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THE AVENGER AND SGT YORK: AN EXAMINATION OF TWO AIR DEFENSE SYSTEMS NONDEVELOPMENTAL ITEM ACQUISITION PROGRAMS

by

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With the Department of Defense's (DOD) budget continuing to be reduced, DOD acquisition managers must acquire technologically superior weapon systems within shorter time periods with less resources. One effective way to accomplish this is to utilize an NDI Acquisition program. This thesis analyzes two NDI Acquisition programs, the SGT York and Avenger Air Defense Systems, to determine what factors made SGT York a failure and Avenger a success. From this analysis, lessons-learned are identified that can be used by other acquisition managers and their staffs to effectively manage future programs. Significant lessons-learned indicate that the maturity of the system, high-level support, media support, and program managers skilled at properly tailoring an NDI program are critical to the success of an NDI program.

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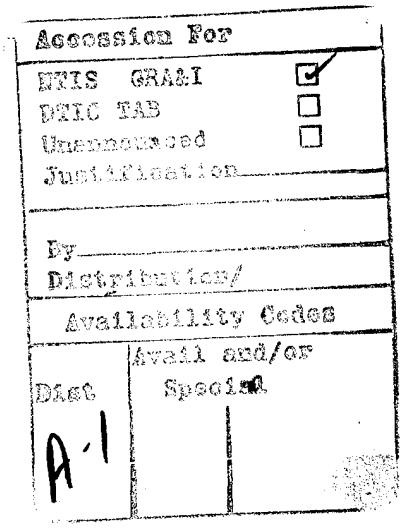

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ABSTRACT

With the Department of Defense's (DOD) budget continuing to be reduced, DOD acquisition managers must acquire technologically superior weapon systems within shorter time periods with less resources. One effective way to accomplish this is to utilize an NDI Acquisition program. This thesis analyzes two NDI Acquisition programs, the SGT York and Avenger Air Defense Systems, to determine what factors made SGT York a failure and Avenger a success. From this analysis, lessons-learned are identified that can be used by other acquisition managers and their staffs to effectively manage future programs. Significant lessons-learned indicate that the maturity of the system, high-level support, media support, and program managements skilled at properly tailoring an NDI program are critical to the success of an NDI program.

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I. INTRODUCTION

A. BACKGROUND

It has become increasingly critical that Department of Defense (DOD) acquisition managers acquire technologically superior weapon systems within fixed periods with minimal resources. One successful Air Defense acquisition was the Avenger program, which utilized a Non-developmental Item (NDI) acquisition strategy. The SGT York also utilized an NDI acquisition strategy but ended as a failed program.

There are two characteristics that make study of the Avenger and SGT York programs interesting. The first characteristic is the success that the Avenger NDI program has enjoyed versus the troubled SGT York NDI program. Both systems used proven and reliable components, but one was a great success and the other a failure.

The second characteristic is that the Avenger and the SGT York both used accelerated acquisition strategies. The Avenger Program went from Milestone III to its Initial Operational Capability (IOC) in approximately 2.5 years, whereas SGT York was already 4.5 years past Milestone III and never reached its IOC prior to its cancellation.

This Thesis will utilize the definition of an acquisition strategy as defined by DOD 5000.2 to look at the acquisition programs of SGT York and Avenger. DOD 5000.2 defines acquisition strategy as:

> A combination of business and technical management concepts designed to achieve program objectives within imposed resource constraints. It is the framework for managing research, development, test, production, fielding support and other essential program activities. [Ref. 1:p. 15-2]

Additionally, this thesis will look at other key factors that affected each program's success. These factors are not all inclusive. These factors are the most critical as seen by the Author.

B. OBJECTIVE

The purpose of this thesis is to examine the failed acquisition program of the SGT York Gun System and the successful acquisition program of the Avenger Air Defense System. From this examination, lessons-learned will be identified that will help other

acquisition managers to more effectively manage all future air defense system acquisition programs. These lessons-learned will also be beneficial for students studying acquisition management.

C. RESEARCH QUESTIONS

The following primary research questions were addressed in pursuing the objectives of this thesis: What are the major factors of the SGT York and Avenger acquisition programs that made the SGT York a failure and Avenger a success? What lessons can be learned from these factors that can be applied to other acquisition programs?

The subsidiary questions used to aid in determining the answers to the primary questions were:

1. What made the SGT York acquisition program a failure and what were the program's strong points?

2. What made the Avenger acquisition program a success?

3. What lessons-learned, that can be applied to DOD acquisition programs in general, can be gained from the study of the SGT York and Avenger programs?

D. SCOPE

This thesis covers only those aspects relating to the SGT York and Avenger acquisition programs as defined by the Author. Additionally, because this thesis focuses primarily on the program management and not on technical aspects, only a general description of the SGT York and Avenger and only as much technical specificity as necessary will be covered. Classified aspects of SGT York and Avenger will not be included.

E. LITERATURE REVIEWS AND METHODOLOGY

Background information was obtained from periodicals, reports, papers, DOD documents, and U.S. Army manuals. These materials were obtained from the Defense Technical Information Center, the Defense Logistics Systems Information Exchange, and

the Naval Postgraduate School Library. For the SGT York, additional information was obtained from the Office of the Program Executive Officer for Field Artillery Systems, Picatinny Arsenal, New Jersey and the U.S. Army Air Defense Artillery School, Fort Bliss, Texas, and interviews with former SGT York personnel. The Forward Area Air Defense (FAAD) Project Office at Redstone Arsenal, Alabama was the primary source of information concerning the Avenger, as well as interviews with current and former Avenger program personnel. Other Avenger program information came from Boeing Aerospace, Missiles and Space Division of the Boeing Defense and Space Group, Huntsville, Alabama and the Directorate of Combat Developments, Fort Bliss, Texas.

F. DEFINITIONS AND ACRONYMS

This thesis used concepts based upon DOD and Army definitions and acronyms used in acquisition management, SGT York and Avenger programs. Definitions of acquisition and program terms are provided throughout the thesis where needed, and Appendix A provides a consolidated list of acronyms.

G. ORGANIZATION

The organization of this thesis includes an introduction, four development chapters and a final chapter of conclusions and recommendations. Chapter II provides a brief review of the acquisition history of the SGT York and Avenger programs. Chapter III provides an analysis of the SGT York acquisition program. Chapter IV provides an analysis of the Avenger acquisition program. Chapter V describes the major lessons learned from the study of the SGT York and Avenger programs. Finally, Chapter VI presents conclusions and recommendations.

II. OVERVIEW

A. SGT YORK

At the conclusion of the Vietnam War, public reaction to military spending was at an all time low. The Soviet Union was busy building up their military machine and producing an unprecedented number of close air support aircraft, and the quality of these systems were impressive. The Soviets also recognized the capabilities demonstrated by the U.S. attack helicopters in Vietnam and began to produce large quantities of these as well.

As a result of this threat, the air defense community realized they needed a system to combat the Soviet air threat. The "Air Defense Evaluation Board Study, the Field Army Air Defense Study and the Short Range Air Defense Study" were conducted from 1970 to 1975. These studies set the stage for the development of a powerful, lethal, radar directed, self-propelled gun like the SGT York.

The major supporter for SGT York in the user community during this study period was Major General C.J. Levan, Commandant of the Air Defense Artillery School at Fort Bliss, Texas. He was heavily involved in conceptualizing the new system and was the champion of getting the concept of SGT York started. Additionally, Fort Bliss users were assisted by Army Material Command (AMC) in defining what was needed and what was possible in a new air defense gun system.

In June 1975, the Army had synthesized its air defense needs enough to allow the signing of a formal Letter Of Agreement (LOA) between Fort Bliss users and Rock Island Arsenal outlining the general requirements for a new air defense gun system. Under this agreement the new system would be a gun, not a gun/missile mix as first envisioned, primarily because of a high cost factor. [Ref. 2:p. 101] The LOA resulted in the beginning of the new development program.

