

AD A129072

The Army's National Training Center:
A Case Study in Management of a Large Defense Project

LTC Robert L. Herndon
HQDA, MILPERCEN (DAPC-OPP-E)
200 Stovall Street
Alexandria, Virginia 22332

Final Report April 26, 1983

Approved for Public Release; distribution unlimited

DTIC
ELECTE
S JUN 8 1983 D
A

A thesis submitted to Massachusetts Institute of Technology in partial fulfillment of the requirements for the degree of Master of Science in Management.

DTIC FILE COPY

83 06 08 029

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
	AD-A129072	
4. TITLE (and Subtitle) The Army's National Training Center: A Case Study in Management of a Large Defense Project		5. TYPE OF REPORT & PERIOD COVERED Final Report April 26, 1983
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) LTC Robert L. Herndon		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Student, HQDA, MILPERCEN (DAPC-OPP-E), 200 Stovall Street, Alexandria, VA 22332		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS HQDA, MILPERCEN, ATTN: DAPC-OPP-E, 200 Stovall Street, Alexandria, VA 22332		12. REPORT DATE April 26, 1983
		13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report)
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for Public Release; distribution unlimited		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES A thesis submitted to Massachusetts Institute of Technology in partial fulfillment of the requirements for the Degree of Master of Science in Management.		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Project management, organizational dynamics, bureaucratic politics, National Training Center, NTC, Fort Irwin, CA, facility activation, unit training, co-optation, stakeholder management, PPBS		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This thesis is a detailed case study which examines and analyzes the management of the planning, development, and establishment of the Army's National Training Center (NTC). The NTC is a new Army unit training facility which was conceived in 1976 and established in 1981 at Fort Irwin, California. Included under the project title "NTC" were all actions associated with developing the training concept, reactivating Fort Irwin, staffing and equipping the installation, designing and procuring sophisticated field (cont on reverse) — 7		

instrumentation, and securing Administration and Congressional approval and funding. The causes and effects of decisions and events impacting the NTC from conception to establishment, focusing on the management methods used, are examined in detail.

This study describes the systemic organizational processes which resist changes within the Army. NTC managers never understood these organizational processes and attempted to manage the project "rationally:" actions have their rational causes which have specific solutions. Such rational management resulted inevitably in poor planning and resource estimation. The study also describes the bureaucratic political environment in which the NTC was managed. NTC managers initially groped with specific issues without identifying the stakeholders. As a result, they were frequently blindsided by negative stakeholders who almost succeeded in killing the program.

The NTC survived these failures because of the national security shield provided by the commitment of senior Army leaders in its establishment. Later, the convergence of positive cost-benefits of the project in comparison to other uses of defense funds, effective bureaucratic-political behavior, and appropriate managerial practices enabled the project to succeed.

The lessons learned from the NTC establishment project are presented and recommendations are made to avoid similar problems on future large scale projects.

THE ARMY'S NATIONAL TRAINING CENTER:
A CASE STUDY IN MANAGEMENT OF A LARGE DEFENSE PROJECT

by

Robert Louis Herndon

B.S. University of Texas, Austin
(1966)

M.E. Texas A&M University
(1973)

Submitted to the Sloan School of Management
in Partial Fulfillment of the Requirements
of the Degree of

MASTER OF SCIENCE IN MANAGEMENT

at the

Massachusetts Institute of Technology

May 1983

© Robert Louis Herndon 1983

The author hereby grants to M.I.T. and the U.S. Department of Defense
permission to reproduce and to distribute copies of this thesis document in
whole or in part.

Signature of Author

Robert L. Herndon

Alfred P. Sloan School of Management
April 1983

Certified by

Mel Horwitch

Dr. Mel Horwitch
Thesis Supervisor

Accepted by

Alan F. White

Alan F. White
Director of Executive Education Program



Accession For	
NTIS GRA&I	<input checked="checked" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special

THE ARMY'S NATIONAL TRAINING CENTER:
A CASE STUDY IN MANAGEMENT OF A LARGE DEFENSE PROJECT

by

ROBERT LOUIS HERNDON

Submitted to the Sloan School of Management on April 22, 1983
in partial fulfillment of the requirements for the degree of
Master of Science in Management

ABSTRACT

This thesis is a detailed case study which examines and analyzes the management of the planning, development, and establishment of the Army's National Training Center (NTC). The NTC is a new Army unit training facility which was conceived in 1976 and established in 1981 at Fort Irwin, California. Included under the project title "NTC" were all actions associated with developing the training concept, reactivating Fort Irwin, staffing and equipping the installation, designing and procuring sophisticated field instrumentation, and securing Administration and Congressional approval and funding. The causes and effects of decisions and events impacting the NTC from conception to establishment, focusing on the management methods used, are examined in detail.

This study describes the systemic organizational processes which resist changes within the Army. NTC managers never understood these organizational processes and attempted to manage the project "rationally:" actions have their rational causes which have specific solutions. Such rational management resulted inevitably in poor planning and resource estimation. The study also describes the bureaucratic political environment in which the NTC was managed. NTC managers initially groped with specific issues without identifying the stakeholders. As a result, they were frequently blindsided by negative stakeholders who almost succeeded in killing the program.

The NTC survived these failures because of the national security shield provided by the commitment of senior Army leaders to its establishment. Later, the convergence of positive cost-benefits of the project in comparison to other uses of defense funds, effective bureaucratic-political behavior, and appropriate managerial practices enabled the project to succeed.

The lessons learned from the NTC establishment project are presented and recommendations are made to avoid similar problems on future large scale projects.

Thesis Supervisor: Dr. Mel Horwitch
Title: Assistant Professor of Management

PREFACE

On July 17, 1978, I was assigned to the Office of the Deputy Chief of Staff for Operations and Plans, Headquarters, Department of the Army, as a General Staff Officer. I had just completed the Army's Command and General Staff College at Fort Leavenworth, Kansas, and held the rank of major. I was immediately assigned Army Staff responsibility of shepherding the establishment of the Army's National Training Center through the Army's Planning, Programming and Budgeting System and for securing Department of Defense and Congressional approval of the project and appropriation of the resources with which to implement it (referred to as the Army Staff proponent for the NTC in the thesis). For the next three years I was involved with all actions related to the National Training Center. I had the unusual experience for an Army General Staff Officer of following a project from the first Congressional Budget request until completion, which, in this case, was the reactivation of Fort Irwin, California, as the home for the National Training Center, on July 1, 1981. I admit to considerable paternal devotion to the National Training Center, but I have tried to be totally objective and factual in this study. I have scrupulously avoided shading the truth.

I had a unique perspective at the Pentagon to view all facets of this project. In many cases, the facts reported in the study were influenced by my personal involvement. However, in conducting the research for the study, I did not rely on memory but, instead, made a comprehensive review of all documents pertaining to the project and conducted interviews with the officers most directly responsible for the establishment of the National Training Center. Also, I have had the benefit of a year of academic reflection as an MIT Sloan Fellow which has provided me the foundation upon which the analysis, lessons learned and recommendations are based.

Robert L. Herndon
Lieutenant Colonel, U.S. Army

Cambridge, Massachusetts
April, 1983

TABLE OF CONTENTS

TITLE PAGE	<u>Page</u> 1
ABSTRACT	2
PREFACE	3
TABLE OF CONTENTS	4
LIST OF FIGURES AND TABLES	6
LIST OF ACRONYMS AND ABBREVIATIONS	7
CHAPTER I. INTRODUCTION	8
1. Why Such a Study?	8
2. The Rational Actor vs Organizational Process and Bureaucratic Politics	9
3. Why Did it Succeed?	13
4. An Overview	16
CHAPTER II. THE NATIONAL TRAINING CENTER CONCEPT FORMULATION	18
CHAPTER III. NATIONAL TRAINING CENTER PROJECT HISTORY 1977-1981	26
1. Initial NTC Planning 1977-1979	26
2. Site Selection and Environmental Documentation	31
3. Programming and Budgeting History	38
4. Staffing and Equipping Fort Irwin	42
5. Facilities Repair and Construction	46
6. Schedule	48
7. NTC Establishment Planning 1979-1981	50
8. Historical Meaning	52

CHAPTER IV. LESSONS LEARNED AND RECOMMENDATIONS	54
1. Concept Development	54
2. Initial Planning	54
3. Recommendations	56
4. Shields, Management and Bureaucratic Politics	61
5. Conclusion	63
6. Summary	66
APPENDIX A. THE ARMY ENVIRONMENT APPLICABLE TO THE NTC	68
1. Organization	68
2. The Army's Planning, Programming and Budgeting System	69
REFERENCES	77
BIBLIOGRAPHY	83

LIST OF FIGURES AND TABLES

		<u>Page</u>
Figure 1	NTC's Initial Planning Organization	27
Figure 2	NTC's Final Planning Organization	51
Figure 3	Major Army Command Structure in the United States	66
Table 1	NTC Cost Profile	42

LIST OF ACRONYMS AND ABBREVIATIONS

Military Rank:

MAJ - Major
LTC - Lieutenant Colonel
COL - Colonel
BG - Brigadier General
MG - Major General
LTG - Lieutenant General
GEN - General

Agencies and Commands:

FORSCOM - US Army Forces Command (Fort McPherson, GA)
TRADOC - US Army Training and Doctrine Command (Fort Monroe, VA)
NASA - National Aeronautics and Space Administration

Acronyms:

MOE - Multi-Organization Enterprise
NTC - National Training Center

THE ARMY'S NATIONAL TRAINING CENTER:
A CASE STUDY IN MANAGEMENT OF A LARGE DEFENSE PROJECT

Chapter I. Introduction

Why Such A Study?

