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# An Acquisition Model to Emulate: An evaluation of the 1988 Packard Commission report

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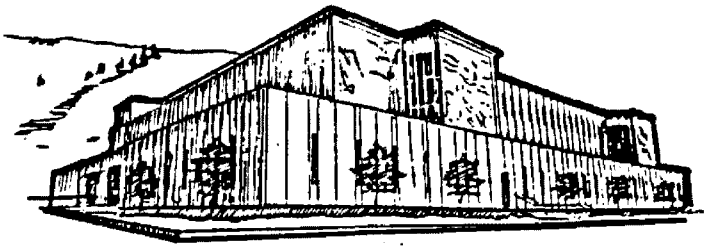

*An Acquisition Model to Emulate -*
*An Evaluation of the 1988 Packard Commission Report.*

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# I. INTRODUCTION

In the later part of his administration, President Reagan appointed a blue ribbon commission on defense management, chaired by Mr. David Packard. In 1986 this commission published its final report to the President. The work was called *A Quest for Excellence* and was an all inclusive examination of four aspects of the Department of the Defense: national security planning and budgeting, military organization and command, acquisition organization and procedures, and government-industry accountability. After the recommendations of the report were published, National Security Decision Directive (NSDD) 219, issued by President Reagan, directed their implementation. This directive was enacted into law by the passage of the Goldwater-Nichols Act in 1986 (Public Law 433, 1986).

The Packard Commission report had a section that addressed acquisition organizations and procedures called "An Acquisition Model to Emulate." The basis of the model that "...major savings are possible in the development of weapon systems if Department of Defense broadly emulates the acquisition procedures used in outstanding programs. To this end, (the Commission) analyzed a number of successful programs to identify management features that they had in common, and could be incorporated in the defense system. (The Commission) identified six underlying features that typified the most successful commercial programs: 'clear command channels', 'stability', 'limited reporting requirements', 'small, high quality staffs', 'communication with users', and 'prototyping and testing'." (Packard Commission, 1986).

The purpose of this paper is not to measure the implementation of this model, but to determine if these measures are evident in existing programs which are considered to be successful. To observe the extent that the characteristics of the model are present in existing programs, a survey was sent to two separate Army aviation acquisition programs. The programs selected were the CH-47 Cargo Helicopter D model upgrade and the Special Operating Forces (SOF) aircraft upgrade for the CH-47 aircraft. These acquisitions were selected because both are relatively recent and are of the same basic aircraft type. To determine if a program was "successful", a subjective analysis was done using performance measures. The measures by which each of the procurements were judged were cost effectiveness and the timeliness of the acquisition.

Historically, the press has reported stories of fraud, kickbacks, payoffs, and other types of misuse of government funds in defense acquisitions. This enigma in defense contracting has cost the tax payers countless dollars. This problem is not new and has roots prior to contemporary weapon systems. Before World War I, contracts and major weapons acquisitions were localized and generally the same local contractors were used. Bidding was not effective and competition was practically non-existent. In the World War II era, the concept of government procurement was one of "damn the costs, there is a war going on". This brought into existence a contract known as Cost Plus. Under this agreement, defense contractors submitted a bill to the government and charged a percentage of the costs for their profit fee. This contract did not lend itself to an efficient use of funds, and did not guarantee that the end

product would be anywhere near what was promised. These profit percentages, although criticized by Congress, were the beginning of the continued criticism of defense procurement. This "goldplating" of military hardware by cost plus contracts disappeared after World War II, but the emphasis on material first and cost second persisted through most of the Cold War era.

During the Kennedy administration, defense contracting reforms were instituted. In what is considered a watershed case, Lockheed in 1961, bid not only for the research and development of a new generation of transport planes (C-5A cargo aircraft) and engines, but also for the actual production of the aircraft. Previously, contractors bid for development only and production lots were bid for later. This new system arose when attempts were being made to find new types of contracts that would tie profits to cost controls.

This system did not work as anticipated. Lockheed managed to run up a multi-billion dollar cost overrun on the project and it was during this procurement that the term "whistle blower" was coined. Cost overruns occurred because no one could accurately estimate what the cost would be or should be before the program was developed. It was at this point that the confidence of Congress and the public in military procurement management was lost (Gregory, 1990).

After this failure, the military tried to award contracts with a "fly before you buy" concept (Gregory, 1990). This allowed the military to ascertain if the weapon system would perform as advertised. If there was a problem with the scheduling or performance requirements, adjustments could be made before new funds were

allocated to the project.

During Reagan's administration, defense buildups and restructuring coupled with double digit inflation caused more strain on the already faltering relations between Congress and the Department of the Defense contracting community. Spare parts started to make the headlines with seemingly unreasonably prices attached to them. Even though some of the pricing was "justified" through creative accounting by using spare parts for the redistribution of overhead and engineering support costs, it was difficult to explain the problem away to the public and Congress. It was during the later part of his administration that President Reagan appointed the Packard Commission to investigate the problems in the defense industry.

In an era of a smaller, more efficient military structure, the dollars that will be made available for major systems will decrease. This downsizing has already had immediate impact on future acquisitions as well as the current programs. Almost all Department of Defense projects are being affected in some way. The B-1 Bomber, Advanced Tactical Fighter (ATF), and the nuclear submarine projects are being threatened with reduction or cancellation. This suggests that the managers of the acquisitions dollars must be more cognizant of where the funds are going and if they are being put to their best and most efficient use.

This paper begins with a brief description of the CH-47 aircraft, followed by an evaluation of the CH-47 D model upgrade program and the SOF aircraft modification program. The next sections will cover the survey and the results. The last segment will provide a summary and a conclusion.

## II. DESCRIPTION OF THE CH-47 AIRCRAFT

The CH-47 (Cargo Helicopter) medium lift helicopter was designed and developed by the Boeing Helicopter Company in the late 1950's. The contract was a result from a design competition conducted by the Air Force on behalf of the Army. A total of 699 helicopters were delivered, with the airframe being a combat tested performer throughout the Vietnam conflict. The CH-47 has undergone several modifications throughout it's production life, from the A model to the current D model. Each model, while retaining the basic airframe structure, has a different mission capability and Reliability, Availability, and Maintainability (RAM) characteristics. For the purposes of this paper the CH-47 C model aircraft will be described as a baseline to compare to the current modifications.

The CH-47C helicopter is the Army's only tandem rotor, medium lift transport helicopter (fig 1). It's primary missions are the movement of munitions, repair parts, petroleum, tactical artillery, troops and special weapons around the battlefield. Additional missions include high altitude search and rescue, fire fighting and special operations. The "Chinook" helicopter is currently deployed around the world and is used by fifteen separate nations (Boeing, 1989).

SPECIFICATIONS:

Max gross weight: 47,000 lbs., Empty Weight: 23,149 lbs., Length: 51 ft., Height: 18 ft. 7.8 in., Fuel: 1,030 U.S. gallons.