The program was initially called the Army Gun Air Defense System (ARGADS). The first project manager was Colonel Russ Parker and Parker was in charge of a ten-man project management team whose first responsibility was to help the user finish the

Required Operational Capability (ROC). The initial ROC consisted of the following requirements:

1. Must be a self propelled gun.

2. Must be able to keep up with the combat maneuver elements of a heavy division.

3. It must be able to shoot down fixed-wing aircraft at specified ranges, which were executing specified maneuvers at specified speeds.

4. It must be able to shoot down helicopters at specified ranges and specified speeds. [Ref. 2:p. 103]

Because of the discontent in Congress and throughout the nation, with programs that took too long and cost too much, COL Parker's superior at AMC headquarters, Lieutenant General Sammet, suggested they move the program directly into full-scale engineering development. The key to this accelerated acquisition was the use of "off-the-shelf" components. In January 1977, following this strategy, the first Army Systems Acquisition Review Council (ASARC) addressed the issue of the chassis for the new system. The chassis selected under this decision was the M48A5 tank with a 750 horsepower engine. Additionally, the gun selected was a proven European design and the radar was from the F-16 Fighter Plane. [Ref. 2:p. 108]

After the approval of ASARC I, COL Parker moved quickly to revise the ROC to provide the necessary flexibility. It stipulated only twelve firm design requirements, and 43 others that could be traded off. The twelve firm design requirements were:

1. Eight second response time from target appearance to shooting.

2. 30 to 40 millimeter caliber cannon.

3. Acquisition/tracking radar.

4. Optical sensor.

5. On board power.

6. Ammunition family.

7. Identification, friend or foe (IFF) capability.

8. Crew size.

9. Environmental stresses.

10. Install on Government furnished M48A5 chassis.

11. Air transportable on C-5A.

12. Radio communications.

The 43 requirements which could be traded off in seeking optimum effectiveness included such elements as:

1. Target acquisition on the move.

2. Laser range finder.

3. Electronic counter-counter measures.

4. Built in test equipment.

5. Environmental control unit (air conditioning). [Ref. 3:p. 11]

Fort Bliss felt they had written a realistic requirements document which stretched gun computer technology to achievable limits and could handle the threat.

The initial Request for Proposal (RFP) consisted of 1000 pages and was published in April 1977. It requested proposals by July 1977 for a system that would satisfy the revised ROC and stay within a Design-to-Unit- Production-Cost (DTUPC) of $1.5 million each (constant dollars). The RFP included a very detailed, itemized cost estimate which Government engineers and cost analysts had developed. This was the ceiling below which competing contractors were to structure their cost proposals. [Ref. 2:p. 132]

Five companies decided to respond to the RFP: Ford Aerospace, General Dynamics, General Electric, Raytheon, and Sperry. Each prepared a proposal to satisfy the requirements within the Government cost ceiling. The proposals were received in July 1977. ASARC II was set for December 1977 and, according to instructions established from ASARC I, cost data on contractor proposals and the results from the Fort

Bliss Cost and Operational Effectiveness Analysis (COEA) were presented. SGT York was given the go ahead to enter Full-Scale Engineering Development (FSED). Contracts with Ford Aerospace and General Dynamics (for $39 million each) to develop competitive prototypes within two years were signed in January 1978. Throughout the rest of 1978 and 1979 the two contractor teams developed their designs. By the end of 1979 they were putting together hardware and implementing the computer software. [Ref. 2:pp. 142-147]

The RFP for initial production was issued to Ford Aerospace and General Dynamics in April 1980, 27 months after the full scale engineering development contracts were issued. The RFP, which was 1250 pages plus an additional six amendments, stated in detail the requirements for fixing the shortcomings evidenced in the shoot-off (which wouldn't actually occur for another two months after this RFP was released), conducting a check test to insure all fixes were accomplished, completing the development of the Integrated Logistics Support (ILS) package, preparing the tooling and production facilities and, finally, producing and delivering 263 vehicles. [Ref. 4:p. 7]

The shoot-off was conducted in the early summer 1980 and was broken down into two tests. The objective of the first test was to determine the accuracy of the gun systems. Crews fired approximately 250 engagements against fixed-wing aircraft and full and subscale helicopters. According to the test results, General Dynamic's gun out shot Ford's, destroying 19 targets compared to nine for Ford. In other tests, General Dynamics gun scored direct hits against subscale drones that were almost twice as far away as Ford's target hits. The second test was a field problem designed to test the systems reliability, maintainability, and durability, which was barely won by Ford. [Ref. 5:p. 30]

Evaluation of the proposals was conducted in late 1980 based on the selection criteria of cost, system performance, tactical suitability, supportability, interoperability and producability. Quality of management was also a criterion. Contract negotiations were held with Ford and General Dynamics from January through May 1981. The General Dynamics' total contract package cost 8% more than Ford's. This was the deciding factor between Ford and General Dynamics. Ford Aerospace was awarded the contract on 5 May 1981. [Ref. 5:p. 34]

The Army contract with Ford Aerospace was a Fixed-Price-Incentive, Firm Target (FPIF) type of contract. The contract was divided into four major segments, a basic segment and three options. The Basic segment allocated the first contract year to designing and developing the Integrated Logistics Support (ILS) package, correcting the 41 problems identified in the shoot-off, as well as cleaning up the design in general. Option 1 was the option to buy 50 SGT YORK launch systems with associated engineering services support equipment, production facilities and literature for $328 million total target price. Option 2 was for buying an additional 96 vehicles with associated management, engineering, ammunition and testing services for a total target price of $396 million. Option 3 was in the contract for 130 vehicles and associated service and items for a total target price of $533 million. [Ref. 6:p. 3] Page 10, Figure 1 shows a rear view of SGT York.

The next four years SGT York ran into steadily increasing opposition. The production phase was an uphill battle primarily because of the accelerated acquisition strategy which removed five years from the normal development process. Consequently, the hardware and software had more than its share of problems that needed to be fixed. Additionally, because of these technical problems, operational test results were poor. The changing threat, and to no small degree the media attention from SGT York's poor testing, also contributed to Secretary of Defense Casper Weinberger canceling SGT York on 27 August 1985. In a press release he stated:

> Based on demonstrated operational tests the system's performance does not meet the military threat. The test also demonstrated that any marginal improvements that could be made to SGT York are not significant compared to the capability of current Air Defense systems and, therefore, not worth the cost. [Ref. 2:p. 178]

The final totals for SGT York was $1.8 billion spent and 65 SGT Yorks produced. Of the $1.8 billion, $300-500 million was salvaged for use on other systems. The rest was lost.