Far too frequently the Army, like many other organizations, wastes precious manpower and resources in re-inventing wheels. A difficult project will have been successfully completed but, due to the exigencies of the moment, the lessons learned are never recorded. Subsequent projects wind up experiencing similar problems and situations and their managers will devise solutions which may or may not be successful. Occasionally, after many iterations, the project managers may arrive at the same solution that was previously successful--the wheel will have been re-invented and the project will roll to success but with much wasted motion.

This thesis attempts to record the lessons to be learned from one such project. It is my hope that in doing so, managers of future large defense projects will not have to re-invent such a wheel: they will better understand the environment in which they must operate; they will avoid the mistakes that were made; and they will avoid the failure that the managers of the Army's National Training Center's establishment so narrowly averted.

This thesis examines and analyzes an Army project that had many mistakes and errors in organization, planning and cost estimation. It was initially characterized by ineffective management and poor bureaucratic-political behavior. Yet, it was ultimately successful. This thesis addresses why it almost failed and why it eventually succeeded.

The Army's National Training Center (NTC) is a classic case study of a large and unique defense project. It was a large project with costs

totalling \$1.029 billion from Fiscal Years 1980-1987. However, it was unique compared to materiel development and acquisition projects in that only about \$70 million was earmarked for "hardware" acquisition and the majority of the project was "people" oriented (issues and costs involving training, stationing, housing and providing for soldiers, civilians and their dependents). It therefore followed a different process from conception to implementation than do materiel development and acquisition projects. The process is well defined for the latter type projects and, indeed, there are Army schools that teach management of such projects. However, NTC managers found themselves constantly breaking new ground for which there were no guidelines.

A study of the NTC is a study of the systemic organizational processes confronting purveyors of change within the Army. Although the NTC was a unique project, it was not unique in that respect. Analyzing these problems may help in understanding such organizational processes and thereby guide future project managers in dealing with such systemic issues. This study will also describe the conditions that saved the project when it was floundering and the elements which were essential for its ultimate success. These conditions and elements of success are not unique to the NTC, but are typical for all large-scale projects. Understanding them will help future project managers and decision-makers to create an environment conducive to success.

The Rational Actor vs. Organizational Process and Bureaucratic Politics

Initially, the complexity of the project overwhelmed those charged with implementing it. They were inexperienced and approached the project from a "rational" viewpoint: the senior Army leadership supports the NTC, ergo subordinate Army commands and agencies will provide full support and cooperation. They failed to understand and appreciate the organizational

processes that moved like the proverbial "invisible hand" against implementation progress. The creation of the NTC effectively revised several Army organizations: a new installation was created; a new training system was established; and new sub-organizations were created within parent organizations to manage the training and the results obtained therefrom. This was a radical departure from the existing Army training organization. As a result, there was an inherent inertia against change. The NTC forced changes in organizational priorities, perceptions, issues, procedures, and repertoires which met inevitable resistance. Overcoming this inflexibility was a major task for NTC personnel, but one which was not understood, appreciated or addressed. They assumed that once the senior Army leaders had approved the concept, the rest of the Army, by rational value maximization (satisfy your boss), would fall in line and provide all the support required. This was not to be the case. They were trying to accomplish something that ran counter to the organizations that were required to implement it.

Allison, in his book Essence of Decision, describes three models to explain international events: the rational actor, organizational process, and governmental or bureaucratic politics. His thesis is that governmental decisions can be explained from each of these perspectives but each will yield quite different results. He persuasively argues that the Rational Actor Model which has been the basis for most decision analyses should "be supplemented, if not supplanted, by frames of reference that focus on the governmental machine--the organizations and political actors involved in the policy process."¹ Although Allison uses international incidents to illustrate his thesis, the application to other governmental actions is direct and insightful. In examining the NTC, I will frequently use his frames of reference to explain the situation.

The Rational Actor Model "assumes that what must be explained is an action, i.e., behavior that reflects purpose or intention."² It assumes "that what human beings do is at least 'intendedly rational' . . . (a) consistent, value-maximizing choice within specified constraints."³ The following situation provides a good example. Army leaders acknowledged the importance of realistic training. Then why, as I will show later, did the NTC, which would provide quantum leaps in training realism, initially not receive the attention, personnel, and planning support essential to the success of such a large project. Several reasons could rationally explain the situation:

1. With limited staffing, subordinate commanders employed their personnel on the hottest issues. The NTC was a "future" project which could be handled later.

2. Although senior Army leaders in the Pentagon were committed to the project, this commitment was not conveyed to subordinate commanders who, although liking the concept, nevertheless felt the idea was too futuristic and involved too many resources ever to be approved.

3. Although publicly advocating realistic training, some commanders were afraid that the results of such training might reflect badly on them and the Army.

4. The senior Army leadership was, in fact, not as committed to the NTC as their public utterances implied and they simply let the project ripen.

Such explanations are a rational way of looking at an issue. Some portions of each explanation may be correct. However, Allison argues that "government leaders can substantially disturb, but not substantially control, the behavior of . . . organizations The behavior of . . . organizations . . . relevant to an issue in any particular instance is . . .

determined primarily by routines established in these organizations prior to that instance."⁴ Therefore, it is not surprising or unusual that such a project which was so radically different from other training projects and would force major organizational changes would face obstacles in obtaining the required organizational support. This is the Organizational Process Model for examining a situation.

The Governmental or Bureaucratic Politics Model states that "to explain why a particular formal governmental decision was made, or why one pattern of governmental behavior emerged, it is necessary to identify the games and players, to display coalitions, bargains, and compromises, and to convey some feel for the confusion."⁵ Initially the NTC managers groped with issues without determining the players or stakeholders. As a result, they were constantly being blindsided by negative stakeholders who knew how to tweek the system and play the bureaucratic political game. Only after a couple of years of experiential learning by NTC managers and the creation of a General Officer Steering Committee whose members served as champions for the NTC was the bureaucratic political contest shifted in favor of the NTC advocates.

Analyzing the NTC on the basis of the Rational Actor Model leads one to believe that incompetence, inexperience or just plain laziness caused many of the problems experienced. However, a more insightful analysis using the Organizational Process and Bureaucratic Politics Models shows that the problems encountered are not unique but are systemic to projects of this type. This helps to understand the situation but it does not explain the NTC's eventual success. Another frame of reference is required in this regard.

Why Did it Succeed?

Borrowing from Horwitch's explanations of successes and failures of large-scale projects, I contend that the NTC survived initially because of the national security "shield" provided by the commitment of senior Army leaders to its establishment based on its promise of better training. It later succeeded because of the convergence of positive cost benefits when compared to other uses of defense funds, effective bureaucratic-political behavior, and appropriate managerial practices. Horwitch has hypothesized that a fourth element is essential to the success of large-scale commercialization programs: a favorable corporate strategic environment. This element was not essential for the NTC as the Army was the sole user of the "product."⁶ However, I would add that the convergence of technological opportunity which coincided with the perceived need for such realistic training was a major facilitating factor in the success of the NTC. Let me explain.

One of the greatest strengths of the NTC was the consensus within the Army, the Executive Branch and Congress that in an age of approximately equal technologies and perhaps outnumbered forces, the primary advantage of U.S. forces in a future conflict could be better training. Converging with this consensus were technological opportunity in battlefield instrumentations which could provide realistic combat simulation. Such a convergence was a key facilitating factor in the eventual success of the NTC. The NTC offered the most comprehensive attempt ever to create a realistic training environment for a modern Army. The NTC concept was originated by senior general officers who succeeded in enlisting the total commitment of the Army's senior leaders. This "shield" of a salable "national security" concept and committed leadership buffered and saved the program from failure through initially ineffective management, organizational inflexibility,

massive cost increases and environmental challenges. However, this shield was not sufficient by itself to make the project succeed, it merely saved it from collapse during the initial stages. More was needed for success.

In a time of massive expenditures for weapon systems, the cost of the NTC is comparatively minor. Yet the benefits to force readiness it promised were greater and more efficient than most of the new weapons combined. No experienced commander would exchange a well trained battalion for a poorly trained but slightly better equipped battalion. Thus, from a cost-benefit perception by Army and Defense Department economists, the NTC was a comparative "best buy" for the Army and the country.

As has been noted, most of the problems initially encountered by the NTC were the result of organizational processes. Only after two years of muddling-through did the NTC managers actually understand who the "players" were, what was their power or influence, and whether they were positive or negative NTC stakeholders. Once these questions were answered and the NTC managers had acquired the requisite bureaucratic and political skills, the negative stakeholders were either outmaneuvered or co-opted. Organizational inflexibility began to ease under such pressure and the "system" became the ally rather than the adversary of the NTC.