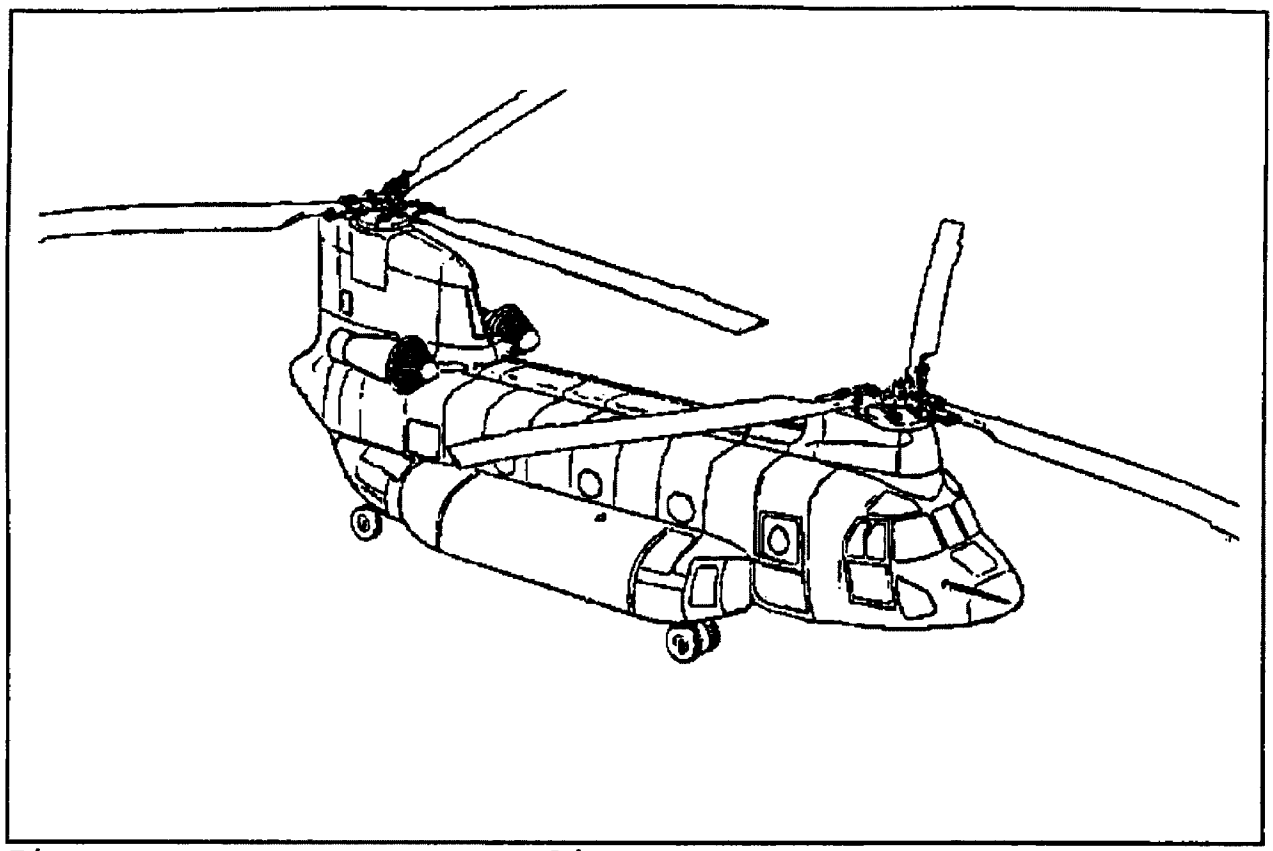

Figure 1. CH-47 Cargo Helicopter.

PERFORMANCE (at gross weight):

Maximum speed (sea level): 142 knots, Service ceiling: 8,500 ft., Maximum range: 229 nm., Rate of climb: 1,100 fpm., Lift capacity: 23,851 lbs. (Headquarters, Department of the Army, 1988).

**Acquisition History:**

In April 1963, the first operational unit was equipped with CH-47 A models. CH-47 A's were deployed to the Republic of Vietnam in July of 1965. In response to an urgent requirement developed by the Army in Vietnam, the Army Material Command formulated a two step program to improve the capacity, speed, and endurance of the A model. In addition to the performance requirements,

modifications were incorporated to improve the flying qualities to allow full utilization of the expanded performance capabilities and to improve reliability, availability, and maintainability (RAM).

The first step in the improvement program resulted in the CH-47 B model, first delivered in May of 1967. It was identical in size and appearance of the A model, with the exception of larger rotor blades. The flight performance was increased due to the installation of larger, more advanced engines and the advanced design rotor blades.

The CH-47 C model was the third generation aircraft to evolve from the improvement program. The size and appearance did not change appreciably, but the C model was powered by new engines and a new drive train that was qualified for over 6000 shaft horsepower. The fuel capacity was increased to 1129 U.S. gallons for the extended range and endurance required by tactical missions.

In 1973, it was realized that the CH-47 fleet was tending towards obsolescence with no budgeted research and development dollars for a replacement aircraft. The Commandant of the Aviation School request for funding in the 1975 budget included a replacement medium lift helicopter. A revised operational capability for modernizing the CH-47 fleet was prepared and subsequently approved by the Army in October, 1974 (U.S. Army DARCOM, 1985). This was the beginning of the developmental process for the D model currently under production.

## III. ACQUISITION PROGRAM EVALUATIONS

**CH-47 D Model Upgrade:**

The CH-47 D model upgrade was a natural extension of the past upgrades to the airframe. It was decided that a rebuild of the aircraft would be more cost effective than the development of a new aircraft that would take over the operational mission of the CH-47. The mission capabilities of the D model were greatly improved over that of the earlier models of the Chinook (figure 2). The helicopters were stripped of all components and refitted from the basic airframe up. Boeing introduced a much larger engine and drive train system along with new fiberglass rotor blades. There were improvements in the communications, navigation and flight control systems. In essence, the D model was a new aircraft.

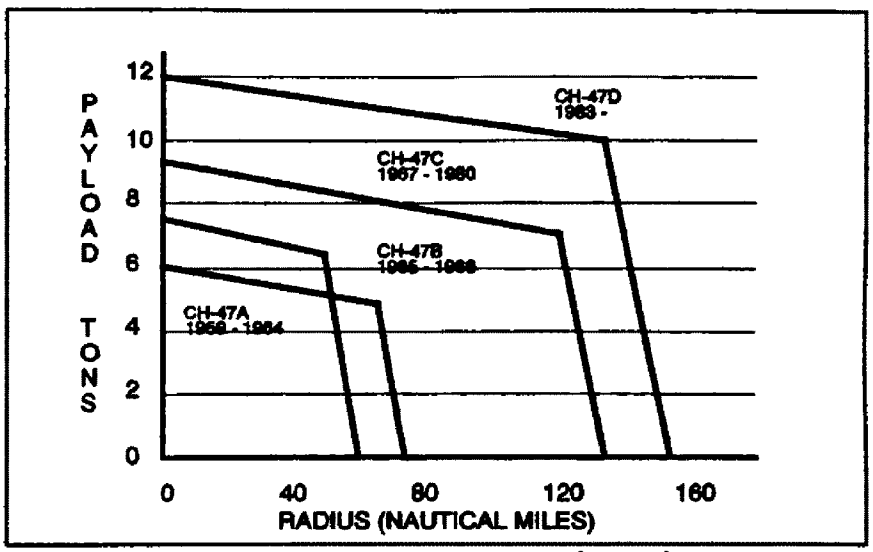


Figure 2. The CH-47 modernization effort did make the earlier models of the Chinook more reliable, less costly to maintain, and much more capable.

The method used in this acquisition was called a Multi-year procurement. This is a unique method of acquiring up to five years requirements of a system with a

single contract. This is a departure from the normal way the Department of Defense acquires major systems. Usually the contract is let for a single year's requirement. Generally, the multi-year contract produces two direct benefits. First, it generates a cost savings because of less variability in the future budget. Secondly, it promotes stability in the requirement, funding, and the design.

The CH-47 D model acquisition seems to be a success story as far as defense contracting is concerned. Since the process began in 1976, the contract has been ahead of schedule and has been within the budget. Boeing did well enough with the production to earn $3.5 million in design to cost incentive fee awards. During the engineering development phase, Boeing received a superior performance rating and 98 percent of the total amount of the incentive fees available (Sutton, 1982).

Cost savings on the program were substantial, especially in light of the historical cost overruns of defense procurements. The Army estimates that in the CH-47 D model program, it has by 1989 had a cost savings of $47.9 million, or 8.3% over the total contract costs of $532.1 million (GAO, 1987).

The release of the aircraft from the plant has been consistently on time or ahead of schedule. Boeing had a 40 month schedule but required its functional departments to maintain a 36 month timetable, accelerated that schedule and as a result, turned out the first prototype that flew four months ahead of the original schedule (Sutton, 1982). According to the General Accounting Office, the modernization program has been proceeding smoothly and the requirements, funding, and design appear to be stable and sufficient to carry out a multi-year contract with

little risk (GAO, 1987).

**Special Operation Forces (SOF) Aircraft Modification:**

In May of 1984 a joint Army and Air Force development initiative identified the requirements and the responsibilities of the rotary wing Special Operation Forces (SOF) operations. This was followed by a joint task force in October of the same year that recommended the transfer of the entire SOF rotary wing mission from the Air Force to the Army. This action was delayed by the Under Secretary of Defense because of the lack of an adequate Army aircraft having the capabilities of the Air Force's HH-53 Pave Low helicopter. In 1986, the Army initiated a modification program for CH-47 aircraft. Operationally, these modified aircraft, designated the "MH-47", are expected to be able to perform clandestine, deep-penetration airlift missions in adverse weather conditions and high-threat environments. Specific missions include: counter-terrorism actions, infiltration, resupply, extraction, interdiction operations, civil affairs, and psychological operations.

In the beginning of the acquisition process, the Army decided that the modified aircraft would be considered a non-developmental item and would require no operational testing or developmental testing. In its 1989 statement of its SOF helicopter acquisition strategy, the Army assumed that because the helicopters used in the program were qualified systems, planned testing and evaluation would consist primarily of integrating and testing already qualified components (GAO, 1990).

This philosophy changed as the limited testing of already qualified components expanded to the complete testing of the entire aircraft system due to the expansion of

and changes to the program. Currently, developmental testing is concurrent with the low rate initial production of 22 of the SOF aircraft. This acquisition approach includes a high risk testing strategy in which the Army would not conduct the required operational tests before production decisions were made. The Army plans to have 53 of the 74 aircraft in production or delivered before the operational tests begin and 90 percent of the production aircraft completed or in production by the time the operational testing is completed. In some cases the test aircraft will not have all the operational equipment installed prior to the tests (GAO, 1990).