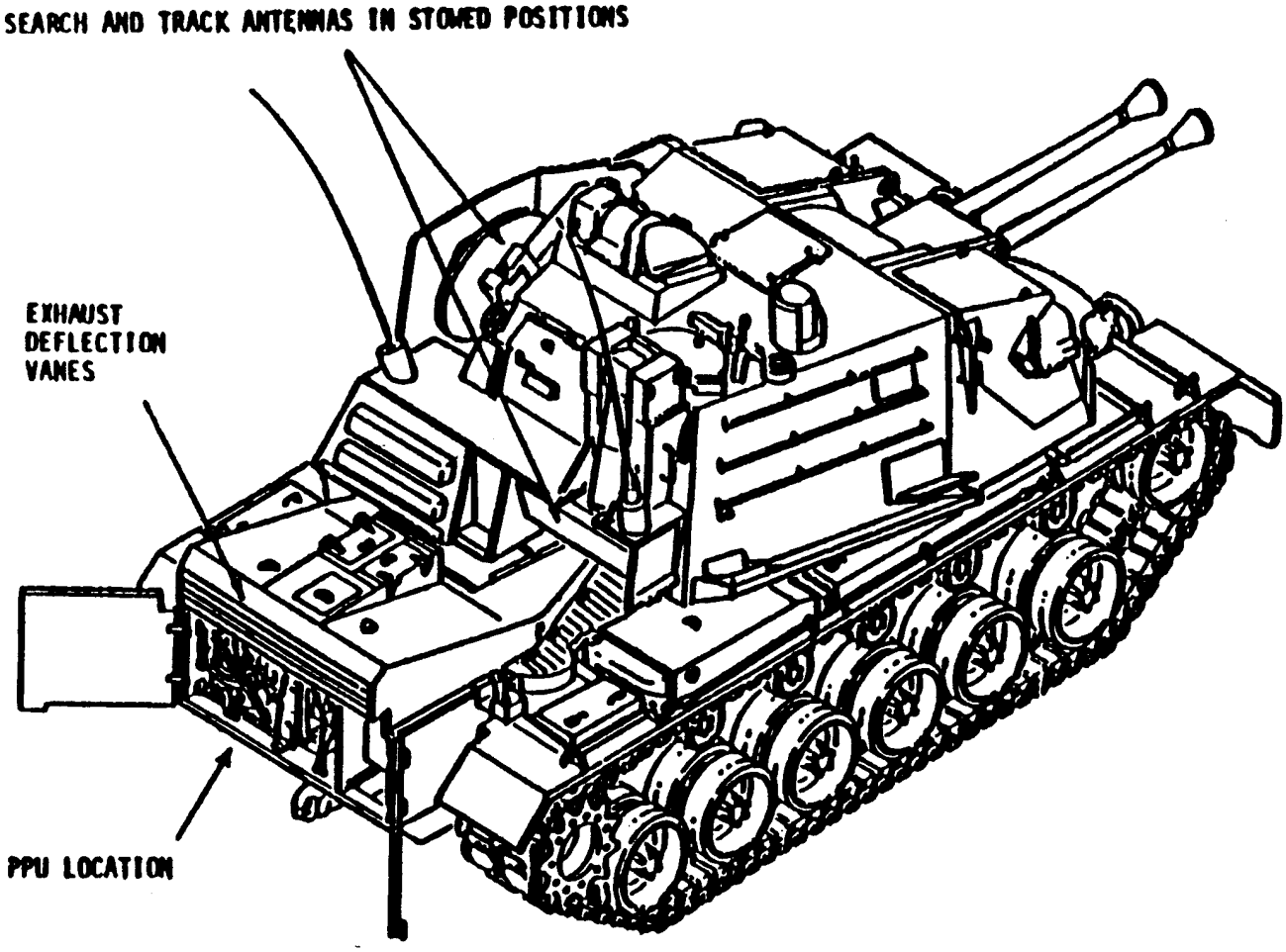

Figure 1. Rear View of M247 SGT York

B. AVENGER

The Avenger began in the early part of the 1980's by Boeing Aerospace Company, and was based on the potential possibility that the Army would need an air defense weapon system. At the time, Boeing was under contract to build the Roland Air Defense System for the U.S. Army. Engineers at Boeing attempted to fire Stinger missiles off the Roland launchers utilizing their radar tracking capabilities. This experimental system proved to be quite effective. Because of this success, Boeing realized the potential of integrating Stinger launchers on to the newly developed High Mobility Multipurpose Wheeled Vehicle (HMMWV) to create a new air defense system.

By May 1984, the first prototype was ready for testing. Boeing began testing with the 9th Infantry Division (motorized) Air Defense Artillery (DIVADA) which used HMMWVs with shoulder launched stingers. Test firing was conducted at Yakima Washington firing center. Three shots were fired from both moving and fixed positions utilizing the HMMWV. All targets were killed in this test, which demonstrated the capabilities of this potential weapon system. [Ref. 7]

Similarly, the U.S. Army Missile Command (MICOM) was developing its own version of a pedestal-mounted stinger (PMS) known as Setter, with the help of General Dynamics. In 1985, the Army tested both the Setter and Avenger at Yakima Firing Center. Both systems proved to be very successful and warranted an NDI Acquisition Strategy. [Ref. 8] Based on these test results from Yakima, General Max Thurman, the Army Vice Chief of Staff, directed the Army to purchase a pedestal mounted system.

Another event which occurred during this period was the cancellation of SGT York in August 1985. Since SGT York was designed to be the air defense gun of the future, its cancellation left a tremendous gap in the Army's air defense capabilities. Because of this weakness, the Army needed to quickly reexamine the direction air defense needed to proceed. They formed the Forward Area Air Defense (FAAD) working group to develop a well thought out and "totally integrated counter air approach to the forward area air defense problem." [Ref. 9:p. 12]

The FAAD working group concluded in January 1986 with the following recommendations: They concluded that the Soviet Aerial Weapon Systems, both fixed-wing and

rotary, were expanding as well as improving technologically. They decided that one system for air defense could not effectively handle all of the potential air threats and they concluded that a family of weapon systems would be needed to handle the threat. This system would later be known as the Forward Area Air Defense System (FAADS).

The concept of the FAAD system was to integrate five components that would all work together to defeat the Soviet threat. These components included: Command, Control and Intelligence (C2I); Line-of-Sight Rear (LOS-R); Non-line- of- Sight (NLOS); Line- of- Sight Forward (LOS-F); and the Combined Arms Initiative (CAI). [Ref. 10] PMS would be the Line-of-Sight Rear (LOS-R) component of the FAADS System.

The FAAD working group had some issues to resolve. By the mid 1980's, costs on military acquisitions had become a major issue with Congress. Additionally, the threat from the Soviet Union was very real and required the air defense system to be fielded as rapidly as possible. Fortunately, NDIs were available to meet most of the FAAD requirements. NDIs were becoming more popular in Congress because they were supposed to be cheaper and faster to field. With this in mind, senior Army officials ordered an NDI approach wherever possible in the FAAD System development. [Ref. 9:p. 14] Secretary of Defense Casper Weinberger approved the FAADS concepts in January 1986.

With the FAAD System approved, the acquisition process began. In March 1986, the Defense Acquisition Board (DAB) approved the Required Operational Capability (ROC) document. The LOS-R component, which had already been successfully tested at Yakima, would be an NDI PMS, and DOD moved it up to a Milestone IIIA review decision with a Low Rate Initial Production (LRIP). The Army began planning for an NDI Candidate Evaluation (NDICE) for PMS. [Ref. 10]

In July 1986, the Request For Proposal (RFP) was issued. Three companies, Boeing Aerospace with Avenger, General Dynamics/Thomson-CSF/Hughes Electro-Optical Data Systems Group with an unnamed prototype, and LTV Aerospace with Crossbow (Setter), submitted proposals. They were each given 100,000 dollars to develop a prototype PMS for NDICE testing. [Ref. 11]

Testing began in November 1986 at Fort Bliss, Texas and White Sands Missile Range in New Mexico. The General Dynamics' candidate was eliminated before actual firing because it failed to meet the weight evaluation criteria. Testing continued with Avenger and Crossbow until July 1987. Based on the NDICE test results, Avenger was the clear winner. On this basis, Boeing's Avenger was selected to fulfill the requirements of the PMS and the LOS-R component of the FAAD System. This was a 16.2 million dollar initial option buy of 20 Avengers. The contract also contained production options for FY 1987 through FY 1991 for a total of 273 Avengers. [Ref. 12:p. 1] Page 13, Figure 2 shows a picture of Boeing's Avenger System.

The Avenger was type-classified in 1987 as Limited Procurement Urgent, which put a higher priority upon Avenger's procurement in an effort to speed the acquisition process. [Ref. 10] Within fourteen months after the contract was awarded to Boeing, the first Avengers were fielded.