As I will show, the NTC initially suffered from poor management. For nearly two years following project approval, there was essentially no central management of the project, no centralized plans or control systems were developed, and management personnel were in a continuous mode of reacting to seemingly stochastic shocks. However, once a committed and experienced Project Manager was appointed, order replaced chaos and proactive plans replaced reactive responses. Because the NTC was largely dealing with conditions of uncertainty and diversity, the Project Manager developed an

informal but effective matrix organization which drew expertise from many commands and agencies. In order to provide immediate problem resolution and to emphasize the high priority of the project, an NTC General Officers Steering Committee, composed of general officers with vested interests in the success of the NTC, was formed. These committee members became champions of the project, and, through their experience, they were able to identify positive and negative stakeholders and then isolate or convert the negative stakeholders and enlist the ardent support of the positive stakeholders. This committee greatly assisted the Project Manager by cutting through governmental bureaucracies and red tape to reach immediate solutions. It provided a visible manifestation of the high priority accorded the project and thus motivated subordinates to reach solutions before they were escalated to committee level. The combination of a dynamic project manager guided and supported by such a senior committee was key to the eventual success of the NTC.

The NTC training environment was based largely on the application of new technologies to combat training. Such technologies held the promise of replicating realistic battlefield conditions and gathering extensive, objective data on such training exercises. Senior Army leaders, Defense Department officials, and members of Congress agreed that the training opportunities created by such technologies must be exploited. Although, as has been noted, such "hardware" costs were minor compared to the overall project cost, the instrumentation was nevertheless essential to the project. Defense contractors saw the NTC as an opportunity to showcase their equipment and expertise and were eager to lend their support to make the project succeed. It is doubtful that the project could have succeeded without such

a convergence of technological opportunity and a consensus within the Army, the Department of Defense and Congress of the need for realistic training.

In summary, the NTC survived initially because of the national security "shield" provided by committed Army leaders and based on a viable concept. However, it eventually succeeded because of perceived positive cost-benefits compared to other defense projects, effective application of bureaucratic politics and good managerial practices. The convergence of technological opportunity and a consensus that such technologies should be applied to training facilitated its success. But, what is the NTC and what is its scope?

An Overview

The National Training Center concept was to develop a training facility where Army battalions could realistically engage a simulated opposing force, could conduct battalion live fire exercises against sophisticated target arrays, and where all actions could be monitored by state-of-the-art instrumentation to provide objective feedback.

Although not awesome in terms of some other Defense Department projects, the scope of the National Training Center exceeds any previous Army training program in terms of cost (the May, 1981 estimate of Fiscal Years' 1980-1987 costs associated with this project was \$1.029 billion⁷), units involved, land area utilized, personnel and equipment required, and intensity of use.⁸ Planning for the NTC involved many complex organizations in the Army, other Federal agencies, state and local government agencies, private interest groups, and government contractors. NTC personnel initially failed to appreciate the complex organizational context in which they were required to operate. They were not skillful in project management or bureaucratic politics. For two years the project floundered. Then, in September, 1979,

an experienced senior officer was assigned to manage the NTC. Subsequently, as effective management practices were applied and the NTC's managers became more skillful in the art of bureaucratic politics, the program succeeded: all essential requirements were met and the center was established on schedule.

With this as a background, I will next describe the NTC concept formulation and the problems encountered in its implementation.

Chapter II. The National Training Center Concept Formulation

In this chapter I will discuss the theory behind the concept of a National Training Center, the technological developments that facilitated establishment of such a training center and the actions taken to develop and approve the concept.

The Army's doctrinal guide to operations opens with the following statement:

The Army's primary objective is to win the land battle--to fight and win in battles, large or small, against whatever foe, wherever we may be sent to war We must assume the enemy we face will possess weapons generally as effective as our own. And we must calculate that he will have them in greater numbers than we will be able to deploy, at least in the opening stages of a conflict We can expect very high losses to occur in short periods of time. Entire forces could be destroyed quickly if they are improperly employed.¹

The purpose of all Army training is to prepare individuals and units to accomplish this objective. To do so, the Army must train as it would fight. "The Army must have leaders who in peacetime training have learned to utilize terrain, to estimate weapon ranges, and to deal confidently with war's heightened challenges of time, maneuver and space. It must have maneuver and fire support units which have developed the capability to move responsively and swiftly, to emplace, fortify, and camouflage, and to do so at night as well as day. It must be able to survive and fight in a hostile . . . environment."²

Yet, because of weapons developments over the past 30 years, the tempo, lethality and size of battle areas have greatly increased. The land that was once ample for training divisions (about 20,000 soldiers) is now inadequate for exercising brigades (about 2,500 soldiers) and, in some cases, battalions (about 600 soldiers). "In most places where Army units

are stationed (in the United States), it is difficult, if not impossible, to train Army aviators in nap-of-the-earth flying, to fire air defense weapons, or to practice electronic warfare. The Federal Aviation Agency, the Federal Communications Commission, the Environmental Protection Agency, and other agencies or groups, public and private, operate to restrict the Army's use of its reservations, and the air space overhead."³ Few units have the resources to portray realistically an opposing force or to provide exercise control and evaluation of battalion size exercises.

The solution to this dilemma could not be to acquire sufficient land at each installation where units were stationed and to provide these units with all the resources to conduct realistic, opposed and instrumented training. Such a solution was simply not feasible because of political and fiscal constraints. However, the U.S. Air Force had experienced similar training constraints and had developed a unique training center at Nellis Air Force Base, Nevada, to solve the problems. Thus, with this precedent setting model, a possible solution was to establish an Army facility similar to the Air Force's and this was to become the Army's National Training Center.

The justification for the Air Force facility is partially based on the studies of Herbert K. Weiss, a Litton Corporation analyst, of data on air-to-air combat in World War II, Korea, and Vietnam.⁴ These combat statistics indicate that combat is a powerful trainer. They show that American pilots in their first combat engagement have had only a 60 percent chance of surviving, but by their tenth engagement, their chances of surviving had increased to 90 percent. Based on this data, the Air Force concluded that if its peacetime training could be sufficiently realistic to provide experience equivalent to those first ten combat engagements, it would have a much

more survivable and effective force with which to fight the opening battles of the next war. The Air Force developed an Air Combat Range at Nellis Air Force Base to provide such a training environment. Air crews from throughout the Air Force's Tactical Air Command must now go to Nellis for three weeks of intensive training every 18 months. They are exposed to realistic combat situations, an aggressive "enemy" air force, (called "Red Flag") an active and dangerous electromagnetic environment, and an extensive ground based air defense system. Their maneuvers are monitored by instrumentation which provides the data for an objective evaluation of each mission.⁵ Such objective evaluations are the real payoff of the training. The ability to capture the action and to measure with exactness the outcome of each engagement makes the exercise an especially valuable learning experience. Like most forms of modern combat, battle encounters in midair are over in seconds. The human senses simply cannot take it all in fast enough, or comprehensibly enough, to appreciate what happened. A detailed critique permits skilled instructors to build on the fresh experience of participants so as to ingrain the lessons which the exercise should have taught. Conventional air training left participants with fleeting impressions of the mock combat to be argued over at the bar.

It is important to note that there are few places in the United States where such exercises would be feasible. In any inhabited area, the use of such electronic equipment would disrupt television, radio, and microwave telephone service, and endanger civil air operations, thereby engendering public opposition to the training. Over Nevada's uninhabited mountains and deserts, no one cares. There are only a few such places left. Even the Army's large military reservations along the Mexican border (Fort Huachuca, Yuma Proving Ground, and Fort Bliss) are not useable for such

purposes because there the military would invite hostile eavesdropping and technical monitoring from south of the border--like football scouts taking movies of a rival's scrimmages.

Although the Army does not have historical data that would quantify the impact of combat experience upon survivability, as does the Air Force, the Army has historically held battle experience as an indicator of superior professional qualification. Every soldier recognizes the advantages of the old campaigners over inexperienced troops. Anyone who served in Vietnam would attest a preference to serve under a battle-tested leader. Thus, with the Air Force's Air Combat Range as a precedent, the challenge of the National Training Center was to create the conditions of ground combat to the point that such training would serve as a surrogate for combat experience.

Fortuitously, technologies had been developed which could be applied to Army training to provide the realism that previously had been lacking in Army exercises. The Multiple Integrated Laser Engagement System was being developed which would permit real-time casualty assessments. Each time a laser equipped weapon fires a blank, an eye-safe laser is emitted which, if it strikes a laser detector worn by an opponent, will render the opponent disabled and prevented from participating further in the battle. Each weapon system has a unique laser signature which accurately simulates the weapon's effects on targets (as an example, a rifle cannot kill a tank, but a tank can kill another tank).

At the same time, the Combat Developments Experimentation Command was developing position location systems and related recording, playback and analysis capabilities. Coupling the laser capability with position location

systems and data collection offered the potential of creating an engagement simulation range that would provide the required realism and objective analysis. Additionally, the Combined Arms Test Activity at Fort Hood had developed a company-size live fire range which would serve as the prototype for a battalion-size live fire range at the NTC. The system consisted of computer-controlled targets representing either attacking or defending opposing forces. Sensors recorded hits and near misses, and telemetered the results to a central processing facility for display and critique.⁶

The convergence of such technological opportunities and a consensus on the need for such a training facility was a key facilitating factor in the success of the National Training Center, as it had been for the Air Force's Air Combat Range at Nellis Air Force Base.

