to hot spots, maybe now that they are aging we can finally test their supposedly designed ability to operate in an austere environment.

Over 15 Years Asking the Same Burning Question

There have been hundreds of studies and analyses on the C-17 since program initiation. Many have been major efforts to continually validate the original requirements, assess program status, or develop the optimum airlift fleet mix.

What has the resultant answer been? The C-17. Every militarily acceptable airlift fleet mix has the C-17, usually in significant numbers, as part of the solution. The User desired a replacement "core" airlifter or workhorse (as the C-141 is called). Why has this requirement, or the solution, been such a surprise?

The most recently completed study, like many previous internal studies, contain errors in basic assumptions (e.g., "average" fleet age as opposed to age of the last aircraft delivered, or the number of ton miles of cargo to be moved daily). These data makes correlation among studies, or comparisons within the study difficult at best. Some studies include the development costs for the C-17 and not the alternative aircraft being evaluated. We have probably reached a point in time where C-17 development costs are "sunk" costs, like the C-5, C-141, or B-747.

If, as a department, we are so concerned about airlift, why not begin with a "validated" amount of tonnage to be loaded/moved to meet peacetime, humanitarian, peacekeeping, contingency and war missions; the most likely landing/maneuver environment; crew size; fuel economy and any other vital mission element. Rather than completing a paper study to select some predisposed result (like the ability to skew a statistic to achieve a particular answer), conduct a fly-off performing quantifiable missions. I recognize this proposal flies (no pun intended!) in the face of acquisition reform where modeling and simulation reign. However, in this case, I think drastic measures are warranted to prove the answer. Remember over 150 studies couldn't satisfactorily answer this question to wary

audiences. Whatever the resultant answer, determine an optimum fleet mix (winner take all; military only mix; military/commercial mix; or, contract airlift (like FedEx or UPS).

Lets finally resolve this unanswerable question, so scarce resources are expended more judiciously on new problems, rather than continually repackaging the same old problem.

Précis

After reviewing the chronology, the five obstacles (and their interrelationship) to program management (Figure 1) were amplified.

At the initiation of the program, McDonnell Douglas encountered an immediate delay of almost four years so their competitors could enjoy higher funding priority (actual procurement). When the go-ahead was finally received, McDonnell Douglas signed up to basically the same terms and conditions and the same contract price with inflation. What was their program commitment after such a long delay? What was their commitment with four firm production programs on the assembly line? Remember the quotes from high level USAF, DoD and Congressional sources that selection did not necessarily equal commitment.

The C-17 was to have been a low risk program, yet there have been so many added requirements that the synergistic effect of these dynamic changes created program uncertainty. In program management there is suppose to be a balance between cost, schedule and performance. It appears, since the SECDEF's only original requirement was IOC, schedule drove the program. The "pull" in one area (schedule) has serious associated costs pushing the other areas (cost and technical performance). Stated another way, when new technical ground is explored, unexpected problems will occur which cause delays and increase cost. This is unavoidable. (Stated very simply: "You want it bad, you get it bad.")

Program penalty comes when attempting to correct these problems. Any mistake in

developing a solution will be magnified which causes further program management problems. Constant reorganizations and ever-changing program management/engineering personnel on the government and the contractor's teams amplifies the situation. Each follow-on problem becomes exacerbated, thus inviting the attention of oversight agencies and Congress. So many changes, so many problems, who is responsible?

To provide additional guidance and oversight, additional directives, legislation and reporting requirements are levied against the program. All of this additional "help" does not necessarily have a positive effect on the program. All oversight parties desire instantaneous results (gratification). Change takes time. While program managers want to be responsive, implementation (change) is not instant.

Additional oversight also affects the decision making process, making the program manager risk-averse, especially if every decision is second-guessed up and down the chain of command. Quality management principles would emphasize decentralized control and program execution.

Any acquisition program must be balanced against the overall service requirements. All programs compete for priority and funding; it's a fact of life. However, in the case of the C-17, it appears the only continuous program commitment was evidenced by the parties who had the least control over the program--the User and the SPO. With so many dynamic and changing requirements, does anyone remember what the User really wanted and when he required it? Does it matter? Five key specification areas have changed four times since program initiation and three times since 1985. The program office was merely managing from crisis to crisis; study to study; ever changing PMD to PMD.

There are many competing solutions to satisfy a mission need. However, there comes a point in time when the Department of Defense must commit to a solution and allow

adequate time for development, test and delivery. Changes would then be inserted at convenient, negotiated points in the process (like block changes to aircraft production lines). I am not so naive to think that requirements are stagnant and not dynamic. But to change the IOC date eight times in ten months (and this was the requirement that initiated the program), makes me wonder: what were the competing interests within the Pentagon?

Through all the program perturbations, or in spite of them, the C-17 has met and actually exceeded some of the specification requirements. The C-17 has set many world records during test. But, not all the specification requirements have been met. I would challenge you to name any program that has met all of the program specifications. I have worked acquisition programs for many years and can't identify one example.