The Army continued to run tests on the Avenger prototype used for NDICE. The Army began the first phase of Force Development Test and Experimentation (FDT&E). This was the Army's initial effort to evaluate doctrine and tactics for Avenger. These tests were conducted in June and July 1988 at Fort Bliss, Texas. Six new Avengers were used for the second phase of FDT&E at Fort Hunter Liggett, California in March 1989. Additionally, Avenger passed the Initial Operational Test & Evaluation (IOT&E) and the Production Qualification Test (PQT), which cleared the way for Avenger to be Type-Classified Standard (TC-S), which cleared the way for Avenger's full-scale production Milestone IIIB review. The review was conducted in April 1990, at which time the DAB approved full-scale production of Avenger. Avenger met Initial Operational Capability (IOC) in January 1991. Additionally, Avenger was employed quite effectively during Desert Shield and Desert Storm. [Ref. 10]

The original contract with Boeing expired in 1991 and the Army awarded a $436.2 million, five-year multiyear contract to Boeing in February 1992 for the production of an additional 679 Avengers. Most recently, the Avenger was fielded to the 2-2 ADA (35th

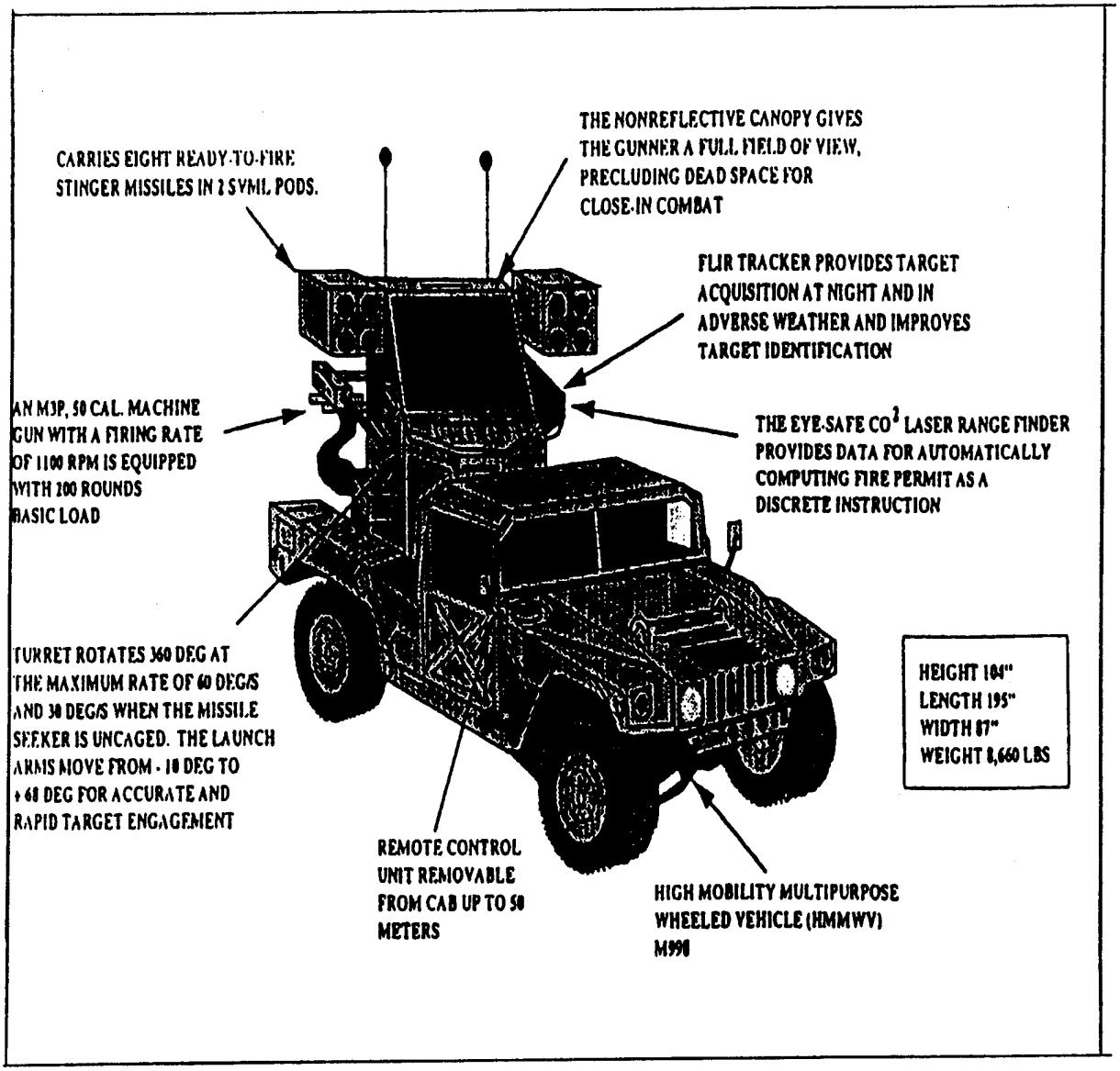

Figure 2. Avenger System

ADA BDE). In January 1995, fielding will begin at the 82nd Airborne Division. The program office continues to make P3I Block upgrades to improve Avenger. [Ref. 11]

III. DETAILED EXAMINATION OF THE SGT YORK ACQUISITION PROGRAM

A. INTRODUCTION

Cancellation of a program is an emotional event for any Program Manager, as well as to the Service that sponsors the program. The SGT York was no different. Although all programs face many hurdles, the SGT York was doomed from the start, primarily because of the acquisition strategy and other factors that were detrimental to the program.

The SGT York was to be acquired under an accelerated strategy, the objective being to field the weapon system as quickly as possible with substantial cost savings. This accelerated acquisition strategy included the use of proven, reliable major components (M48A5 tank chassis and M-60 tank power train) and the incorporation of European designed gun hardware (40mm gun) and mature hardware derivatives (F-16 radar system). Additionally, the Army adopted a "Skunk Works" approach that allows the contractor to use in-house initiatives and resources during engineering development to further refine the technical characteristics of the weapon system. This strategy also emphasized minimum Government management during system development, restricted access to contractors and contractor information to avoid leaking proprietary or competition-sensitive information, and reduced the likelihood of a protest from the contractor not selected for production.

The SGT York's acquisition strategy was to have three phases: (1) engineering development, which included a 29-month competition between two contractors selected from an original group of five, (2) follow-on development and initial production by the winning contractor, and (3) follow-on production. The acquisition strategy was designed to field a system in about six and a half years, from program initiation in February 1977 to achieving initial operational capability in October 1983. [Ref. 13:p. 40]

B. ANALYSIS OF THE SGT YORK ACQUISITION PROGRAM

The acquisition strategy of the SGT York was unique because it combined several concepts to attempt to accelerate fielding. These concepts were competitive development; a "skunk works" approach to program management in which contractors were allowed to

design the system the way they thought most appropriate in order to meet the Army's requirements (this in essence turned out to be a "hands off" approach where Government played a minimal role in the management of the development of the weapon system) a curt, combined development and operational test prior to production; and a phase which combined the system's follow-on development, referred to as the maturity phase, and initial production. It was hoped that these concepts would significantly shorten the development phases preceding the initial production. Since it was recognized that such an acquisition strategy was inherently risky, several safeguards were used that the Army believed would minimize these risks. Most important were the use of proven sub-components, the negotiation of a fixed-price development contract with fixed-price production options, and a warranty designed to protect the Government against cost increases resulting from corrections of design and various other problems.

The first phase of the acquisition strategy consisted of the development competition between the two designated contractors. This resulted in the Army receiving two complete prototypes to be used in a head-to-head evaluation. The advantages of this concept is that the Army had actual hardware with which to make a comparison, and it stimulated the contractors' creativity to devise a system to meet the mission.

Many of these advantages may have been lost, however, because the Army decided to select the prime contractor for full-scale production following the development and operational tests. The results of the tests showed that both the Ford Aerospace prototype, which was selected, and the General Dynamics corporation prototype displayed significant shortcomings and still required further development. [Ref. 6:p. 6] It may have been more prudent to have waited until the systems were more fully developed before making the selection.

The "hands-off, skunk works" approach minimized the amount of Government intervention by "holding quarterly 2-day design review meetings at each contractor's location and to reviewing contractor-generated reports." [Ref. 14:p. 40] This concept led to the thinly staffed Government and contract program staffs being shielded from interference by other curious Government agencies. Additionally, it gave the contractors

significant freedom and responsibility to create a weapon system to meet the Army's needs. The key points of a skunk works project were:

1. Strong authority to the team leader.
2. Strong but small project office.
3. Restrict the number of people connected with the program (10-25% of normal).
4. Simple and flexible control of drawings.
5. Minimum reporting, but thorough recording of important work.
6. Monthly cost reviews including predicted costs to complete.
7. Prime contractor has strong authority to pick and deal with vendors.
8. Nonduplicative inspections.
9. Contractor has authority to test his product.
10. Agreement on specifications before contract is signed.
11. Timely funding from customers.
12. Mutual trust between Government and the contractor.
13. Strongly controlled, limited access by outsiders.
14. Good pay not based on the number of people supervised [Ref. 15:p. 18]

Lockheed had used this concept quite successfully on their aircraft contracts. All potential prime contractors for SGT York were briefed by Lockheed on how "skunk works" should be implemented. There is some speculation that the army's contractors did not fully understand or incorporate the "skunk works" concept. [Ref. 16:p. 11] A failure to fully implement this concept could have created additional problems for SGT York's acquisition.