Therefore, the concept of a National Training Center was to provide the Army a training facility where a total combat environment could be simulated. Such an environment was to have realistic maneuver areas, adequate battalion live-fire range areas, an opposing force equipped to simulate a Soviet motorized rifle regiment, unconstrained air space, full nuclear, biological and chemical warfare play, and integration of artillery, attack helicopters and Air Force close air support to complement maneuver battalion operations. The center was to be fully instrumented to provide real-time monitoring and recording of exercises but with instrumentation that does not detract from realism.

The concept had its origins in informal discussions among senior Army commanders between 1974-1976. In November, 1976, Major General Paul F. Gorman, the Deputy Chief of Staff for Training at the Training and Doctrine Command (TRADOC) described the concept in a paper entitled "Toward a Combined Arms Training Center."⁷ This paper was informally transmitted to

Lieutenant General E. C. Meyer, Deputy Chief of Staff for Operations and Plans (and later Chief of Staff of the Army) at Headquarters, Department of the Army, who endorsed further development of the concept.⁸ The concept was presented to and approved by General Walter T. Kerwin, Vice Chief of Staff of the Army, on April 11, 1977.⁹ As has been noted, this high level support for the concept at its very inception proved to be critical to the survival of the project for the next two years.

MG Gorman fleshed out his original concept and originated a catchier name and acronym for the center in a TRADOC concept paper entitled "Toward National Training Centers (NTC) for the U.S. Army," dated May 23, 1977.¹⁰

The schedule approved by the Vice Chief of Staff on April 11, 1977 was to begin funding for the NTC beginning in Fiscal Year 1980. Battalion size units would rotate through the NTC, two at a time, for two weeks of continuous field training. NTC rotations would begin in the Summer of 1981 and would increase in frequency until 42 battalions would rotate through the NTC annually beginning in 1984. Battalions and their support elements (engineers, signal, artillery, logistics, and etc.) would move to an airbase near the NTC by military or commercial airlift and then by bus to the training center. Upon arrival, they would draw pre-positioned equipment just as they would if they were deployed to Europe in time of war. They would then deploy to the field and begin two weeks of force-on-force engagement simulation exercises and live fire exercises. All actions would be monitored and recorded by sophisticated instrumentation. Debriefing teams would process the data thus collected and provide periodic field debriefings during the exercise and a final critique of performance. A take-home package would be provided to permit concentrated training at home stations or weak areas identified at the NTC.¹¹

A major spin-off benefit of the NTC concept would be the opportunity for the Army as a whole to improve its unit training methods. The Army would have an objective system to quantify unit performance in a realistic combat environment which could lead to the development of better training methods and programs. Additionally, as the NTC experience would be the closest approximation yet devised to combat between modern military forces, it would serve as a laboratory to observe and evaluate innovative tactical concepts. Such objective analysis could serve as a basis for modifying current doctrine or developing future doctrine.

Because unit training within the United States is a responsibility of the U.S. Army Forces Command (FORSCOM), it was designated as the lead agency in "developing and coordinating this initiative."¹² Although TRADOC would continue to develop the training environment for the NTC, the exact division of authority and responsibility was a source of many contentious issues over the next three years. It also placed primary responsibility upon a command that had not developed the original concept and did so without providing it with additional personnel other than a colonel to serve as program manager. Although FORSCOM superficially embraced the NTC concept, the planning effort became an additional and secondary job for members of the FORSCOM staff. The NTC would effectively revise the FORSCOM organization by creating a new installation to manage, by creating a new unit training system which would require constant management attention, and by creating new sub-organizations within the FORSCOM headquarters to accomplish this. Such a radical change naturally met considerable organizational inflexibility and inertia against change. As a result, major planning requirements were overlooked or given only superficial treatment, coordination and liaison with other commands, agencies and political

organizations were not established, and initial resource requirements developed by FORSCOM proved grossly inadequate. This initial planning failure almost led to the demise of the entire concept. The key factor which saved the program was the "shield" provided by the high priority given the National Training Center by the Army's senior leaders. From 1978 through 1981, the NTC was designated the Army's highest priority training project.¹³ When the danger flag was raised, this high priority generated extraordinary efforts and unique solutions which saved the program.

Once the Army's Vice Chief of Staff had approved the concept, the effort shifted from concept formulation to detailed planning. At this point, the program stumbled. A site had to be chosen for the NTC, environmental documentation had to be prepared, detailed resource requirements (personnel, equipment, and funding) had to be identified, programmed and budgeted, instrumentation had to be developed, procured and installed, and facilities had to be repaired and constructed depending on the site selected. Included under this umbrella of requirements were such diverse issues as troop and family housing, medical care, recreation facilities, water supply, communications, tactical and administrative equipment procurement and maintenance, unit stationing, and environmental and community impacts. Each of these issues caused major problems during the establishment of the NTC. The following chapter will deal with these problems by providing an historical description of the NTC's establishment experience.

Chapter III. National Training Center Project History 1977-1981

This chapter will provide a narrative history of the events leading to the establishment of the National Training Center at Fort Irwin, California. Such an historical analysis will permit a better understanding of the NTC experience and will provide a context for the lessons to be learned from this project. I will begin with a discussion of the initial phase of NTC planning which lasted from April, 1977, to September 1979. This phase was characterized by ineffective management and poor bureaucratic-political behavior. Included in this critical period were such events as site selection and environmental documentation, initial cost estimations, planning for the staffing and equipping of Fort Irwin, and the planning for Fort Irwin's facilities repairs and new construction. The process of scheduling for these events is then presented and analyzed. The period from September, 1979, to July, 1981, completes the historical analysis of the NTC's establishment. This period was characterized by effective management practices and successful bureaucratic-political behavior. I will then summarize this chapter by describing the most significant conclusions to be derived from the NTC establishment project.

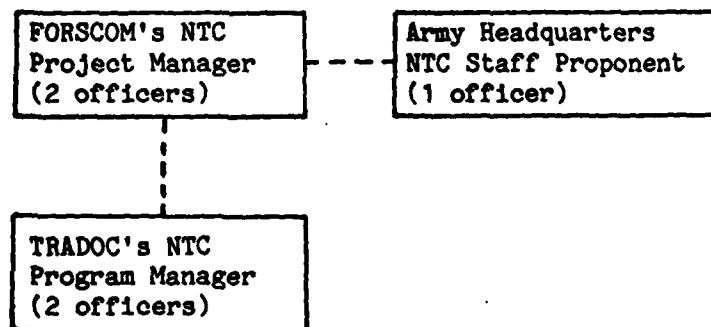
Initial NTC Planning 1977-1979

The decision to establish an NTC made by GEN Kerwin on April 11, 1977, set into motion detailed planning at FORSCOM and TRADOC. However, considering that resources required to establish the NTC in Fiscal Year 1980 had to be requested in the commands' Program Analysis and Resource Reviews which were due in January, 1978 (see Appendix A), the planning process was far too slow to start and too limited once underway. There were several reasons for this planning failure: First and foremost, the NTC represented a major organizational change that was resisted for a variety of reasons. Second,

all personnel then associated with the project failed to appreciate the magnitude of the effort. Third, no data existed upon which to base estimates for the resources required to establish and operate an NTC. Fourth, no accurate information could be obtained on the various decisions that would be required to establish an NTC.

The first action taken by FORSCOM was to hold a working conference with all concerned Army commands and agencies on May 23, 1977. At this conference, the initial requirements for selecting a site, preparing environmental documentation, developing resource requirements, and scheduling were discussed and responsibilities assigned.¹ On July 5, 1977, Colonel John C. Lippencott was assigned as the NTC Project Manager.² Up until his assignment, no individual was assigned full time to NTC planning. COL Lippencott was augmented by Major David Barth in July and these two officers remained as FORSCOM's primary NTC planners for the next 20 months. TRADOC also established an NTC planning staff to concentrate on the training environment and instrumentation at the NTC. Therefore, as of the Summer of 1977, the NTC planning organization was as Figure 1 indicates.

Figure 1. NTC'S INITIAL PLANNING ORGANIZATION



The TRADOC's NTC Program Manager, Lieutenant Colonel (later Colonel) Richard I. Edwards, was not subordinate to the FORSCOM's NTC Project Manager. Recognizing that a potential overlap of interests may occur, both officers attempted to negotiate a memorandum of understanding to specify each command's NTC responsibility and authority. However, TRADOC wanted to have complete control over the training at the NTC whereas FORSCOM felt that unit training was its responsibility and wanted TRADOC only in an assist role at the NTC. This disagreement prevented a memorandum of understanding from being completed. Not until the Director of Training at Headquarters, Department of the Army, interceded and published the Army regulation which prescribes the policies, objectives and responsibilities for operating the NTC was the disagreement resolved.³ However, this situation highlights one of the major organizational problems during the planning stage: the failure clearly to identify authority, responsibility and accountability for the project from the very inception. Allison notes that such "failures" are a nearly inevitable consequence of two factors: "many jobs do not fall neatly into precisely defined organizational jurisdictions; and vigorous organizations are imperialistic."⁴ As a result, it fell largely to the NTC players to establish their own responsibilities. The results were inevitable conflicts of interests and overlooked responsibilities.