I visited Dover Air Force Base, Delaware, in late January to tour a C-17 visiting the base and talk to the crew. They seemed genuinely pleased with the aircraft and, you know, it was an impressive plane. It had easy access, a large cargo box, great view from the comfortable cockpit and many modern innovations, compared to older transports. How could a program that is so inherently bad, have a user so pleased?

Critics have compared the C-17 program with the A-12. Having worked the A-12, I disagree. Schedule, changing requirements and lack of program commitment drove cost and technical problems on the C-17. Program managers recognized the signals and were constantly reacting to crisis. The A-12 management saw the signals and chose to ignore them. However, the C-17 is very similar to the C-5 program. Both programs endured cost and schedule problems, similar technical challenges and extensive oversight--to the obvious detriment of the program.

Technical experts assert technology takes approximately 25 years to be developed. For example, the jet engine was first tested in 1941 and had commercial application in 1969

on the B-747. The VCR was invented in 1956 and was commercially available in the 1980s. The legacy program (AMST) was initiated in 1972 and the ultimately developed product--the C-17 reached IOC in 1995--a mere 23 years!

Who's In Charge?

The Packard Commission recommended many reforms to improve processes within the Department of Defense. The Program Executive Officer (PEO) structure was to have provided broader authority, responsibility and accountability for the program manager (PM). The PM would report through the PEO, to the Service Acquisition Executive (SAE), on to the Under Secretary of Defense for Acquisition (USD(A)). This process sounds good and looks good on paper. But how was it executed on the C-17?

In December 1979, the C-X Task Force was established in the Pentagon. The SPO was not organized until a month later. Yet, even though a program manager was named, all decisions and actions continued to be cleared through the Task Force. Who was responsible?

As the more formal PEO structure developed, the PEO for the C-17 remained at Wright-Patterson and was not "working" the Building. The appearance was that nuances of potential programmatic actions were missed.

In the very early days the SECDEF managed the program, determined the requirements and even dictated funding. When the USD(A) organization was created, the USD(A) became the de facto program manager and he used the Defense Acquisition Board (DAB) committee structure to set the terms and conditions for programs to move from one acquisition phase to another.

Relationships and perceptions did not help this program. Knowing who the key players were was difficult at best. When problems developed on the program it was hard to

determine what was really transpiring and how to fix it. The adversarial relationships between the SPO and the contractor; the DPRO and the SPO; the DPRO and the contractor; the SPO and the Air Staff; the SPO and OSD; the contractor and the DEPSECDEF; the Department, the contractor and Congress.

Programs in trouble attract attention. The C-17 attracted the attention of the Congress who then took control of the program by cutting funding and setting new terms and conditions via congressional language. If that wasn't enough "help", OSD deleted funding by Program Budget Decision (PBD). So, the program manager is placed in an untenable situation. Everyone else can set terms and conditions, yet he must execute what he is dealt. Where was his authority?

The PM was not in charge since the program was dictated to him. The Users' requirement was lost in the terms and conditions maze; they weren't driving the program. That leaves the committee structure and USD(A) who determine how the program is progressing and if the program will proceed. That is until a program goes sour. At this point their roles change to that of a final arbiter, who must distance themselves from the perception of being involved in the program. Once everyone has distanced themselves, who is in charge? Who is accountable? The only person left is--the program manager.

At the beginning of the paper I stated no one was in charge. And that's true. Everyone wanted to run the program, unfortunately, no one wanted to be responsible for the program when it got tough. Perturbations in funding, requirements, schedule and lack of commitment created massive upheaval in the C-17 program.

What Would Have Helped?

- Identifying a small group (the USD(A), SAE or PM) with authority to make or accept changes to the program. Remember the nine PMDs in one year?

- Let requirements stabilize; make changes at regular intervals or in small blocks.
- Once a program phase is initiated, fund the phase; don't tweak program funding at every budget exercise.
- Finally, give the PM the authority to manage the program and develop a cooperative relationship with the entire acquisition team, to include the contractor. Hopefully, if a team is developed, the contractor will not feel the need to seek relief outside the program chain.

The Future

Have we (the DoD) learned any lessons from this acquisition program? Yes, but will we apply them? Probably, only very selectively.

The Joint Primary Aircraft Training Systems (JPATS) program appears to have the potential to follow a very similar program path as the C-17. The program is reducing quantities (which inevitably drives up unit cost), experiencing reduced funding profiles and schedule delays. According to Defense News, industry sources are asking, "Is there a commitment to this program?" Good question. The competing companies are assuming risk (at a cost of approximately \$1M/month) to keep their teams together, anxiously awaiting a selection. Like the C-17, which was to have been a streamlined, commercial development, the JPATS is well on the road to developing an adversarial government-contractor relationship even before final selection is made. (Indecision breeds contempt.)

Like the C-17, there are other market possibilities (commercial applications) on the horizon, but a selection must be made.

Throughout the C-17 program history, the plane has been evaluated to perform a myriad of missions--one plane does it all! Since the Air Staff is in the process of preparing PMD #28 for the aircraft--perhaps we could do a study to see if the C-17 could perform the JPATS mission! Think it would work?

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