Another significant point was that the contractor was given the authority to trade-off some of the requirements in order to gain an overall cost savings at the expense of

performance. The Army established 12 firm requirements that each competing contractor's weapon system had to meet. Beyond these, the Army identified 43 system requirements in priority order which each contractor could trade-off to help lower the program's cost. For example, Ford Aerospace elected not to equip its weapon with night vision capability, one of the 43 tradeable items, in an effort to keep unit production costs down. [Ref. 6:p. 16]

In the interest of accelerating the SGT York's fielding, the Army decided to perform developmental activities concurrently with production and to conduct less testing before the production decision than is usually conducted under a more conventional acquisition strategy. With this strategy, the competitive "shoot-off" was the only scheduled test before the Army made its selection and awarded the source the phase II contract. Phase II itself involved "initiating production before completing the development of the weapon system". [Ref. 4:p. 5] The "check test" was planned to be conducted at the end of the maturity phase to discover whether the prime contractor had resolved problems found in its weapon system during the competition. The next test was scheduled to use initial production units and was not slated until the end of phase II.

Because of the desire to accelerate the program, many development tests were deferred until after production began. These tests included "operation in a cold climate, durability of the system in stressful battlefield conditions, system transportability, and electromagnetic compatibility and interference." [Ref. 16:p. 6]

Operational tests, which were scheduled to be held before the production decision was made, were "constrained by limited realism of the test environment, which to some extent was unavoidable because of safety considerations." Operational issues which were not planned to be fully evaluated prior to production included: operation and maintenance by Army personnel; proposed doctrine, tactics and training; and system effectiveness and survivability as part of a larger force in combat. [Ref. 16:p. 7]

Additionally, "the development of integrated logistics support requirements and resources was deferred until after the winning contractor was selected so that costs would not be incurred to support more than one system." [Ref. 17:TabQ] The development of the support package is important for operational testing because a key part of this testing

is the Army's ability to train soldiers to operate and maintain the weapon under battlefield conditions.

The accelerated acquisition program of the SGT York also involved risks, particularly in view of the planned concurrence and limited testing. In order to minimize these risks, several safeguards were built in the system's acquisition strategy. The first was the use of proven sub-components; the second was obtaining more extensive warranty coverage than generally found in major weapon systems contracts; and the third was negotiating fixed-price development and production contracts.

The basic rule used during phase I competition was that each contractor was to use proven subsystems instead of an all-new design. The assumption was that this would reduce design problems and allow for an accelerated development schedule. The only development task then would be to integrate these proven subsystems into one weapon system. Each contractor was to use the M48A5 tank chassis as the vehicle for its weapon system and each chose a mature radar and gun system to include in its design.

Another safeguard of this strategy was that of the extensive warranty. Once Ford Aerospace accepted the position as the prime contractor for the system, they also accepted the responsibility of the warranty associated with the program. These terms stated that Ford would be held responsible for ensuring that the system met all specifications, which were derived from the Air Defense gun requirements, in the maturity phase. In essence, all corrections to the system required for it to meet specifications, and any problems in the system caused by defective workmanship or material, would be corrected at no charge to the Government. "In the Army's view, this warranty was a safeguard against any cost increases that might arise from needing to correct performance deficiencies." [Ref. 18]

This warranty was a new concept, according to the Army, because of its ground breaking nature. Prior to warranty legislation included as section 794 of the fiscal year 1984 Department of Defense Appropriation Act, the standard warranty clause traditionally covered only workmanship defects. This warranty protected the Army against claims arising from design defects, which are typically the significant problem for the Government. This type of coverage is basically the provisions detailed in the section 794 legislation.

The last safeguard which the Army employed to minimize risk associated with the accelerated acquisition program was that of fixed price contracts. Initially, during phase I, the Army awarded fixed-price contracts to the competing contractors. The idea was that these fixed-price contracts would complement the "hands-off" and tradable requirements concepts, eliciting the contractors' best efforts as well as offering a cost savings for the Government. The three production options included in phase II were also fixed-priced, however, they were also with incentives. The intent behind this was to provide protection against cost growth during production when only one contractor would be producing the weapon. Thus, the production prices had the benefit of being established through competition. The Army also held the possibility of reopening competition for phase III production as additional cost protection. [Ref. 4:p. 14]

In looking at the acquisition strategy, there are many items that were innovative and offered a number of theoretical advantages, lending credence to the idea that an accelerated strategy should have been undertaken in the procurement of the SGT York. However, in practice many of these concepts employed in the strategy were never fully realized, or actually contributed to the demise of the program.

Although the contractual aspect of the strategy did hold down program costs, this advantage was outweighed by other elements of the strategy which contributed to the program's cancellation. These elements were the "hands-off" approach taken by the Army during the development phase, limiting the reviews of the contractors progress and inhibiting wider dissemination of information about the program, and the reduced testing required by the strategy. Each of these elements will now be looked at in more detail.

Basically, there were three factors that contributed to the effectiveness of the control of costs during the program. The first was the use of "fixed-price production options covering nearly half the planned quantities. The second was the use of proven components to reduce the technical development costs. The third was the use of integrated prototypes during competition." [Ref. 18] Even with the use of the proven components and the integrated prototypes, the program still had difficulties integrating the components and continued to have major performance problems that could have lead to increased costs. The use of fixed-priced contracts resulted in the only effective cost

control measure of the strategy when the program was terminated. The other feature where the Government expected to gain cost savings was in the warranty package, which ensured all costs to correct design deficiencies would be borne by the contractor.

To the point at which it was cancelled, the program was controlling costs. However, history has shown that at the point where the Government has to negotiate contracts based on actual production experience, many major weapon systems have incurred significant cost growth. Since the Army never reached this point in the SGT York program life cycle, it is difficult to determine whether the cost savings associated with this strategy would have continued.

Although fixed-price options can be credited with holding down the costs of the first 146 gun systems, they caused a problem in that officials were too sensitive to the fact that they were fixed-priced and allowed this to weigh heavily in decisions of whether to proceed with production on schedule, even though the system displayed "serious technical difficulties and critical performance capabilities were not demonstrated." [Ref. 19] The Army maintained, however, that "deferring production would cause a lost opportunity to take advantage of favorable procurement options." [Ref. 18]

The ultimate goal of the accelerated acquisition strategy used in the SGT York acquisition program was to obtain an early IOC date. However, this never happened. The gains in time that the Army expected from combining development and initial production were never realized. Starting with the immaturity of the prototypes delivered for the 1980 competitive tests, the program began to slip. Tests were delayed while others had to be added, and the Office of the Secretary of Defense became involved in reviewing the program and in evaluating the SGT York's performance in the tests. [Ref. 11]

According to projections, had the SGT York program continued, actual IOC would have been about three and a half years later than was called for in the original schedule. Instead of an IOC of six and a half years after program initiation, the projections showed that it would have taken about ten years to accomplish. Reasons for this delay can be attributed to three areas: "(1) the deletion of fiscal year 1981 production due to funding cuts which delayed the first year's production by about one and a half years, (2)

production start-up problems, which delayed deliveries, and (3) deferral of the third production option decision to conduct additional operational testing, which led to stretching out delivery of units already under contract to avoid a production line shutdown." [Ref. 18] The last two areas which delayed the program are directly related to the underestimation of the need for testing, and the insufficient information available for decision makers due to the "hands-off" management approach used by the Army.