Coordination and communications also suffered because of this failure to delineate specific responsibilities. There was no single office that had knowledge of all actions where accurate information could be obtained. This function was eventually assumed by the NTC's Army Staff proponent. Also, no office felt obligated to lobby for (or "champion") the NTC both within the Army and with outside interest groups until the Army's Director

of Training assumed that responsibility in early 1979. This was a situation where the failure to delineate specific responsibilities resulted in the convergence of two very different issues, each of which had negative impacts on the project: organizational and political. The project was not properly organized and this led to poor and unsuccessful bureaucratic-political behavior.

The Army has an inherent dislike for telling subordinate commands how to do their job. However, in retrospect, the general directive "Request FORSCOM continue with lead role in developing and coordinating this initiative"⁵ perhaps did not convey the specific responsibility, authority and accountability a project of this magnitude required.

To plan for the NTC, FORSCOM altered its headquarters internal organization by forming an NTC Project Manager's office. However, this office was staffed during the critical first two years with only two officers. Needless to say, they could do little more than coordinate and consolidate information and plans from other FORSCOM offices. But other members of the FORSCOM headquarters staff had no organizational responsibility for accuracy or initiative in NTC planning--"there was a special NTC office that was responsible."

Another more subtle, but probably more significant action resulted in FORSCOM staff officers devoting minimal time to NTC planning. Although actively supporting the NTC in public, senior FORSCOM general officers on several occasions privately expressed their personal doubts to members of their staffs that the NTC would ever be established. Such doubts were translated into cursory efforts by the FORSCOM staff in developing resource, logistics, personnel, and engineer requirements for the NTC.⁶

Besides having a minimal number of officers assigned full time to NTC planning, with the exceptions of COL Lippencott and LTC Edwards the officers assigned were relatively inexperienced in high level staff operations and bureaucratic politics. A prerequisite for assignment to such projects should be rational skills as well as organizational and political skills. Only after suffering through nearly two years of experience building did these officers develop such skills which were essential to the NTC's success. Additionally, COL Lippencott was assigned as the NTC Project Manager in July, 1977, yet he had a mandatory retirement date of March 1, 1979. Upon his retirement, his position was not filled for six months, leaving MAJ Barth as FORSCOM's single, full time NTC planner. Such personnel assignments fostered the perception that the NTC was not the top priority project that it had been designated.⁷

Once the NTC planning team was in place, they functioned more in a reactive than a proactive mode both politically and rationally. Planning was too limited in scope and too shallow in depth. They provided information when it was requested but volunteered little. No detailed schedules were prepared; crude bar charts sufficed and pace-setting factors were not identified. Coordination was made only with commands and agencies with easily identifiable interests: state officials and Congressional representatives were not contacted; the agencies that control post commissaries and post exchanges were overlooked as was the command that has responsibility for upgrading roads serving all Army installations. NTC planners were not sophisticated regarding potential environmental impacts and failed to appreciate the power that environmental groups have over government actions or the time required to complete the environmental documentation process. Such planning failures at the inception mandated significant resource

revisions later and almost killed the program because of unforeseen environmental impacts and resource shortfalls.

Site Selection and Environmental Documentation

The first two major actions required to establish an NTC were to select a site for it and document the environmental and socio-economic impacts associated with such an establishment. From the very beginning of NTC concept development, the Army focused on Fort Irwin, California, an inactive, 642,805 acre installation located in the Mojave Desert midway between Los Angeles and Las Vegas, as the prime site for the NTC. However, to avoid overlooking a possibly better site, FORSCOM conducted a rigorous analysis of alternative sites both in the United States and Canada. They identified the following six major factors as discriminators in evaluating each site.

1. Size - Two maneuver areas are required. The largest, about 68 kilometers by 15 kilometers, is required to conduct battalion live fire exercises. The second, about 30 kilometers by 13 kilometers, is required for force-on-force engagement simulation exercises.
2. Challenging terrain - The site should offer diversity and military challenges to maneuvering units.
3. Uncluttered electromagnetic spectrum - Because of the electronic warfare training planned for the NTC, the site should be remote from commercial broadcast areas.
4. Air space restricted to military use - In order to realistically portray the air-land battle, the air space over the NTC should be restricted to military use.
5. Adequate ranges - Adequate safety area is required to fire all the weapons employed by a battalion task force.

6. Favorable weather - While the Army does train and fight in all types of weather, good weather conditions for air operations are desirable so that each rotating battalion is faced with comparable challenges and provided with similar support.⁸

Twelve sites that generally met the size criteria were chosen for detailed analysis. Of these, three installations were judged to be feasible sites for the NTC: Marine Corps Base 29 Palms, California; Yuma Proving Grounds, Arizona; and Fort Irwin. Of these three sites, Fort Irwin was identified as the preferred site and became the focus of the environmental impact statement for the NTC.⁹

The Fort Irwin area has a rich history of Indian habitation and western expansion. The Old Spanish Trail cut through what is now Fort Irwin. The area was explored by Captain John C. Fremont and Kit Carson in 1844 and used as a camp for the Army's Mormon Battalion in 1846 and an Indian Wars base camp in 1860. In the 1930's, General George S. Patton used the area as a maneuver site for armored vehicles and, as an indication of the fragility of the desert environment, tracks from those maneuvers are still visible in places. In 1940, the Army established the Mojave Anti-Aircraft Range in the area of the present Fort Irwin. In 1942, the post was named Camp Irwin in honor of Major General George Leroy Irwin, who commanded field artillery units in World War I. The camp was inactivated in 1944 but reactivated in 1951 as a training center for combat units during the Korean War. In 1961, the post was designated a permanent Army installation and renamed Fort Irwin. During the Vietnam War, it served as a pre-deployment training center for the units enroute to southeast Asia. In January, 1971, the post was again inactivated during the Vietnam drawdown. In 1972, the California

Army National Guard assumed full responsibility for the post and used it as a unit training center.¹⁰

Besides enormous size, Fort Irwin has much to recommend it as the site for the NTC. Although in the desert, the area contains highly variable terrain. Several mountain ranges separate maneuver areas and rock outcroppings, hills and gullies provide cover from direct fire. Other than in vegetation, the area is topographically similar to the Fulda and Hof Gaps in West Germany. Fort Irwin is totally within a militarily restricted air space as it is adjacent to China Lake Naval Weapons Center and near Edwards Air Force Base and Marine Corps Base 29 Palms. The ranges at Fort Irwin can accommodate all Army direct fire weapons and can support stand-off delivery of air launched missiles. Fort Irwin is in the High Mojave Desert and temperatures vary from extreme cold to extreme hot. High winds are common at Fort Irwin but it averages 360 clear flying days per year. Fort Irwin is 35 miles from the nearest civilian community, Barstow, California, and electronic warfare emissions would not interfere with any commercial broadcast. However, in what appeared as the first NTC crisis, the electromagnetic spectrum at Fort Irwin was not totally clear. The National Aeronautics and Space Administration (NASA) had constructed their Goldstone Deep Space Tracking Station, one of three worldwide stations, on the southwest corner of Fort Irwin.¹¹ Although a tenant at Fort Irwin, NASA had invested considerable resources in the Goldstone site and politically was in a stronger position than the Army. A resolution of this apparent conflict was essential to the selection of Fort Irwin as the site for the NTC.

Because electronic warfare play at the NTC is a portion of the training environment, TRADOC undertook the responsibility of resolving this issue.

LTV Edwards contacted the Department of Defense Electromagnetic Capabilities Analysis Center and requested that they evaluate the potential interference problem with NASA. The results of this evaluation were that the Army and NASA operate on such widely separated frequencies that the potential of interference was minimal. However, to prevent even the possibility of stray emissions from causing interference, they recommended procedures to screen electronic equipment operating at Fort Irwin and other nearby military installations for spurious emissions and recommended procedures to monitor all electronic emissions. In a series of negotiating sessions among NASA, the Navy, Air Force, Army (represented by the NTC's Army Staff proponent) and Office of the Secretary of Defense an agreement was reached to govern all electronic activities in the Mojave area and permit compatible operations by all Services and NASA.¹²

Following identification of Fort Irwin as the preferred site for the NTC and Marine Corps Base 29 Palms and Yuma Proving Grounds as alternative sites, the environmental documentation process became the next critical issue. Following the May 23, 1977 meeting at FORSCOM, the Sacramento District Engineer was contacted to act as the contracting agency for the preparation of the Environmental Impact Statement. EDAW, Inc., a San Francisco based environmental consulting firm, was contracted to prepare the studies for this statement. Unfortunately, the environmental documentation process was conducted as an academic exercise as opposed to a procedure to involve all interested parties in the decision-making process. Until the Draft Environmental Impact Statement was distributed nationwide for comments on September 21, 1978, California State and local authorities had not been contacted. Once the contract to EDAW, Inc. had been awarded, FORSCOM stepped out of the environmental picture until the draft statement

was published and public hearings conducted. The comments received from the State of California's Resources Agency during the public comment period on the draft statement revealed a strong opposition to the establishment of an NTC at Fort Irwin. Even these strong comments did not generate enough concern at FORSCOM to prompt a meeting with California authorities. All comments were academically addressed in the Final Environmental Impact Statement which was filed with the Environmental Protection Agency and distributed nationwide on January 19, 1979.¹³