There have been multiple problems in the SOF aircraft program which resulted in increased costs of over $302.6 million as of March of 1991. Of these costs, Congressional budget cuts were approximately $48.4 million. Changes in the program requiring extra effort, such as prototype testing requirements and an alternate cabin arrangement, resulted in $97.3 million deficit of which $66 million additional funds were provided. Cost increases in the Aircraft Survivability Equipment (ASE) hardware and an outstanding claim from IBM resulted in an $53.6 million cost impact. Benefits that were not received, such as the new T55-L714 engine development and the auxiliary fuel tank qualification cost $19.5 million.

A development that impacted the program was the cancellation of the Army purchase of the V-22 Osprey tilt-rotor aircraft. The costs associated with the production and qualification of the Multi-Mode Radar (MMR) and the loss of the development, tooling, co-production and software support resulted in over $84 million. All the costs that were to be absorbed in the production of the V-22 now had

to be absorbed into the SOF program.

The total cost of the program has expanded dramatically from $1.36 billion for 74 helicopters to an estimated cost of at least $2.1 billion. Most of these cost increases are due to component and airframe costs that will be incurred are being reported and paid for by other Army activities (GAO, 1990). The U.S. General Accounting Office states that the Army will probably incur more cost to correct problems identified during development and operational testing and to install equipment that will not be available when the aircraft are fielded.

Although both acquisition programs dealt with the same basic airframe and are within the same general time period, the differences were substantial. The CH-47 D program has been considered to be always on time and within/under budget. The SOF Aircraft program has had budgetary problems as well as difficulties in producing the first prototype. In the comparison of the two programs, dissimilarities in the contract types and the fundamental acquisition philosophies created problems with the internal validity. However, the basic premise of a "good" program as delineated by the Packard Commission should be evident in spite of these problems.

## VI. RESEARCH DESIGN

### Questionnaire.

A Likert scale questionnaire was selected as the most appropriate instrument for accumulating data for this research project. After each question there was an area that allowed for subjective comments, reproduced in Appendix B. There were two to three questions for each of the six conditions for a successful acquisition as delineated by the Packard Commission. These questions were systematically distributed throughout the questionnaire to prevent the grouping of the topics. The questions were randomly presented in either a positive or negative manner. This ensured that the individuals would read each question and would not just go down the survey answering all positively or negatively.

The survey questionnaire was prepared after a through review of literature on the topic. The questions were designed to address each of the specific areas in an acquisition model to emulate. Dr. Gerald Evans and Dr. Charles Smith reviewed the questionnaire prior to the distribution. In addition, the questionnaire was pre-tested on two military officers in order to determine the clarity of the questions and assess the potential responses.

### Population.

The entire population consisted of the Program Managers for each of the two acquisitions and their primary staff. Since the population was relatively small, there was no need for sampling.

Response rate.

A total of eight questionnaires were sent out. Two were sent to the Program Managers and six to their primary staff. All were returned, resulting in a 100% response rate.

## VII. SURVEY RESULTS

The survey questionnaire and a tabulation of the results of each question are included in Appendix A. The questions are identified by two numbers. The second is the original number assigned when the questionnaire was sent out and the first number realigns the questions into category groupings. The results of the questionnaire were manipulated so that all the responses would be on the same scaling as to the phrasing. The lowest score, one, indicates that the respondent was in total agreement with the statement. In general, the higher the response value, the more in disagreement the respondent is with the question, indicating a problem with the acquisition program. This chapter presents the results of the survey questions as they relate to the six conditions for a successful acquisition in the Packard Commission report.

### Clear Command Channels:

In the Packard Commission's report, the item of clear command channels were explained as:

> "A commercial program manager has clear responsibility for his program, and a short unambiguous chain of command to his chief executive office (CEO), group general manager, or some comparable decision maker. Corporate interest groups, wishing to influence program actions, must persuade the responsible program manager, who may accept or reject their proposals. Major unresolved issues are referred to the CEO, who has clear authority to resolve any conflicts. (Packard Commission, 1988)

Questions one through three were structured to measure the degree in which the programs had this attribute. Question one addressed the short, unambiguous chain

of command, question two addressed the clear responsibility issue, and question three addressed the CEO's authority. There was some confusion as to who the CEO was in the two programs and so the third question was thrown out.

The quantitative data displayed in figure 3 appears to indicate that both

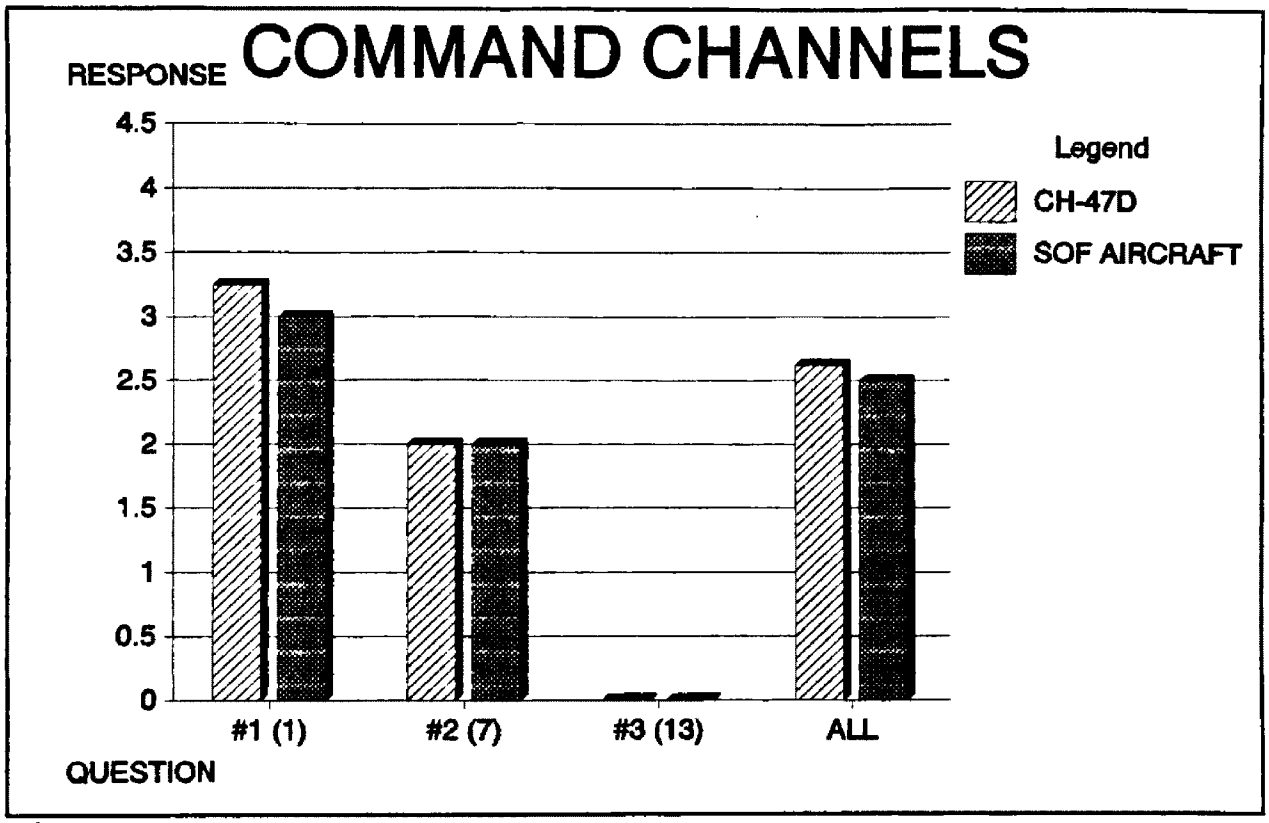


Figure 3.

programs tend to be fairly equal in their responses. Although both acquisition programs agreed with the questions, both tended to be neutral in their responses. The qualitative comments revealed that there are problems in redundancy of reporting and the transitions into the new Army management program.