The SGT York test units were less technically mature than anticipated. This gave rise to testing delays and the need for additional testing. The integration of the weapon's major subcomponents, as well as the modifications necessary to allow these subsystems to function on the weapon system, represented greater technical challenges than anticipated. An example of this integration problem was the F-16 radar provided by Westinghouse. Westinghouse had numerous problems integrating the radar for ground use and had to modify it so that it would function properly on SGT York. [Ref. 20] Since evaluations of the SGT York's tests were not seen as favorably by the Secretary of Defense as by the Army, changes in the program's course had to be made. Also, under pressure to show that the weapon system was capable of accomplishing the required specifications before it could obtain approval to proceed with the third year's procurement, the Army added some tests and moved others.

As stated earlier, the initial competitive testing of the two contractors was difficult due to the immaturity of the systems. Although these tests were scheduled for 30 days, they had to be canceled because of system failures. This caused a two month delay until the tests could be completed. After source selection in 1980, Ford Aerospace was to conduct a "check test" to ensure that it had corrected all of the deficiencies noted during the competitive testing. The test, however, revealed that not all the noted system problems had been corrected. [Ref. 18] Even so, the Army and the Office of the Secretary of Defense supported exercising the first production option.

The durability and maintainability test which had become a seven month test, was scheduled to begin in February 1982. The Army delayed start until May 1982 to give the contractor time to upgrade its prototype. Still, after three attempts to demonstrate the

prototype's readiness for production, the Army's test and evaluation agencies concluded the prototype was unsuitable for testing and discontinued the test.

In addition to two tests being added to the program, a series of events in early 1984 stretched the program even more, which caused Ford Aerospace to deliver its first SGT York in March 1984. This was five months later than called for in the contract. Ford had encountered problems in making the transition from prototypes to production units, including test failures, design changes rework, and assembly difficulties. [Ref. 18]

It was at this point that the Under Secretary of Defense for Research and Engineering directed the Army not to exercise the third production option until solid test results were available. The Army conducted this testing in July 1984, referred to as the "limited test." [Ref. 6:p. 26] The test results were inconclusive due to the lack of realism of the test and the statistically insignificant number of SGT Yorks. The Secretary of Defense decided to defer exercising option III until after further operational tests. These tests were conducted in June 1985.

The limited testing contributed to a lack of prompt recognition that system flaws were not being corrected as needed to justify continued production. Additionally, it combined with the "hands-off" management style of the Army to make it even more difficult to justify funding for the program, and as a result contributed to program delays. The constraints resulting from the "hands-off" management style inhibited essential information on system performance and program progress from reaching those who were to make funding and programming decisions. Earlier, this same lack of data contributed to significant reductions in the Army's 1981 planned budget, resulting in major program restructuring.

The deletion of the 1985 purchase of SGT York and the deferral on exercising further production options were due to the system's performance in testing and to the uncertainty about the system stemming from the lack of sufficient operational testing on production units. Thus, although the acquisition strategy called for little operational testing to be done before initial production, such testing proved to be necessary to continuing the program.

In the end, once all of the testing had been concluded and the evaluations of the test data had been completed, the Army's position was that the SGT York's performance "was found to be significantly better than the Vulcan's, although some system shortcomings still required correcting." [Ref. 18] Evaluators from the Office of Operational Test and Evaluation in the Office of the Secretary of Defense, however, reviewing the same data, found that "although the SGT York represented an improvement over the current Vulcan air defense gun, it did not adequately protect friendly forces during simulated combat." Also, the system was found "not operationally suitable because of its low availability stemming from its being frequently down for maintenance." [Ref. 6:p. 27]

According to the Office of the Secretary of Defense officials, the SGT York could not effectively meet the Soviet helicopter threat. Overall, in simulated Force - on - Force engagements, the system brought down an unacceptably small number of helicopters and the forces it was protecting suffered large losses.

1. Negative Press

As in most Government projects, negative press was a problem. In SGT York's case, it was one of the primary factors in its failure. This was primarily attributable to the "hands off" approach the Army used with the press and Congress. Since the press never likes to be left out, they found their own methods to get information on SGT York. For some reason, what information that was leaked was usually bad. Informed sources within the program and OSD who were opposed to SGT York found ways to leak negative information to the press. Additionally, poor performances on operational tests created more bad press and fueled the fire within the Pentagon and Congress to cancel SGT York. Congressman Denny Smith, Co-Chairman of the Military Reform Caucus, was a key figure in the negative press that surrounded the program. Congressman Smith was able to get "leaked information" from unknown sources and give this information to the Washington Post. He and the Washington Post were quite effective in damaging the SGT York program. [Ref. 21:pp. 20-24]

2. Lack of Sponsorship

With these inherent shortcomings in the SGT York program, sponsorship was needed to help keep the program viable. Unfortunately for SGT York, they had no military or political support. In the eight years the program ran, numerous changes took place, both in the Pentagon and within the White House administration. It was a monumental task keeping a program like SGT York going. One major reason for this lack of a sponsor was the "hands off" acquisition strategy. It closed out the Army staff, OSD, the user, and almost everyone who normally participates in the early development. It is in this period where a program gains support, but in SGT York's case any supporters were alienated. Even Congress was not briefed on the progress of the SGT York system. The positive attributes and the progress of SGT York were poorly marketed to the people who could have supported the program. With a stronger sponsorship, many misinterpretations by Congress, the Pentagon, and the press could have been dealt with more effectively. [Ref. 16:pp. 5-6]

Along the same lines, Ford Aerospace and Communication Company, who was awarded the phase II contract, was unwilling to fight for the SGT York program at the top levels of OSD. There are three theories on why Ford did not support SGT York. The first is the "hands off" approach the Army used. Ford may have decided that since the Army did not feel the need to support or defend SGT York, they would follow the same strategy and resist the temptation to lobby Congress. The second possibility relates to the Fixed-Price-Incentive-Firm Target Contract (FPIF). As Bob Seamonds pointed out, when Ford Aerospace assessed the long term profits and losses from the program they became painfully aware of the true cost of producing an acceptable SGT York. Ford's highest decision makers lost interest in the project and were not willing to support the program. Lastly, because of the growing negative press about SGT York, Ford did not want the bad press to reflect on their primary mission of building automobiles. Ford may have tried to distance themselves from SGT York. [Ref. 20] Any one of these reasons could have hurt the program's chances for success.

IV. DETAILED EXAMINATION OF THE AVENGER ACQUISITION PROGRAM

A. INTRODUCTION

As described earlier, the Acquisition program, as defined in this thesis, includes the acquisition strategy and any other significant factors that affected the acquisition of the Avenger. This chapter includes additional analysis of the Avenger acquisition strategy and those additional factors that influenced Avenger's procurement.

B. ANALYSIS OF THE AVENGER ACQUISITION PROGRAM

One of the keys to the success of any program is the acquisition strategy. In looking at Avenger's acquisition program's success, a quick review of its acquisition strategy would be useful. The Avenger program's acquisition strategy was developed in September 1986 and updated in May 1988. There are twelve major elements that were critical to the overall management of the program. Each element is briefly described below:

1. The program called for a prime contractor with total system integration utilizing an NDI procurement.

2. A tailored acquisition process based on a low risk NDI procurement. Program management officials were permitted to tailor the acquisition process so that Avenger could move directly into the Production and Deployment (P/D) phase. This was based on responses from RFPs and a good market investigation.

3. Manpower Personnel Integration (MANPRINT) analysis was to be conducted throughout all Avenger testing from NDICE through Production Qualification Test (PQT).

4. Initial logistics support for Avenger was provided by the prime contractor though an Interim Contractor support agreement for at least the first 29 months of fielding. Additionally, maximum use of built in test equipment; line replaceable units; standard support; and test equipment were also planned for in the acquisition strategy.

5. Manufacturing and production directed that the contractor have total system integration responsibility. Total production of Avenger through FY 1999 was planned at 1207 systems.

6. Test and evaluation was designed to be tailored to support a low risk NDI acquisition strategy. Four types of tests were to be conducted on Avenger. These were NDI candidate evaluation (NDICE), Force Development Test and Experimentation (FDT&E), Production Qualification Test (PQT), and Initial Operational Test and Evaluation (IOT&E).