FORSCOM felt that this completed the environmental documentation process and was preparing to recommend that Fort Irwin be selected as the site for the NTC when additional comments were received from the Resources Agency of California. These comments were so challenging that Major General James C. Smith, the Army's Director of Training, upon recommendations by the Office of the Army General Counsel, decided to answer them in detail in a supplement to the Final Statement, which was distributed on May 31, 1979.¹⁴ In preparing these comments, representatives from Army Headquarters and FORSCOM finally met with California officials on April 4-5, 1979. These representatives felt that the responses contained in the supplement would resolve California's concerns. However, on July 6, 1979, the acting Director of the State of California's Resource Agency wrote to the Chairman of the Defense Subcommittee of the House of Representatives Appropriations Committee, requesting that funding for the NTC be withdrawn from the Fiscal Year 1980 Budget because of the Army's failure to satisfy California's environmental concerns.¹⁵ Based on this letter, the subcommittee on July 26, 1979, deleted all funding for the NTC in its initial budget review.¹⁶

The only solution to restore the funding for the NTC was to get the State of California officials to withdraw their objections. To meet

Congressional budget milestones, this had to be accomplished in less than eight weeks. The NTC's Army Staff proponent and United States Representative Jerry Lewis, who represented the Fort Irwin area, developed a plan to meet with California officials in Sacramento on August 9, 1979, to attempt to resolve the problems. MG Smith led the Army delegation to this meeting, which was attended by Representative Lewis and numerous California State officials. This meeting did stroke the egos of California State environmentalists but did not resolve the problem. They wanted the Army to specify what exact mitigation measures were planned for all adverse environmental and socio-economic impacts. Participants agreed to meet in San Bernardino on September 6, 1979, to address those mitigation measures.¹⁷

The actions that ensued did more for the ultimate success of the NTC than simply resolving California's concerns and reinstating the Fiscal Year 1980 NTC funds. The crisis resulted in all commands and agencies finally recognizing the high priority attached to the NTC and in bringing together a first class team of planners who were to guide the NTC into being. The timing also corresponded with the assignment of Colonel (who was soon to be Brigadier General) James T. Bramlett as COL Lippencott's replacement and who was also designated to be the first commander of the NTC. By the time the September 6 meeting began at San Bernardino, the Army finally had gotten its NTC act together. Additionally, Representative Lewis, working behind the scenes with some old political allies in the California Legislature, had secured a California Assembly resolution passed September 5, 1979, which unanimously endorsed establishment of the NTC at Fort Irwin. Copies of the September 6 San Bernardino Sun-Telegram carrying a front page article on

this resolution were placed before each participant at the beginning of the meeting.¹⁸

At the meeting, the Army countered every concern by California environmentalists with specific mitigation measures which the Army committed to undertake. The all-day meeting was conducted in an atmosphere of cooperation vice confrontation. Prior to adjournment, a memorandum of understanding was signed by Army and State of California officials and a letter drafted to the Defense Subcommittee of the House Appropriations Committee stating that California's concerns had been satisfied and recommending that NTC funding be restored. Based on these actions, the House Appropriations Committee on September 20, 1979, restored all Fiscal Year 1980 funding for the NTC.¹⁹

A major lesson that can be drawn from this experience is that the environmental documentation process, in addition to providing decision-makers with the impacts of an action, also provides proponents an opportunity to lobby for their project with interested agencies, to solicit their comments and to make them feel a part of the project thus having a vested interest in its success. Horwitch describes such a process as "stakeholder management."²⁰ Subsequent informal conversations with California officials revealed that if this had been done, the issue would never have become so contentious and potentially destructive to the project. Essentially they felt left out and that Washington was trying to cram something down their throats. Their concerns were not so much environmental as they were "political turf." They had exercised their political muscle and forced the Army to defer to them.

Immediately preceeding these meetings in California, the Army Staff had recommended that Fort Irwin be officially designated as the site for

the NTC. On July 3, 1979, the Secretary of the Army concurred and recommended that the Deputy Secretary of Defense approve establishment of the NTC at Fort Irwin. On August 8, 1979, this approval was made.²¹

Programming and Budgeting History

Once the Army's Vice Chief of Staff had made the decision on April 11, 1977 to proceed with planning for the NTC, the task fell to the staffs at Army Headquarters, FORSCOM, and TRADOC to identify the required resources and secure approval through the Army's and Defense Department's Planning, Programming and Budgeting System. To lay the groundwork for subsequent years' requirements, the NTC's first Army Staff proponent prepared a detailed justification for the NTC which included a projected timetable for resource requirements to begin in Fiscal Year 1980 and submitted this for inclusion in the Fiscal Years 1979-1983 Army program. Subsequent Defense Department approval of this program, which included the NTC justification, gave the Army de-facto approval of the project.²² This was one of the more astute political moves made during the NTC planning phase. Because this program, item had no Fiscal Year 1979 resources associated with it, the Office of the Secretary of Defense did not challenge it. However, it did formally advise the Defense Department that resources would be requested in subsequent years thereby avoiding future surprises. It also provided an Office of the Secretary of Defense concurrence of the concept thereby lessening the possibility of a conceptual disagreement being used as a justification for deleting resources in the future. Additionally, because the program was distributed throughout the Army, it served to notify senior officers and resource managers that an NTC was being developed and that it had been approved by the Army and Defense Department leadership.

Beginning in the Summer of 1977, the staffs at FORSCOM and TRADOC began preparing the detailed resource estimates for establishing and operating the NTC. Based on preliminary results from the analysis of alternative sites, planners based their estimates on the NTC being located at Fort Irwin. However, legal counsels at Army Headquarters and FORSCOM advised planners that because of existing environmental law, until environmental documentation was completed and a site formally selected, that no funds should be expended to conduct site specific engineering studies of facilities at Fort Irwin. However, detailed cost estimates were required by January, 1978, nearly 20 months before a final site selection was made. Therefore, FORSCOM planners resorted to using existing records of Fort Irwin facilities and several cursory field trips to Fort Irwin upon which to base their estimates.²³ These estimates later proved to be grossly low thus requiring major program and budget revisions.

Such a bureaucratic catch-22 was not the only reason for poor initial estimates. Because of the understandable organizational resistance to the NTC and the poor management previously discussed, no procedure or methodology was developed to identify all possible resource requirements at the NTC. Instead, planners simply developed estimates of requirements as they came to mind based on their past experience. Also, for the reasons described previously, there was a tendency of many staff sections in FORSCOM to provide superficial data and in no case was a comprehensive evaluation of requirements and resources made. A justification that was later made, and perhaps was an actual rationale at that time, was that if the full cost of the NTC had been identified initially, the Army, Defense Department and Congress would never have approved it. Thus, get the proverbial camel's-nose-under-

the-tent and it becomes difficult, if not impossible, to turn the camel around.²⁴

The cost escalations for the NTC have been singled out by its critics as a major planning failure. Such cost growth was used repeatedly by negative stakeholders as a rationale for killing the program. I have just described some rational and organizational reasons for such escalations. However, significant cost escalations are not unusual for such unique projects; they are more the norm than the exception. In fact, the tripling of cost estimates detailed in Table 1 is rather modest compared to the quintupling of estimates for coal gasification projects between 1972 and 1976 and other such large projects.²⁵ Hederman has described four causal factors contributing to such cost escalations: general inflation, construction-cost changes above general inflation, environmentally dictated changes, and improved cost estimates. He estimates that eighty percent of cost escalations observed are attributable to improved cost estimates. Such systemic cost escalations were recently verified by Franklin Spinney, a Defense Department analyst, who testified before Congress that the Services regularly underestimate long-term project costs. He stated, "It is just the way the system works . . . a structural problem . . . It's not orchestrated."²⁶ Simply stated, such growth in cost estimates for large projects like the NTC is to be expected. However, skilled managers should anticipate such cost growth and devise both rational plans to deal with the growth and bureaucratic-political plans to counter any criticism resulting therefrom.

TRADOC's responsibility was to identify those resources required to establish and operate the training environment at the NTC. Included in this was instrumentation development, procurement and operation, live fire

range development, and electronic warfare simulation. TRADOC's problems in resource estimation were different from FORSCOM's. TRADOC was dealing with state-of-the-art instrumentation systems that had never been combined in the manner and magnitude planned at the NTC. They were also estimating what such a system would cost under competitive bidding procedures. They contracted with several firms to develop the specifications for the system and to provide estimates on its cost. TRADOC also contracted with Ford Aerospace, General Dynamics Electronics and Science Applications, Inc. to develop a prototype system to test and to refine the instrumentation concept. Upon completion of this test and the subsequent revision of the specifications, TRADOC was within two weeks of issuing a solicitation for competitive bids when the Small Business Administration issued a Public Law 95-907, Section 8a, Pilot Program "set-aside" of the contract for AMEX, Inc., a minority owned small business in Southern California. The Army objected to this action because of the size and complexity of the project but was powerless to overcome the set-aside. It was significant that this action occurred in July, 1980, during the height of the Presidential campaign and that the owner of AMEX, Mr. Manuel Caldera, was a member of the President's Commission on Small and Disadvantaged Businesses.²⁷ The resulting contract was awarded for a total cost of over \$40 million more than was initially estimated in January, 1978.²⁸ Wisely, AMEX selected General Dynamics Electronics and Science Applications, Inc. as subcontractors thus retaining the expertise developed in the prototype test phase. According to TRADOC officials, the contract execution has proceeded satisfactorily and all milestones have been met.²⁹

Table 1 is a cost profile of the NTC which shows the programmed and budgeted amounts by fiscal year as they were revised each year. Also shown

are the actual expenditures in Fiscal Years 1980-1982, which includes re-programming actions, and the percentage growth between the first estimate and last estimate or actual expenditure. Not included in these costs are items which were provided to the NTC without additional cost to the Army (such as pay for military personnel stationed at Fort Irwin, cost of equipment relocated to Fort Irwin and cost of tactical or training equipment issued directly to Fort Irwin or the NTC).