**Stability:**

The second underlying feature identified by the Packard Commission's model is stability. The commission describes stability as follows:

> "At the outset of a commercial program, a program manager enters a fundamental agreement or 'contract' with his CEO on specifics of performance, schedule, and cost. So long as a program manager lives by this contract, his CEO provides strong management support throughout the life of the program. This gives a program manager maximum incentive to make realistic estimates, and maximum support in achieving them. In turn, a CEO does not authorize full-scale development for a program until his board of directors is solidly behind it, prepared to fund the program fully and let the CEO run it with the agreed-to funding." (Packard Commission, 1988)

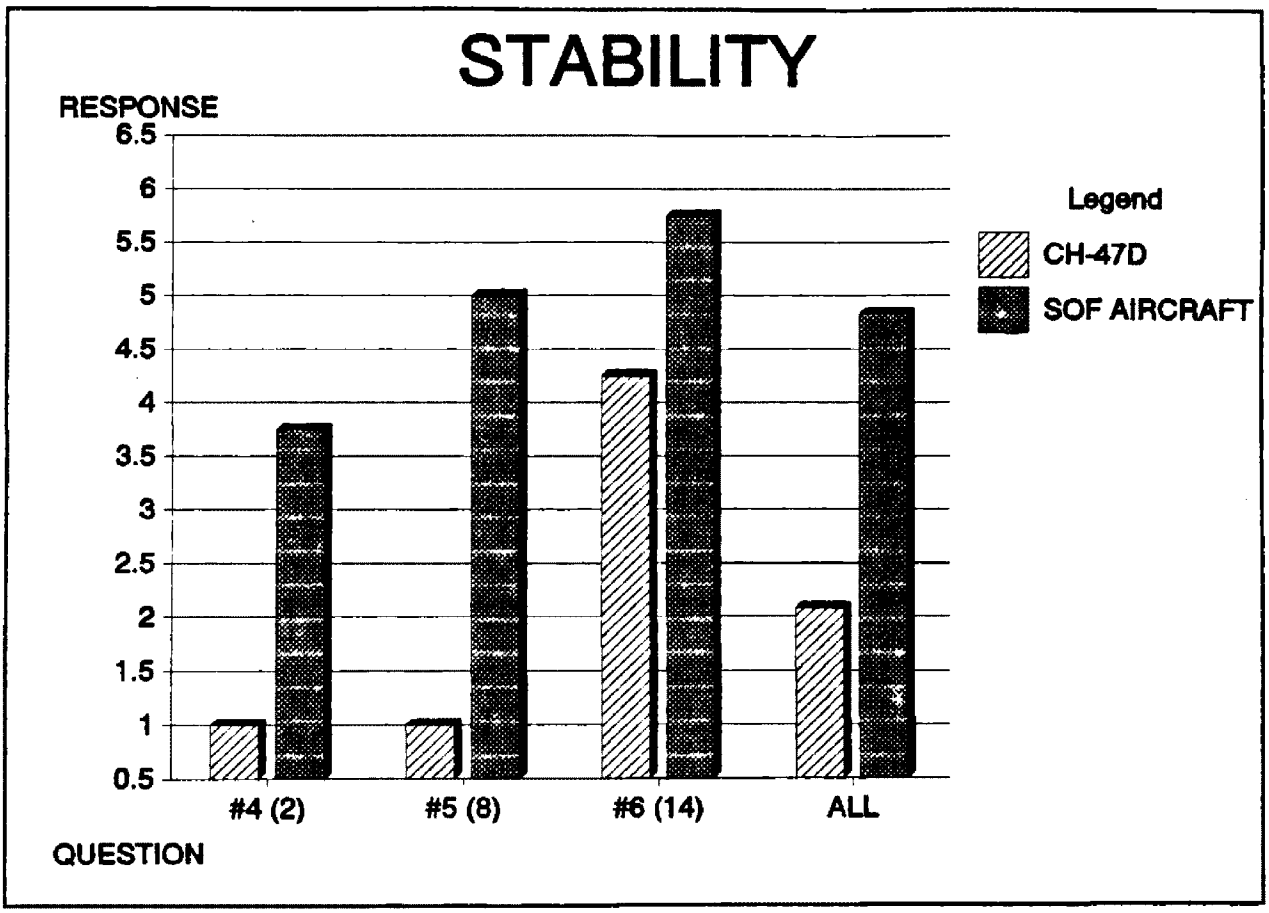


Figure 4.

The was a large difference in the responses in this area (Figure 4). On question four, *This program has long term stability,* and question five, *This program has unrealistic parameters on cost, scheduling and performance,* the CH-47D program responses agreed completely with the statements. As one respondent stated, "The CH-47D modernization program has always been on schedule and cost". With the SOF Aircraft procurement, the lack of stability seemed to be a major problem. One response stated that "It is a credit to (the) Program Manager it (the program) stayed on course at all with the many program changes".

**Limited Reporting Requirements:**

Limited reporting requirements is the third feature identified in the Packard Commission model. The Commission's meaning of limited reporting requirements is as follows:

> "A commercial program manager reports to his CEO. Typically, he does so on a *management-by-exception* basis, focusing on deviations from plan." (Packard Commission, 1986)

Reporting requirements seem to be a problem area for both the CH-47D and the SOF aircraft programs. This area also prompted negative comments from both programs. As stated by one respondent, "Many of the reoccurring reports convey information which is 90-95% historical and (is) of no value as a management tool". There was some confusion as to what "management by exception" meant. Because of this, question eight was eliminated.

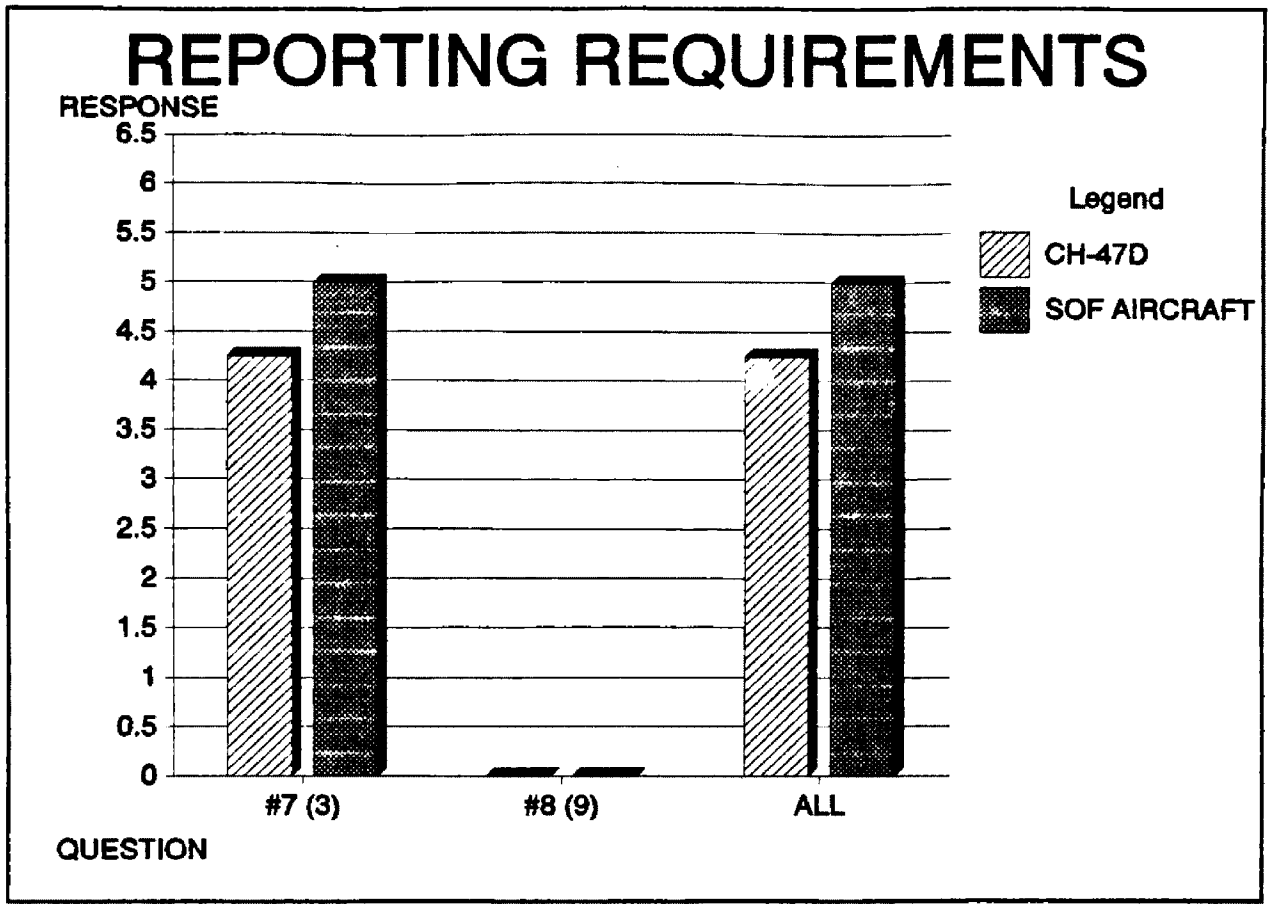

Figure 5.