7. Cost growth was to be controlled by only one method since Avenger was considered low risk. The cost goal used in the Avenger program was the Program Acquisition Unit Cost (PAUC). The PAUC included procurement costs and RDT&E costs. Design-to-cost would not be used because the system was available for immediate production.

8. Technical risk was assessed as being low because Avenger was an NDI and because of previous tests and evaluations.

9. Human Factor Engineering (HFE) was to be conducted throughout the testing of the system to identify any issues affecting soldier and system effectiveness.

10. Standardization of the Avenger hardware was not considered important since Avenger was a NDI. Interoperability was considered enhanced because of the Stinger missile.

11. Avenger had to meet three survivability criteria. First, its ballistic protection had to be equal to or greater than a HMMWV. Second, it had to meet standards set forth in AR70-71 for Nuclear Biological and Chemical (NBC) survivability. Third, it directed that Avenger must be decontaminated using materials that resist contaminate absorption. [Ref. 22:pp. 33-42]

12. The contracting strategy consisted of the following key elements:

    a. Broad-based with full and open competition.

    b. Multiyear follow-on acquisitions.

    c. Dual-source procurement of the SVML.

d. Spares Acquisition Integrated with Production (SAIP).

e. Competition by the prime contractor in subcontracting [Ref. 23:pp. 1-2].

Additionally, Firm Fixed Price (FFP) contracts were to be used to the maximum extent because Avenger was a low risk NDI acquisition. The initial contract was FFP with the following options:

1. Delivery of the first system 14 months after contract award.

2. Provisions for Interim Contractor Support (ICS) and SAIP until Army could implement its logistics support structure.

3. Planned Annual procurement quantities for four additional years.

4. Delivery of a Technical Data Package (TDP) with rights delineated in a license agreement. [Ref. 10]

There are numerous success factors within the Avenger program. Avenger had an extremely high approval rating and a great deal of support from the user community and Congress. The Avenger program was perceived by Congress as being well-managed with an effective program manager and staff. [Ref. 22:p. 48] Avenger implemented an effective NDI acquisition strategy that remained on time and on schedule. The user community was a huge supporter of Avenger. Generals Donald Infante, Chief of Air Defense Artillery (ADA) from 1985-1989 and Donald Lionette, Chief of ADA from 1989-1991 were extremely supportive sponsors of Avenger [Ref. 11]. Both spoke highly of Avenger throughout the user community and Congress. Additionally, the program office put in extra time and effort to keep Congress and the press informed on Avenger's progress, especially the successes of the program. This effort was quite effective since there was never any negative press associated with Avenger and Congress considers Avenger a real success story. [Ref. 10]

The Avenger program conducted a very successful market investigation to determine if a PMS system was a viable concept. From this, it was determined that an NDI strategy was appropriate. The market investigation was critical to the success of the Avenger acquisition strategy [Ref. 10].

Program Management Officials realized that logistics support would lag behind the deployment of Avengers primarily because of the rapid 29 month fielding. In an attempt to close this gap, the program management team utilized Interim Contractor Support (ICS) during the first 29 months to insure there was basic logistics support when Avenger was fielded. [Ref. 22:pp. 50-51] This proved to be an effective method of controlling the logistics problem.

The use of Firm-Fixed-Price (FFP) Contracts proved to be another success factor for Avenger. Because the Avenger was an NDI acquisition with little research and development required, the program was considered to be low risk. Since Avenger was a low risk NDI, the program management officials felt that an FFP contract would be appropriate. This helped reduce administrative and management costs and reduced contractual risk to the Government. Also, since the program was quite stable, a multiyear procurement was considered appropriate. The Government could take advantage of lower Economic Order Quality (EOQ) prices offered by the contractor. [Ref. 22:p. 51]

Another important factor that made the Avenger program a success was the effective tailoring of the acquisition process, which is key to an effective NDI acquisition strategy. The program management officials were given tremendous leeway to tailor the Avenger acquisition process because Avenger was going to be a low technical risk NDI acquisition. This tailoring allowed for a reduction in the administrative and procedural requirements. [Ref. 10] This reduced the cost and the time of the entire Avenger program.

Another key factor was the tailored test and evaluation (T&E) program. Because the Avenger was an NDI acquisition the Army modified the test plan. This tailoring allowed the test and evaluation to be reduced by combining developmental testing and operational testing without a loss of efficiency. This allowed Avenger to be fielded much quicker and at additional program cost savings. [Ref. 22:p. 52]

Another key success factor was the concurrent design of Pre-Planned Product Improvement (P^3Is) during the P/D phase of the acquisition process. Because of the urgent need for Avenger by the Army, it was fielded with only two changes. All other

improvements were made later according to the Avenger System Improvement Plan (SIP). This plan allowed for quicker fielding of Avenger. [Ref. 22:p. 52]

One last factor that helped the Avenger Program succeed was the dedication and experience of the prime contractor, Boeing Aerospace. Boeing had experience with many air defense systems and had consistently produced these systems on time and on cost. [Ref. 22:p. 52] Additionally, Boeing did its part to lobby Congress to support Avenger. This support added to the perception in Congress that Avenger was a worthwhile program. [Ref. 11]

V. LESSONS-LEARNED FROM THE SGT YORK AND AVENGER ACQUISITION PROGRAM

A. INTRODUCTION

The analysis of the SGT York and Avenger acquisition programs reveals many acquisition management lessons-learned. These lessons-learned are qualitative in nature and are based upon SGT York's and Avenger's acquisition strategies and those critical factors that most effected those programs. The lessons-learned in this chapter are not all inclusive. They are the significant ones identified from the analysis identified in this thesis.

Additionally, these lessons-learned are not designed to make any conclusions on the competency of the program management of SGT York or Avenger. They are intended to help acquisition managers and their staffs to effectively manage future acquisition programs. This will also help students studying acquisition management.

B. LESSONS-LEARNED

The significant lessons-learned from the examination of the SGT York and Avenger acquisition programs include the following:

- **NDI Acquisition Strategies work well if they are used to produce a mature system**. This strategy worked well for Avenger because all of the components of Avenger had been tested and proven reliable prior to the Government buying Avengers. Avenger was produced on time and on cost, whereas SGT York was much more complex with many uncertainties within its software and hardware development that had not been worked out prior to the Government buying SGT York. Additionally, SGT York required enormous integration of hardware and software to produce a functional system. This required numerous modifications which took time and money to accomplish and the reliability of SGT York never reached its required level.

- **The continuing support of Congress, DOD, and the user community is critical to the success of any acquisition program.** SGT York had no military or political support. The primary reason for this was the "skunk works" acquisition strategy which closed out the Army staff, OSD, the user and Congress from the program. This secrecy negated any possible support, especially when that support was needed to keep the program alive. Avenger, however, was much more successful because it developed

a strong link between the program office, the user and Congress by keeping them informed of the program's progress.

- **Portrayal in the media is important**. Because of the "skunk works" strategy, the press printed whatever information they could gather. This was normally information about poor test results that may or may not have been true. The SGT York program office did little to refute these articles because of "skunk works." Because of this negative press, many Americans, including politicians, were persuaded that SGT York was a bad idea and helped lead to SGT York's demise. Avenger's program office worked hard to keep the press correctly informed of Avenger's status so that what information was printed was correct. The press had a much more positive view of Avenger's abilities.

- **Proper tailoring of the Acquisition strategy is critical in an NDI Acquisition.** Because of the complexity of SGT York and the fact that it had many unproven components, more developmental testing and operational testing was needed. A full-length acquisition program would have given SGT York a better chance of success by giving it the necessary test time so problems could be isolated and fixed. Avenger was much less complex with proven components. The decision to move directly into the production phase was correct considering the level of development Avenger displayed. Avenger did not require numerous modifications to move into production and development.

- **It is critical that program managers fully understand how to properly tailor an NDI Acquisition.** Avenger's program management team did an outstanding job of determining the level of development needed in the program so they could properly tailor out unnecessary test requirements without compromising the quality of the system. SGT York's Program Management team miscalculated the amount of developmental and operational testing required to field a reliable system. SGT York moved too quickly into the production phase. Future program managers need training in NDI acquisition so they can always ascertain how much tailoring is appropriate for a program.