Table 1. NTC COST PROFILE³⁰
(\$millions - FY 80 constant dollars)

<u>Program Years</u>	<u>80</u>	<u>81</u>	<u>82</u>	<u>83</u>	<u>84</u>	<u>85</u>	<u>86</u>	<u>87</u>
80-84	29.9	33.6	65.0	57.2	55.6			
81-85		60.4	130.8	96.5	92.2	86.3		
82-86			169.9	91.8	89.6	85.7	96.0	
83-87				147.2	153.4	138.6	125.9	163.5
Actual Expenditures	44.1	82.6	174.1	-	-	-	-	-
Cost Growth	14.2	49.0	109.1	90.0	97.8	52.3	29.9	-
%Growth	47%	146%	168%	157%	176%	61%	31%	-

Source: "National Training Center (NTC) Program Summary,"
Internal working paper, Headquarters, Department of
the Army (DAMO-TRS), May 6, 1981.

Staffing and Equipping Fort Irwin

The personnel who developed the NTC concept recognized that the Army could not support an increase in force structure or equipment in the quantities required to operate the NTC. Their solution was to man the facility primarily with active duty soldiers drawn from other installations, to re-station two battalions to the NTC to act as the opposing force and to use the equipment from these two battalions, augmented by equipment drawn from stateside installations, to provide the pre-positioned equipment pool and

administrative equipment necessary to operate the training center and the installation.³¹ All initial resource estimates were based on this. Although this concept was basically followed, minor modifications resulted in major increases in resource requirements.

Because the reactivation of Fort Irwin was considered to be a new Army activity, Army policy required that a detailed study be conducted to determine if civilian contractors could perform installation support functions for less cost to the government than either soldiers or Army civilians. This was called a Commercial-Industrial Type Activity study. Such a study was a recognized requirement in June, 1977.³² However, FORSCOM planners did not appreciate the criticality of such a requirement and argued that the approval of the NTC concept also constituted approval of the manning concept which negated the need for the study.³³ This was not the case and the Office of the Assistant Secretary of the Army for Installations, Logistics, and Financial Management continued to insist upon such a study.³⁴ During the frantic preparations for the San Bernardino environmental meeting, FORSCOM officials finally recognized that they could not avoid the study and initiated the process. Within six months, they realized that this study and the implementation of its findings were the critical path events in the NTC establishment schedule.³⁵ Over 30 months had elapsed from the initial recognition of the requirement to the point the FORSCOM planners understood the criticality of the study. In partial defense of such ostrich-like actions, this was the first Army installation activation or reactivation in over 20 years and the first installation to have all support activities subjected to such a study. In this instance, as in most of the NTC actions, planners were breaking new ground and, as was noted previously, were initially ill-equipped by prior training,

experience and seniority to such an undertaking and were facing monumental organizational inflexibility.

In order to adhere to the establishment schedule, FORSCOM was forced to assign some soldiers and civilians to Fort Irwin on a temporary basis pending the outcome of the Commercial-Industrial Type Activity study. This study showed that contractor operations would be the most cost-effective method of performing installation support functions. Recognizing the possibility of this result, the NTC's Army Staff proponent added sufficient resources to the NTC program to provide for such a contract. It is ironic that a solution that was shown to save the government over \$18 million during a three year period required additional resources for the NTC. Such savings are explained by the requirement for numerous personal benefits and support personnel, not accountable to the NTC, to support soldiers and Army civilians which are not required under contract operations. Also, pay for soldiers is not accountable under the NTC programs (soldiers will be paid whether they are stationed at Fort Irwin or anywhere else). Yet the cost of the contract is included under the NTC program. Boeing Services International won the competitive bidding for the Fort Irwin contract and began full contract performance on October 1, 1981.³⁶

Due to an Army-wide shortage of some tactical and administrative equipment, providing Fort Irwin and the NTC with their full requirements became a major problem. FORSCOM drew from its other units and installations until the FORSCOM commander determined that further drawdowns would adversely impact readiness. It then became an Army Headquarters problem. Each item of equipment was managed on a case-by-case basis and only the high priority of the NTC permitted the adequate equipping of Fort Irwin and the NTC.³⁷

Family housing also had a profound impact on staffing plans. The family housing situation at Fort Irwin and Barstow, California, was recognized as a concern during the environmental documentation process, but studies indicated that adequate housing was available. However, by late-1980 and early-1981, the situation had become acute. Inflation, speculation, and high interest rates had driven housing costs in Barstow too high for junior enlisted soldiers to afford. Engineers were in the process of rehabilitating the 506 family housing units at Fort Irwin, but that still left a requirement to house approximately 900 military and civilian families off-post. This amount of affordable housing was not available at Barstow.³⁸ The Army had included in the Fiscal Year 1982 NTC Budget the construction of 254 family housing units at Fort Irwin. Representative Lewis got Congress to add 200 modular housing units to that budget item but the construction of these 454 units would not be complete until late 1983 thus providing no immediate relief to the shortfall.³⁹ The problem was compounded by the environmental conditions at Fort Irwin. To assign a married soldier to the middle of the Mojave Desert where insufficient family housing existed was appalling to all concerned. The solution required the concerted efforts of Army Headquarters, FORSCOM and Fort Irwin and proved to be one of the most successful management actions during the NTC project.

As an exception to policy, Army Headquarters, acting through the US Army Military Personnel Center, limited the assignments to Fort Irwin of junior enlisted soldiers (who could least afford the family housing in Barstow) to unmarried soldiers who could be housed in rehabilitated barracks at Fort Irwin. This policy would be lifted once sufficient housing was available but served to temporarily eliminate the requirement for about

400 family housing units. Army Headquarters also conducted an out-of-cycle survey of Barstow housing costs and, based on this survey, increased the Variable Housing Allowance for personnel assigned to Fort Irwin. This served not only to ease the financial burden on soldiers but served to stimulate commercial housing construction in Barstow.⁴⁰ FORSCOM temporarily assigned several of their best housing managers to Fort Irwin to establish a housing referral office to assist personnel in finding commercially available housing. Fort Irwin assisted commuting personnel by providing low-cost bus service from Barstow to Fort Irwin. These actions mitigated the impacts of the housing shortage which is being eliminated by the construction of both on-post and off-post housing.⁴¹ However, such construction is expensive and the additional on-post family housing was one of the contributions to the area of largest cost growth--facilities repair and construction.

Facilities Repair and Construction

The largest cost growth in the NTC program occurred in the areas of facility repair and new construction. These costs escalated from \$27.5 million, contained in the Fiscal Years' 1980-1984 program, to \$299.4 million which was estimated in May, 1981 to include all such costs through Fiscal Year 1987.⁴² The causes of such cost growth were numerous but can all be attributed ultimately to superficial initial planning.

The planning for facility and utility repairs was restricted by the limitations on conducting site specific engineering surveys until environmental documentation was complete and a site for the NTC was selected, as was noted previously. Fort Irwin had been an active Army installation through 1970 and since 1972 had been maintained by the California Army National Guard. FORSCOM engineers assumed that the facilities and

utilities would need only minimal repair to put them in full operation and programmed only \$6.3 million for such repairs. However, once detailed surveys were made in the Fall of 1979 (at the beginning of Fiscal Year 1980), engineers discovered that the desert environment had caused massive deterioration to facilities and utilities. The alkaline soil had corroded water and gas pipes so extensively that nearly all had to be replaced. Kangaroo mice had eaten through the insulation covering electrical wiring thus requiring rewiring of most buildings. The water at Fort Irwin contains excessive amounts of fluoride which requires removal prior to consumption. A defluoridization plant existed at Fort Irwin but it was found to use an out-of-date technology requiring chemicals that were not available commercially any more. This required that an entirely new facility be constructed and bottled water supplied until it was completed. Additionally, the repair of building interiors and exteriors proved more extensive than had been envisioned.

In order to adhere to the NTC establishment schedule, additional funds had to be provided out-of-cycle. The Army provided nearly \$5 million for repairs by internal reprogramming but had to obtain Congressional approval for \$7.65 million new construction reprogramming. Such construction of water purification facilities and utility renovations was essential for the health and welfare of personnel already being assigned to Fort Irwin. Congress approved this request but noted in its approval: "The Committee is not pleased, however, with the manner in which this issue has been brought before us. Customarily, we would not approve a new start of this type in a reprogramming, but, because troops and families are already in place and more are planned to be transferred, we are left with little choice but to approve this request." Representative Gunn McKay, the Chairman of the House

Appropriations Subcommittee on Military Construction, also penned a note to the bottom of this approval letter stating, "P.S. don't come in here after the fact anymore!"⁴³ Poor planning was not winning the NTC any friends in Congress.