**Small, High Quality Staffs:**

The fourth feature of the Packard Commission's report is small, high quality staffs. The commission describes these staffs as follows:

> "Generally, commercial program management staffs are much smaller than in typical defense programs, but personnel are hand selected by the program manager and are of high quality. Program staff spend their time managing the program, not selling or defending it." (Packard Commission, 1986)

Over-all, the CH-47D program seemed to be satisfied with the staffs that were assigned to the program, however, the respondents thought that the staffing was too small in relation to the program size. One respondent stated, "Major staff reductions

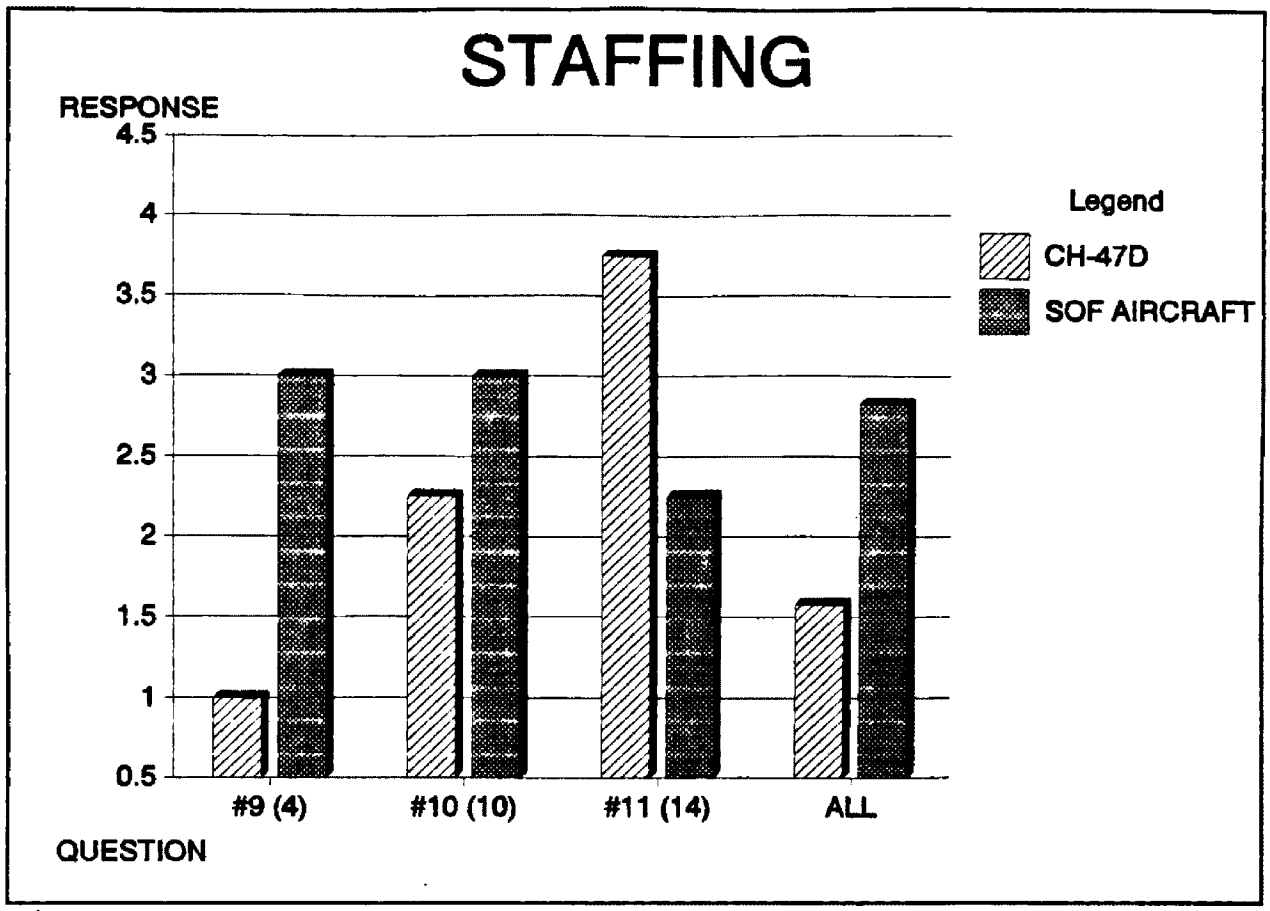


Figure 6.

in 1985 under 'matrix' initiatives, but no corresponding work reduction". The responses concerning the quality of the people working on both programs seem high. A SOF Aircraft program respondent stated, "We have been very lucky with staffing. The mission of the aircraft motivates many", and "A small, close and very functional group with a wide variety of capabilities".

**Communication with Users:**

The fifth underlying feature defined by the Packard Commission was communication with users. The Commission define communication with users as

follows:

"A commercial program manager establishes a dialogue with the customer, or user, at the conception of the program when the initial trade-offs are made, and maintains that communication throughout the program. Generally, when developmental problems arise, performance tradeoffs are made -- with the user's concurrence -- in order to protect cost and schedule. As a result, a program manger is motivated to seek out and address problems, rather than hide from them." (Packard Commission, 1986)

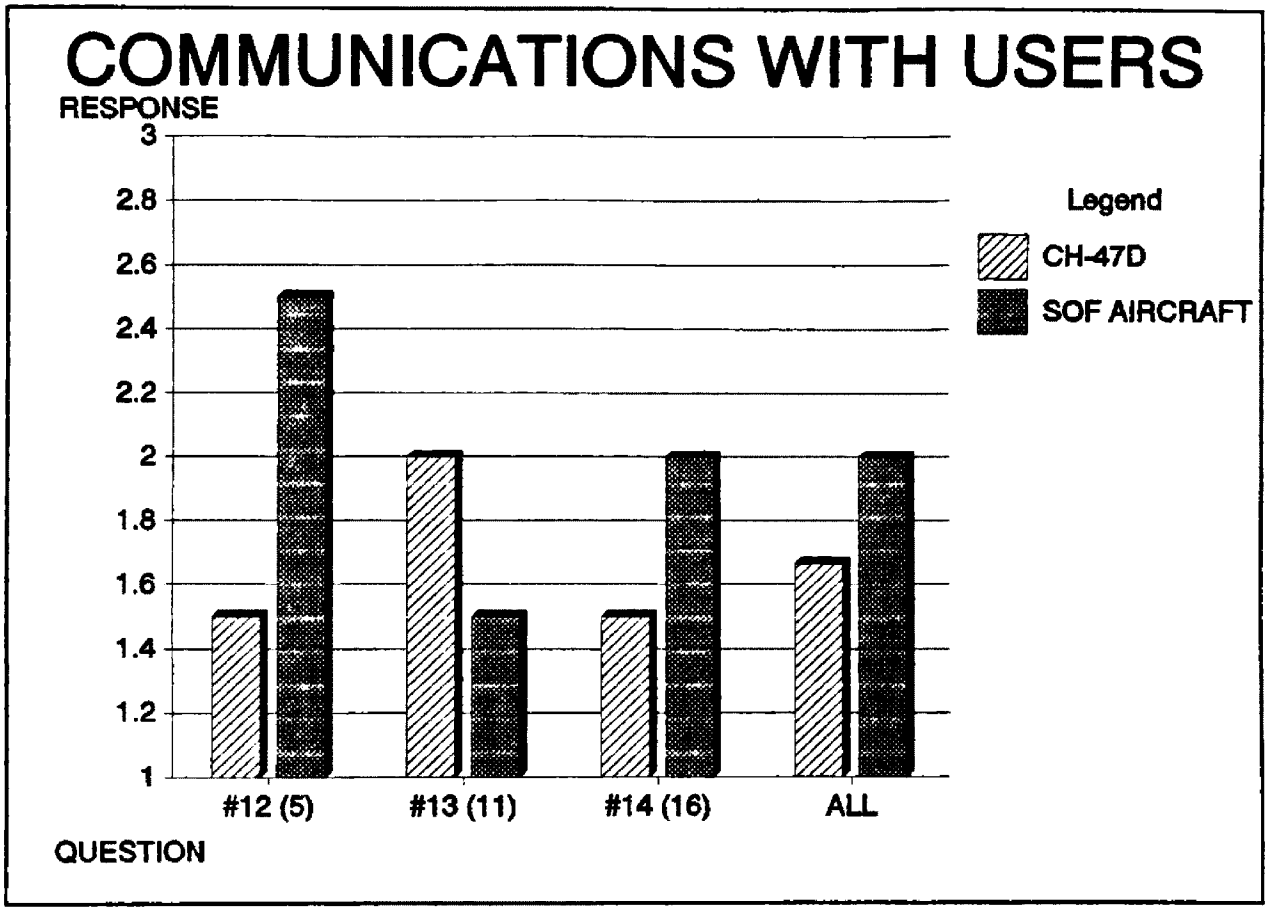


Figure 7.

Generally, both programs seem to be satisfied with the quality of communication with the end user. The comments showed that the SOF aircraft program had some difficulties with the end user leadership. One SOF program respondent said, "User leadership is not always on line, but (the) lower levels have direct real time involvement".

**Prototyping and Testing:**

The last of the six underlying features that typified the most successful commercial programs is prototyping and testing. The Commission described prototyping and testing as follows:

> "In commercial programs, a system (or critical subsystem) involving unproven technology is realized in prototype hardware and tested under simulated operational conditions before final design approval or authorization for production. In many cases, a program manager establishes a *red team*, or devil's advocate, within the program office to workout pitfalls -- particularly those that might arise from operational problems, or from an unexpected response by a competitor. Prototyping, early operational testing, and red teaming are used in concert for the timely identification and correction of problems unforeseen at a program's start." (Packard Commission, 1986)

There was a wide gap in the responses of the two programs. Almost all of the responses of the CH-47D program were in total agreement as to quality and quantity of the prototyping and testing of the program. The SOF program had problems throughout with this issue. Comments from the SOF respondents were, "Prototypes were built, however schedule and funding dictated concurrency with low rate initial production", "Very limited testing. Production was blessed prior to completion of the prototype" and, "Have prototypes, but also a very compressed schedule".