- **A thorough market investigation is critical when using an NDI Acquisition strategy.** The program office did an outstanding job of investigating the technical feasibility of developing Avenger before investing Government money. They also looked into the competency of potential prime contractors to accomplish the mission. SGT York's program office failed to conduct a market investigation which, if conducted, might have uncovered potential development problems before a decision was made to develop the program.

- **As NDI complexity increased, cost-type contracts should be considered.** Because of Avenger's maturity, a fixed-price contract worked well because costs could be determined. SGT York was much more complex, making it difficult to determine realistic costs. As costs increased for SGT York, the Prime Contractor began to lose interest in SGT York and may have tried to cut corners to save money and profits. A cost-type contract for SGT York would have helped keep the prime contractor motivated to properly finish this complex project.

- **Contractor experience is critical to the success of an NDI acquisition program.** Boeing Aerospace had an enormous amount of experience with large Government contracts, especially air defense programs, and this experience certainly helped them as they developed Avenger. Ford Aerospace had no experience with Air Defense systems. This lack of experience may have been a key reason why SGT York had so many development problems.

- **Program office must ensure NDI components will not require major modifications to meet combat situations.** SGT York's program office expected to utilize the F-16 radar in its original condition. In the ground mode, the radar was not as reliable as anticipated, which incurred costs to toughen the radar to meet ground combat requirements. Avenger's program office correctly used ground combat proven systems like Stinger to ensure reliability would remain high and that the program would not require major modifications which would increase costs.

- **NDI should use the latest technology available.** SGT York was designed to use an M48A5 chassis and a M60 750 horsepower engine when an M1 chassis and engine were available. If SGT York had been fielded, it is doubtful whether SGT York could have properly supported an Army Heavy Division. Avenger utilized state-of-the-art components so that it would not be obsolete once fielded.

- **"Skunk works" is appropriate as long as program personnel fully understand how to implement it.** The SGT York Program Office may have lacked the required understanding of "Skunk works." Their "hands-off" approach inhibited essential information on system performance and program progress from reaching those who made program decisions and provided necessary funding.

- **Operational testing must be realistic.** SGT York's operational test had limited realism. These tests did not provide adequate performance data to support further funding of SGT York.

Table 1 below summarizes these key factors.

CRITERIA	SGT YORK	AVENGER
Mature System	-	✓
Congressional Support	-	✓
User Support	✓	✓
DOD Support	-	✓
Media Support	-	✓
Proper Tailoring	-	✓
Program Manager's Skill	-	✓
Thorough Market Investigation	-	✓
Contract Type vs. NDI Complexity	-	✓
Contractor Experience	-	✓
Major MODS Unnecessary	-	✓
Best Use of Technology	-	✓
Operational Testing Realistic	-	✓

Table 1. Key Factors Matrix

VI. CONCLUSIONS AND RECOMMENDATIONS

A. GENERAL CONCLUSIONS

It is clear that as the Defense budget becomes tighter, the push for NDI acquisition programs will continue to increase. Program Managers will need to have a clearer understanding of how to successfully manage them. In an effort to help acquisition managers to accomplish this task, this thesis examined two NDI programs, SGT York and Avenger. The programs were examined to determine key factors that made SGT York's program a failure and Avenger's program a success. From the analysis of SGT York compared to Avenger many mistakes can be seen in the SGT York program. It is clear from this analysis that the level of maturity of a system plays a critical role in the tailoring of an NDI acquisition program. Program Managers must be adept in all aspects of program management so they can properly implement their programs.

B. SUMMARY OF LESSONS-LEARNED

A summary of the lessons-learned from the study of the SGT York and Avenger programs is listed below.

- NDI Acquisition Strategies work well if they are used to produce a mature system.
- The support of Congress, DOD, and the User community is critical to the success of any acquisition program.
- The support of the media is important.
- Proper tailoring of the acquisition strategy is critical in an NDI acquisition.
- It is critical that Program Managers fully understand how to properly tailor an NDI acquisition.
- A thorough market investigation is critical when using an NDI acquisition strategy.

- As NDI complexity increases, cost-type contracts should be considered.

- Contractor experience is critical to the success of an NDI acquisition program.

- The Program Office must ensure NDI components will not require major modifications to meet combat situations.

- NDI programs should use the latest technology available.

- "Skunk works" acquisition is appropriate if the program office understands how to properly implement it.

- Operational testing must be as realistic as possible.

C. RECOMMENDATIONS

From the examination of the SGT York and the Avenger programs, the following recommendations are made:

1. The lessons-learned should be disseminated to current and future program management personnel, as well as other DOD acquisition officials.

2. DOD acquisition officials should ensure that during concept exploration, a thorough examination of a proposed major weapon system should be conducted to determine if it is appropriate for an NDI acquisition program.

3. Continued examination of other NDI programs is necessary to broaden the knowledge base of NDI acquisitions.

APPENDIX. ACRONYMS

ACRONYM	FULL TITLE
ABN	Airborne
AC	Aircraft
ACR	Armored Cavalry Regiment
ADA	Air Defense Artillery
ADATS	Air Defense Anti-Tank System
AMC	Army Material Command
ARGADS	Army Gun Air Defense System
ASARC	Army Systems Acquisition Review Council
BDE	Brigade
C^2I	Command, Control and Intelligence
CA	Combined Arms
CAV	Cavalry
CE/D	Concept Exploration and Definition
COEA	Cost and Operational Effectiveness Analysis
CPIF	Cost-Plus-Incentive-Fee
CUCV	Commercial Utility Cargo Vehicle
DA	Department of the Army
DAB	Defense Acquisition Board
DEM/VAL	Demonstration and Validation
DIV	Division
DIVADA	Division Air Defense Artillery
DOD	Department of Defense
DODI	Department of Defense Instruction
DSMC	Defense Systems Management College
DTUPC	Design-to-Unit-Production-Cost
EMD	Engineering and Manufacturing Development
EOQ	Economic Order Quantity
FAAD	Forward Area Air Defense
FDT&E	Force Development Test and Experimentation
FFP	Firm-Fixed-Price
FLIR	Forward-Looking Infrared
FPIF	Fixed-Price-Incentive-Firm Target
FSED	Full-Scale Engineering Development
FY	Fiscal Year

HFE	Human Factors Engineering
HMMWV	High Mobility Multipurpose Wheeled Vehicle
ICS	Interim Contractor Support
ILS	Integrated Logistics Support
ILSP	Integrated Logistics Support Plan
IOC	Initial Operational Capability
IOT&E	Initial Operational Test and Evaluation
LID	Light Infantry Division
LOA	Letter of agreement
LOS-F	Line-of-Sight Forward
LOS-R	Line-of-Sight Rear
LRIP	Low-Rate Initial Production
MANPADS	Man-Portable Air Defense System
MICOM	Missile Command
MX	Mechanized Infantry Division
NBC	Nuclear, Biological and Chemical
NDI	Nondevelopmental Item
NDICE	Nondevelopmental Item Candidate Evaluation
NET	New Equipment Training
NLOS	Non-Line-of-Sight
OMB	Office of Management and Budget
OTEA	Operational Test and Evaluation Agency
P^3I	Pre- Planned Product Improvement
PAUC	Program Acquisition Unit Cost
P/D	Production and Deployment
PEO	Program Executive Officer/Office
PFW	Predicted Fire Weapon
PM	Program Manager; Product Manager; Project Managers
PMO	Program Management Office
PMS	Pedestal Mounted Stinger
PQT	Production Qualification Test
RDT&E	Research, Development, Test and Evaluation
RFP	Request for Proposal
ROC	Required Operational Capability
SAIP	Spares Acquisition Integrated with Production
SAM	Surface-to-Air Missile
SECDEF	Secretary of Defense
SIP	System Improvement Plan
SVML	Standard Vehicle Mounted Launcher

TC-LPU	Type-Classified Limited Procurement Urgent
TC-S	Type-Classified Standard
TDP	Technical Data Package
TECOM	Test and Evaluation Command
TRADOC	Training and Doctrine Command

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