**Statistical analysis:**

In order to determine if the results of the questionnaire were statistically significant, The Wilcoxon Rank Sum Test for Independent Samples was performed on each of the questions. The Wilcoxon test was chosen because the data scale was

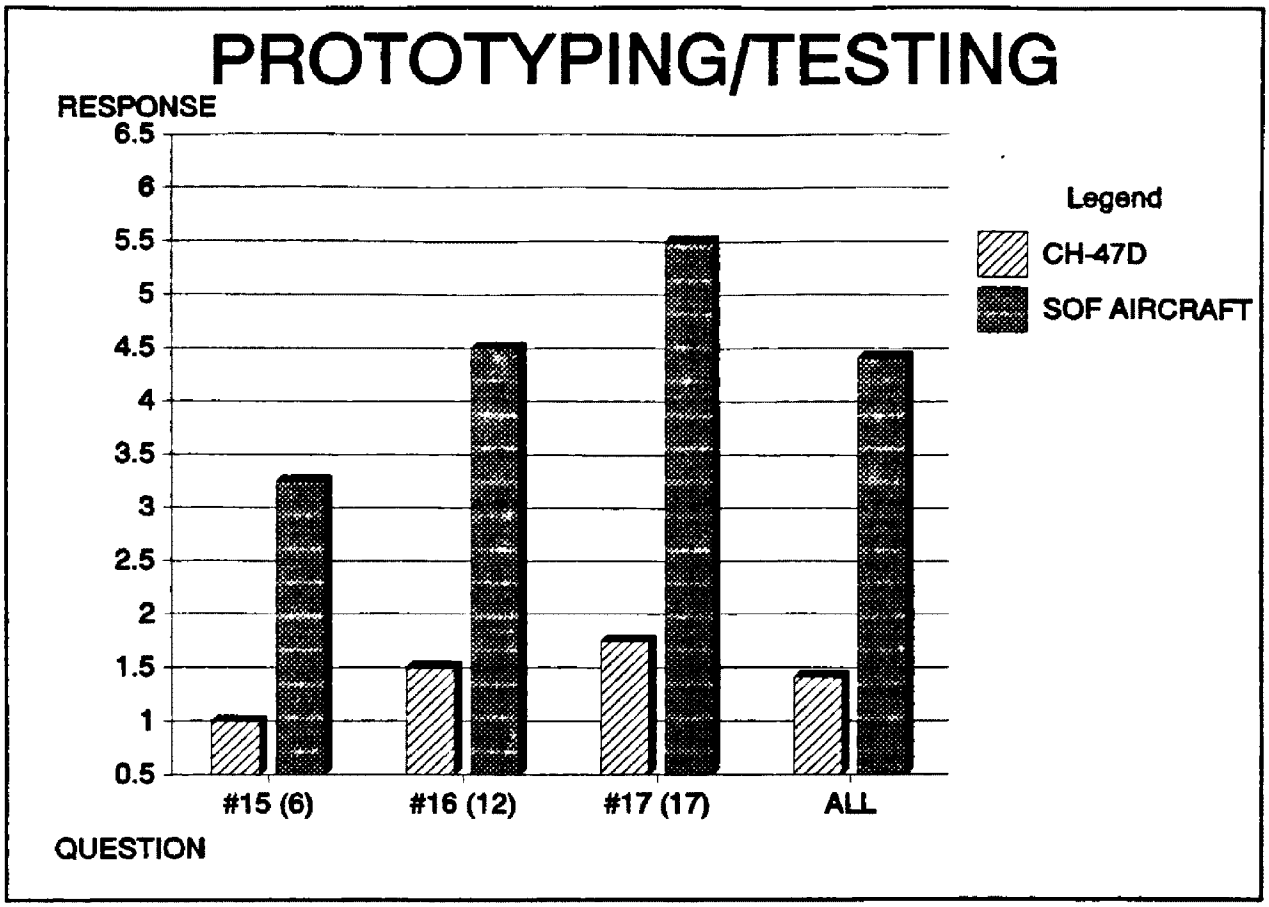


Figure 8.

ordinal and the problem objective was to compare two independent populations. The null hypothesis was that the responses from the two programs were the same. The alternative hypothesis was that the responses of the SOF aircraft program were different then that of the CH-47D program. The significance level was set at alpha of .10 (Keller, et al, 1990).

The results from the Wilcoxon test can be found in figure 7. The test revealed that the responses to questions 4,5,15,16, and 17 were found to be statistically significant. These questions related to two specific areas, stability and prototyping and testing. Even though only responses to five questions were found to be significant, almost all of the responses from The CH-47D program were lower than

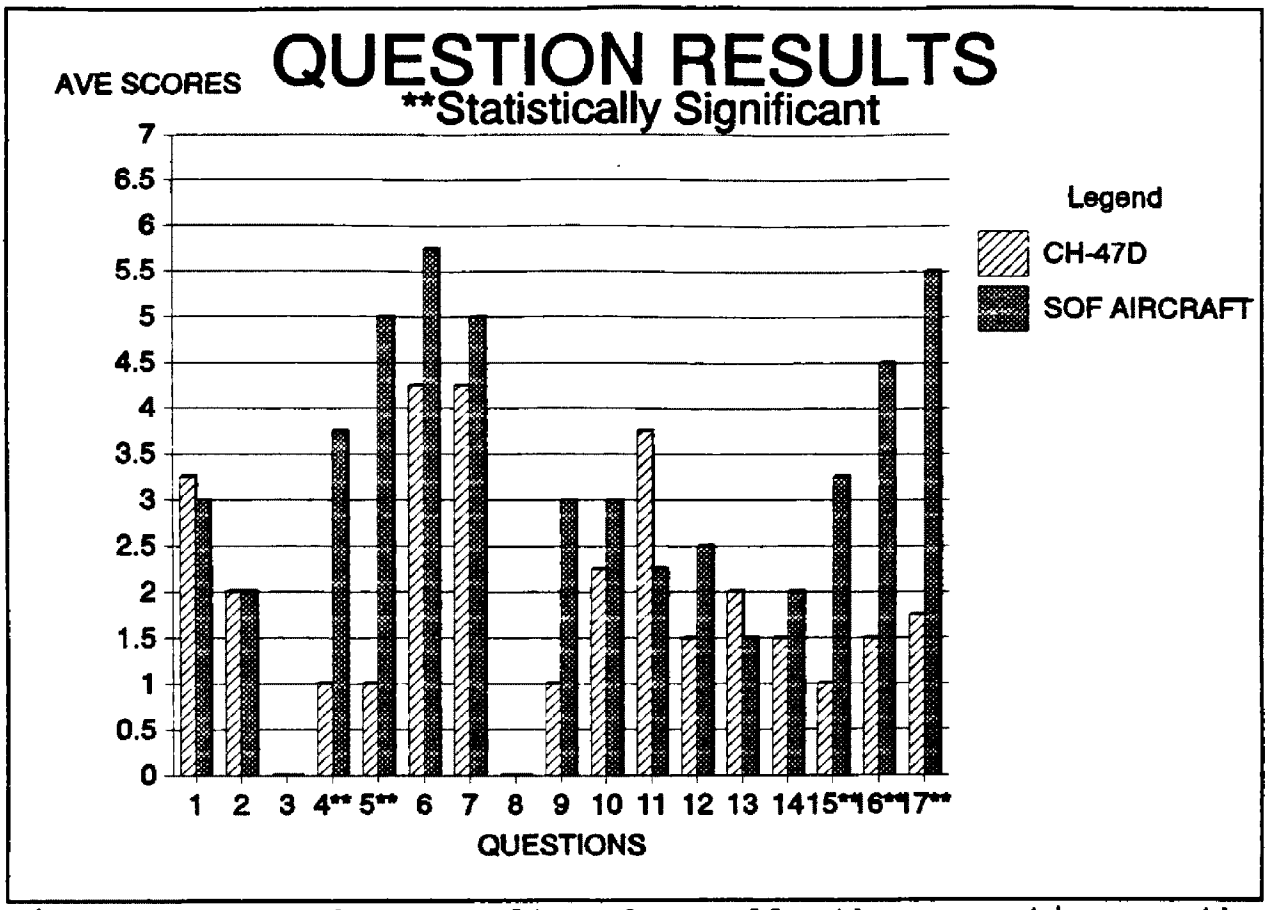


Figure 7. The results for all the questions, the statistically significant responses are marked with an asterisk.

that of the SOF Aircraft program.

## VI. SUMMARY

In 1986, when President Reagan established the Blue Ribbon Commission on Defense Management, he was looking in part for an answer to the acquisition dilemma. The motivation was largely due to eroding Congressional and public confidence in light of "*overpriced spare parts, test deficiencies, and cost and schedule over-runs*" (Packard Commission, 1986). The Packard Commission, in a section called "an acquisition model to emulate", identified six management features evident in successful commercial programs. These features were based on the analysis of a number of successful commercial programs. This paper has attempted to answer whether those features are present in two current Army acquisition programs. One acquisition, the Ch-47 D program, is generally considered a very successful program and the second, the SOF aircraft program, has been plagued by problems in cost over-runs and program scheduling.

The survey identified two areas which were statistically significant in the differentiation of the two acquisition programs; stability and the use of prototyping and testing. Although the other areas addressed in the survey were relatively close in their responses, the CH-47 D program was consistently more in agreement with the Packard Commision Report than that of the SOF aircraft program. This consistency of responses would tend to support the assumption that the areas identified in the Packard Commission's report are present in successful programs, even though the responses to these questions were not statistically significant.

In the area of stability, there was a large divergence in the responses of the

two programs. For the question "This program has long term stability", all respondents from the CH-47 D model program stated they totally agreed with the statement (average of 1) while the SOF aircraft program respondents tended to be neutral (average of 3.75). In response to the second stability question, "This program has realistic parameters on cost, scheduling and performance", the CH-47 D program respondents again totally agreed with the statement while the SOF program respondents disagreed (average of 5). While the responses to the last question in the area of stability, "Funding has not been a problem due to changes in the program", were not statistically significant, there still was a wide gap in the responses in the two programs. Most defense programs probably feel the pinch of funding problems and relate them to changes in their program. As one CH-47D program respondent stated *"Lack of funding is the root of all evil"*.

The responses by the SOF aircraft program in the area of stability are not surprising due to the large numbers of changes in the program itself and the impact of the loss of the V-22 Tilt-rotor program. The initial philosophy that the SOF program would be non-developmental, and the urgency in which the aircraft were needed, impacted dramatically on the long term stability of the program. Since the Air Force was losing the special forces mission, the Department of the Defense planners were in essence, trying to speed the developmental process. With the realization that the requirements of the aircraft systems were expanding and the increased risk involved in the process, there was going to be a need for developmental and operational testing. This additional testing

operational testing. This additional testing strained the long term stability of the SOF program.

Stability has long been known as serious defense acquisition problem in both the commercial and government sectors. In 1983, the Air Force Systems Command investigated ways to shorten the acquisition process and procure weapons at a lower cost. The study reviewed the cost and scheduling histories of 109 acquisition programs and concluded that "*program instability is the major causative factor of cost and schedule growth*" (Air Force System Command, 1983). Frank Carlucci, former Defense Secretary, once stated that "*We all know what is fundamentally wrong with the acquisition system, time and again instability has been scored as its most chronic defect*" (F. C. Carlucci, 1988). David Packard, the head of the Presidents Blue Ribbon Commission stated that "*Without stability, no permanent acquisition improvements are possible*" (U.S. Senate, Committee on Armed Services, 1986).

Prototyping and testing proved to be another area in which the programs were significantly different. The first question in this area, "This system was proven using prototyping of the hardware", showed that the CH-47 D program was in total agreement with the statement while the SOF program tended to be more neutral in its response. The next two questions dealt with testing the system's design under simulated operational conditions and the timely identification of problems using testing and prototyping. Both questions showed a wide disparity between the two programs in that the CH-47 D program responses were almost in total agreement with all the questions in this section, while the SOF Aircraft program responses were, on average,

the highest for the entire questionnaire.

The questions on prototyping and testing prompted responses indicative of the problems experienced by the SOF aircraft program. One respondent stated they had "*very limited testing. Production was blessed prior to completion of the prototype.*" and "*Prototypes were built, however scheduling and funding dictated concurrency with low rate production*".

The main problem with the SOF aircraft program is derived from the initial thought that the SOF aircraft would be a non-developmental item and would require no developmental or operational testing. Since the risk of the program was determined to be large (GAO, 1990), the testing process was added after the acquisition process had begun. The high risks that the General Accounting Office identified as inherent to the SOF aircraft program included fielding systems requiring expensive retrofits and providing aircraft that would be unable to perform their required mission.

In this project, there were some limitations as to the internal validity of the results. The two programs, although they both dealt with similar aircraft, were of different contract types. The acquisitions were also different in respect to the procurement time frame and the criticality of the mission aircraft. The surveyed population was limited in size, but was substantial enough to perform the Wilcoxon Rank Sum Test for Independent Samples. In light of these problems, there can be drawn some valid conclusions concerning these two programs. First, the Packard Commission's six underlying features of a successful acquisition program are evident

in what is generally considered as a timely, cost effective program. Secondly, instability and the lack of prototyping and testing were major factors in the degradation of the procurement process in the SOF aircraft program.

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**APPENDIX A.** Survey Questionnaire and results.

**BACKGROUND INFORMATION:**

Title/Position:_____ Yearswiththe program:_____ Mil/Civ_____

QUESTIONNAIRE:

Please answer the question by indicating whether you agree or disagree by marking an X along the scale. Provide any comments in the area provided.

1. This program has a short, unambiguous chain of command.
   AGREE 1-----2-----3-----4-----5-----6-----7 DISAGREE
   NEUTRAL

COMMENTS:

2. This program has long term stability.
   AGREE 1-----2-----3-----4-----5-----6-----7 DISAGREE
   NEUTRAL

COMMENTS:

3. There have been extensive reporting requirements.
   AGREE 1-----2-----3-----4-----5-----6-----7 DISAGREE
   NEUTRAL

COMMENTS:

4. The staffing for this program has been excessive.
   AGREE 1-----2-----3-----4-----5-----6-----7 DISAGREE
   NEUTRAL

COMMENTS:

5. The program staff has had poor communication with the end user.
   AGREE 1-----2-----3-----4-----5-----6-----7 DISAGREE
   NEUTRAL

COMMENTS:

6. The system was proven using prototyping of the hardware.
AGREE 1-----2-----3-----4-----5-----6-----7 DISAGREE
NEUTRAL
COMMENTS:

7. The Program Manager has clear responsibility for the program.
AGREE 1-----2-----3-----4-----5-----6-----7 DISAGREE
NEUTRAL
COMMENTS:

8. This program has unrealistic parameters on cost, scheduling and performance.
AGREE 1-----2-----3-----4-----5-----6-----7 DISAGREE
NEUTRAL
COMMENTS:

9. Reporting is accomplished by a "Management by exception principle.
AGREE 1-----2-----3-----4-----5-----6-----7 DISAGREE
NEUTRAL
COMMENTS:

10. Personnel involved with this program are of the highest calibre.
AGREE 1-----2-----3-----4-----5-----6-----7 DISAGREE
NEUTRAL
COMMENTS:

11. All developmental problems and performance tradeoffs were made without the users' concurrence.
AGREE 1-----2-----3-----4-----5-----6-----7 DISAGREE
NEUTRAL
COMMENTS:

12. The system's design was tested under simulated operational conditions before final design approval or production authorization.

AGREE 1-----2-----3-----4-----5-----6-----7 DISAGREE

NEUTRAL

COMMENTS:

13. The Chief Executives Office does not have clear authority to resolve any conflicts.

AGREE 1-----2-----3-----4-----5-----6-----7 DISAGREE

NEUTRAL

COMMENTS:

14. Funding has been a problem due to changes in the program.

AGREE 1-----2-----3-----4-----5-----6-----7 DISAGREE

NEUTRAL

COMMENTS:

15. The program staff spends most of their time managing the program, not "selling of defending" it.

AGREE 1-----2-----3-----4-----5-----6-----7 DISAGREE

NEUTRAL

COMMENTS:

16. Quality communication with the end user has been inconsistent throughout the program.

AGREE 1-----2-----3-----4-----5-----6-----7 DISAGREE

NEUTRAL

COMMENTS:

17. Prototyping and operational testing were used together for timely identification and correction of problems that were unforeseen at the programs start.

AGREE 1-----2-----3-----4-----5-----6-----7 DISAGREE

NEUTRAL

COMMENTS:

**APPENDIX A.** Survey Questionnaire and results.

Please answer the following questions:
A) What were the major accomplishments of the program?

b) What were the major problems with the program?

Thank you for your time and effort with this project. If you have any questions, please contact me at (406) 251-2793

John M. Wilson
CPT, AV

**SURVEY RESULTS:**

SOF Aircraft Modification:

| Original Number | Adjusted Number | | | | | Average |
|---|---|---|---|---|---|---|
| **Clear Command Channels.** | | | | | | |
| 1 | 1 | 4 | 1 | 5 | 2 | 3 |
| 7 | 2 | 3 | 1 | 3 | 1 | 2 |
| **Stability.** | | | | | | |
| 13 | 3 | 0 | 0 | 0 | 0 | 0 |
| 2 | 4 | 5 | 2 | 5 | 3 | 3.75 |
| 8 | 5 | 6 | 7 | 5 | 2 | 7.75 |
| **Limited Reporting Requirements.** | | | | | | |
| 14 | 6 | 6 | 7 | 6 | 4 | 5.75 |
| 3 | 7 | 4 | 7 | 5 | 4 | 5 |
| 9 | 8 | 0 | 0 | 0 | 0 | 0 |
| **Small, High Quality Staffs.** | | | | | | |
| 4 | 9 | 1 | 7 | 1 | 3 | 3 |
| 10 | 10 | 2 | 1 | 7 | 2 | 3 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 15 | 11 | 2 | 1 | 2 | 4 | 2.25 |
| **Communication with Users.** | | | | | | |
| 5 | 12 | 2 | 1 | 5 | 2 | 2.5 |
| 11 | 13 | 2 | 1 | 2 | 1 | 1.5 |
| 16 | 14 | 2 | 1 | 4 | 1 | 2 |
| **Prototyping and Testing.** | | | | | | |
| 6 | 15 | 3 | 3 | 3 | 4 | 3.25 |
| 12 | 16 | 3 | 6 | 2 | 7 | 4.5 |
| 17 | 17 | 6 | 5 | 5 | 6 | 5.5 |

CH-47 D Modifications:

| | | | | | | |
|---|---|---|---|---|---|---|
| **Clear Command Channels.** | | | | | | |
| 1 | 1 | 7 | 1 | 1 | 4 | 3.25 |
| 7 | 2 | 3 | 1 | 3 | 1 | 2 |
| **Stability.** | | | | | | |
| 13 | 3 | 0 | 0 | 0 | 0 | 0 |
| 2 | 4 | 1 | 1 | 1 | 1 | 1 |
| 8 | 5 | 1 | 1 | 1 | 1 | 1 |
| **Limited Reporting Requirements.** | | | | | | |
| 14 | 6 | 1 | 5 | 1 | 4 | 1.75 |
| 3 | 7 | 4 | 2 | 7 | 4 | 4.75 |
| 9 | 8 | 0 | 0 | 0 | 0 | 0 |
| **Small, High Quality Staffs.** | | | | | | |
| 4 | 9 | 1 | 1 | 1 | 1 | 1 |
| 10 | 10 | 3 | 1 | 2 | 3 | 2.25 |
| 15 | 11 | 1 | 3 | 2 | 1 | 1.66 |
| **Communication with Users.** | | | | | | |
| 5 | 12 | 2 | 2 | 1 | 1 | 1.5 |
| 11 | 13 | 4 | 2 | 1 | 1 | 2 |
| 16 | 14 | 2 | 2 | 1 | 1 | 1.5 |
| **Prototyping and Testing.** | | | | | | |
| 6 | 15 | 1 | 1 | 1 | 1 | 1 |
| 12 | 16 | 2 | 2 | 1 | 1 | 1.5 |
| 17 | 17 | 2 | 1 | 1 | 3 | 1.75 |

**APPENDIX B.** Questionnaire comments.

The numbers in the parenthesis are the original order that they were asked. The questions have been realign into the six areas as described by the Packard Commission.

**Clear Command Channels.**

1.(1) This program has a short, unambiguous chain of command.

CH-47 D modification:

* The Logistic's division reports through both AVSCOM and PEO. At times this redundant effort causes priority issues to be put on hold.
* Everyone is in charge and therefore no one is!

SOF Aircraft:

* Transition from the Army to SOCOM management has not been trouble free. Army still wants a hand in management.

2.(7) The program manager has clear responsibility for the program.

CH-47 D modification:

* AMC has not relinquished one iota of responsibility to PEO structure.
* Overall responsibility are clear. With regards to sustainment/readiness, we are in a state of confusion.

SOF Aircraft:

* None

3.(13) Thrown out.

**Stability.**

4.(2) This program has long term stability.

CH-47 D modification:

* The CH-47D modernization program has always been on schedule and cost.
* Attribute to multiyear procurement.

SOF Aircraft:

* Within a low density aircraft fleet.
* It is a credit to (the) PM it has stayed on course at all with the many program changes.

5.(8) This program has unrealistic parameters on cost, scheduling and performance.

CH-47 D modification:

* The basic CH-47D program has realistic parameters.

SOF Aircraft:

* Had it been properly staffed from the start, the goals would have been more realistic.

6.(14) Funding has been a problem due to changes in the program.

CH-47 D modification:

* The basic program has remained stable. We have funding shortfalls mainly due to ECP's to better serve the user. We also have funding issue due to Operation Desert Storm.

* All solvent programs experienced pressure to fund unprogrammed requirements to support Desert Storm.

* Lack of funding is the root of all evil.

SOF Aircraft:

* No comments.

**Limited Reporting Requirements.**

7.(3) There have been extensive reporting requirements.

CH-47 D modification:

* Many of the recurring reports convey information which is 90-95% historical and is of no value as a management tool.

* Many reports should be combined.

SOF Aircraft:

* SOCOM not sure yet what they want.

* There have been extensive historical/back briefings/ updating matrix support people.

8.(9) Thrown out.

**Small, High Quality staffs.**

9.(4) The staffing for this program is excessive.

CH-47 D modification:

* Overall program staffing has been adequate. We need authority to more (sic) personnel as required due to program changes.

* Major staff reductions in 1985 under "matrix" initiatives, but no corresponding work reductions.

* I have reduced staffing by 25% in four years.

SOF Aircraft:

* No comments.

10.(10) Personnel involved with this program is of the highest calibre.

CH-47 D modification:

* I believe personnel involved with the CH-47D program is well above average.

**APPENDIX B.** Questionnaire Comments.

SOF Aircraft:

* We have been very lucky with staffing. The mission of the aircraft motivates many.
* A small, close and very functional group with a wide variety of capabilities.

11.(15) The program staff spends most of their time managing the program, not selling or defending it.

CH-47 D modification:

* The program sold itself.

SOF Aircraft:

* Lot of time spent selling and defending the program.

**Communication With Users.**

12.(50) The program staff has poor communication with the user.

CH-47 D modification:

* We have great communication with the user.

SOF Aircraft:

* User leadership is not always on line, but lower level has direct real time involvement.

13.(11) All developmental problems and performance tradeoffs were made without the users' concurrence.

CH-47 D modification:

* Those that affected the REC were coordinated.
* The user participated as a member of the CH-47D development team.

SOF Aircraft:

14.(16) Quality communication with the end user has been inconsistent throughout the program.

CH-47 D modification:

* Strongly disagree.

SOF Aircraft:

* Good communication

**Prototyping and Testing.**

15.(6) This system was proven using prototyping of the hardware.

CH-47 D modification:

* Three prototype aircraft had full D.T./O.T. tests and demonstrated REC requirements.
* Three prototypes tested for over three years plus accel. svs. life aircraft

tested for ten years during production.
SOF Aircraft:
* NDI off the shelf modifications with excessive integration.
* Have prototypes but also a very compressed schedule.

* Prototypes were built, however schedule and funding dictated concurrency with low rate production.

16.(12) The system's design was tested under simulated operational conditions before final design approval or production authorization.
CH-47 D modification:
* Done as required.
SOF Aircraft:
* The modification package was considered "off the shelf" to an existing/proven package.
* Very limited testing. Production was blessed prior to completion of the prototype.

17.(17) Prototyping and operational testing were used together for timely identification and correction of problems that were unforeseen at the programs start.
CH-47 D modification:
* The prototyping and operational tests were separate programs, however both were used to identify and correct problems.
SOF Aircraft:
* Operational testing was part of the program based on MS O/I MARB.

**Major accomplishments.**
CH-47 D modification:
* Always below costs. Always within 60 days of schedule (off only during groundings). It meets all requirements.
* Program has been executed within cost and schedule.
* The CH-47 modernization program is a total success. We are in the 10th year of production and remain on schedule and cost. We have also successfully fielded the active Army with 95% availability of ASL/PLL and special tools.
* On time, on cost, exceeding all technical and performance requirements specified by the user.

SOF Aircraft:
* Provided unique aircraft for special operations. First truly integrated cockpit for helicopters.
* In spite of funding and service fighting, the prototypes are flying.
* In spite of program dynamics and budget cuts we have managed to keep the

program on track and viable. We are now actually on the verge of awarding production contracts.

* Completion of prototypes, technical testing and obtaining a fully funded program.

**Major Problems.**

CH-47 D modification:

* Cost, ie. more system should have been modernized (cockpit,rotorhead, ect.) but only so many dollars were available for development/production.

* During 1989, after the loss of an aircraft, a joint technical review team recommended several improvements to the airframe and quality (on track an Boeing).

* Program delivery ends October 1993. This, plus other business base reductions have caused a shift of key contractor personnel to commercial and higher visibility military programs, result is reduced levels and timeliness of contractor management support.

* Spares support at initial fielding and very large technical issues discovered five years into production.

SOF Aircraft:

* Gain matrix, operational/technical tester support. Getting AAA to understand the program.

* Having to live with all the problems a compressed schedule creates and the reliance on benefits from other programs that did not materialize.

* Impacts of changes in the military industrial base. Contractors hidden agendas and lack of urgency.

* Funding cuts and diversions.