By far the largest cost increase was in the new construction programmed for Fort Irwin, which, as was noted previously, is a common problem in such large-scale projects. The initial estimate was for only \$21.2 million but the May, 1981 estimate was for \$264.7 million of new construction. Added to the original program were such new facilities as ⁴⁵ family housing units, troop barracks and a mess hall, road upgrade to Defense Access Road standards, a commissary, troop recreation facilities, a fire station, an ammunition supply point, miscellaneous command, control and administrative buildings, and a railroad spur.⁴⁴ Several of these projects are still subject to deletion if cost-benefit studies do not prove positive, but the magnitude of the increase and the obvious essentiality of many of the projects make the initial estimates appear quite superficial if not intentionally misleading.

Schedule

The NTC establishment schedule approved by the Army's Vice Chief of Staff on April 11, 1977 called for initial funding to be included in the Fiscal Year 1980 Budget. This required that all costs associated with the establishment be identified in FORSCOM's and TRADOC's Program Analysis and Resource Reviews which were due in January, 1978. This was a herculean requirement although not recognized as such by FORSCOM. The results of their efforts have been previously described. But, why was such a schedule proposed and was it realistic?

In the Spring of 1977, 1980 appeared to be far into the future. However, the schedule presented during that briefing was grossly unrealistic. It called for the environmental documentation to be completed by January, 1978 (within eight months); personnel to be stationed at the NTC beginning in November, 1978 (within 19 months); the facility to be fully manned by January, 1980 (within 33 months); facility renovation to begin in October, 1979 (almost a year AFTER stationing soldiers at the NTC); and training to begin in October, 1978.⁴⁵ In retrospect, it is hard to envision how such scheduling was developed unless it was conducted by inexperienced personnel without input from responsible agencies.

By the time the Resource Reviews were submitted in January, 1978, the schedule had been pushed back exactly one year except for initial funding which was still scheduled for Fiscal Year 1980. This schedule and the costs contained in the Resource Reviews were briefed to the Vice Chief of Staff, the Commanders of FORSCOM and TRADOC and the senior Army Staff on February 2, 1978. These experienced officers recognized that many items were not included in the plans such as additional family housing, a commissary, re-stationing requirements, contractor operated installation support activities, and equipping the NTC. The status of the environmental documentation concerned attendees. In summation, the Vice Chief of Staff commented that the NTC was "probably undercosted 1½ to 2 times," but that "the Chief of Staff of the Army is in favor of an NTC"⁴⁶ Subsequent prioritization of the NTC during the Planning, Programming and Budgeting System ranked it as the Army's highest priority training project.

The implied approval of the NTC schedule presented to the Vice Chief of Staff locked FORSCOM and TRADOC into meeting that schedule. Even when the environmental documentation process was delayed by California and the

engineering surveys of Fort Irwin's facilities and utilities revealed massive, essential but unprogrammed repairs, the schedule was considered sacred. This ultimately proved to be a good strategy. Extraordinary, out-of-cycle procedures had to be devised to provide the required resources to maintain that schedule. There was a perception among NTC planners that if the schedule were allowed to slip, the high priority which was carrying the NTC through the Planning, Programming and Budgeting System might slip and thereby endanger the entire project. They felt that some of the extraordinary, out-of-cycle actions were good for the project by maintaining visibility and by displaying the high priority the NTC enjoyed. After several of these actions, the perception throughout the Pentagon was that whatever the NTC wants, the NTC gets. By 1980, other commands and agencies began attempting to justify some projects based on their linkage, however indirectly, to the NTC.⁴⁷

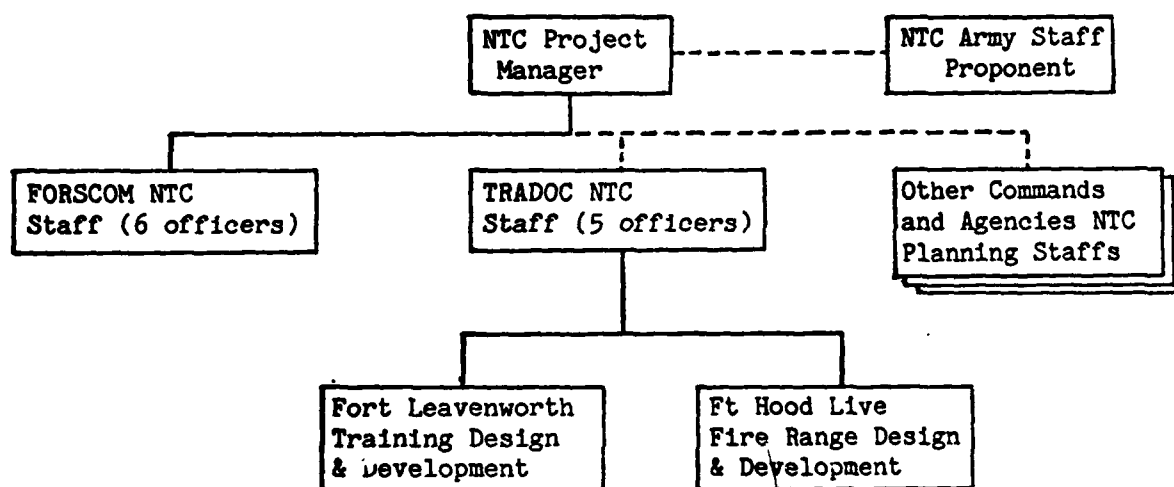
The ultimate result of such actions was that despite missing most milestones, the overall goal of establishing the NTC in Fiscal Year 1981 was met. Funds for the NTC were initially budgeted in Fiscal Year 1980, the NTC was formally established on October 16, 1980, and Fort Irwin was re-activated as an active Army installation on July 1, 1981.⁴⁸

NTC Establishment Planning 1979-1981

As was noted previously, the frantic actions preceeding the environmental meeting in San Bernardino brought together a first class team of planners and coincided with the maturing of NTC personnel as experienced bureaucrats, the assignment of BG Bramlett as the NTC Project Manager/Commander and the selection of Fort Irwin as the site for the NTC. This team, led by BG Bramlett and organized into a loose matrix, was primarily responsible for the NTC's success. BG Bramlett brought experience and the

clout of a general officer to NTC planning. He expanded the NTC planning staff at FORSCOM and assumed de-facto control over all NTC actions at TRADOC and other commands and agencies.⁴⁹ By November, 1979, the planning organization had expanded to that indicated at Figure 2.

Figure 2. NTC'S FINAL PLANNING ORGANIZATION⁵⁰



In order to coordinate the efforts of all Army NTC planners, BG Bramlett began quarterly in-process reviews at which all NTC planners would present the progress made and receive information and guidance. The first of these reviews was held at the Los Alamitos Army Reserve Center, California, on January 17, 1980.⁵¹

The Army's Director of Training, MG Smith, recommended that a General Officer Steering Committee be formed to monitor the NTC progress, resolve problems, and ensure inter-command coordination at the highest levels. The Deputy Chief of Staff for Operations and Plans, LTG Glenn K. Otis, approved this recommendation and established the committee on March 27, 1980.⁵² The first NTC General Officer Steering Committee meeting was held at FORSCOM

Headquarters on May 12, 1980.⁵³ This organization served to give visibility to the NTC and its high priority and to escalate problems to the decision level expeditiously. Its members became "champions" of the NTC. Through their collective experience and bureaucratic political skills, they were able to identify the stakeholders, to neutralize or co-opt negative stakeholders and to enlist the ardent support of positive stakeholders. The committee greatly facilitated the establishment of the NTC on schedule and, if it had been formed at the outset of NTC planning, could have avoided many of the problems resulting from initial planning failures. Both the in-process reviews and the General Officer Steering Committee were disestablished upon reactivation of Fort Irwin on July 1, 1981.⁵⁴

Historical Meaning

The preceeding historical summary and analysis provides us with the data to derive some conclusions of a general meaning to the NTC's establishment. The facts reported serve to illustrate the salient management points to be learned from this large-scale defense project. They also serve to characterize the culture, conditions of uncertainty and ambiguity, organizational processes, and bureaucracy within which managers of such projects must operate. Although the project was unique, the problems encountered are common to such large-scale projects and understanding the causes of such systemic problems will aid future project managers and their subordinates to succeed in this arena.

The NTC was fortunate in that one of the three elements essential to a successful enterprise was favorable from the inception. The cost-benefits of such a training center, which promised greatly improved force readiness, were positive when compared to other potential uses of defense dollars. Also, technological developments in instrumentation converged with a

consensus that such developments should be applied to improve training realism. Such a convergence facilitated the success of the project. However, the history of the NTC shows that from 1977 to 1979 the project management personnel did not exhibit effective bureaucratic-political behavior or appropriate management practices. It only survived during these two years due to the national security "shield" provided by senior Army leaders who accorded it a high priority based on the promise of the better training it would provide. This alone would not have been sufficient to make the NTC succeed. Success followed the addition of the last two elements. In late 1979, chaotic management was replaced by appropriate management practices orchestrated by an experienced project manager who was supported through a matrix organization by a dedicated team of experts. In early 1980, an NTC General Officers Steering Committee was formed and the members of this committee became the champions of the program who were able to identify and manage positive and negative stakeholders. The expertise of the committee members, the project manager, and the experienced NTC staff in bureaucratic politics was the final essential element which was key to the success of the project.

The following chapter will detail the specific lessons learned from this project and recommend actions and practices which could have been employed to overcome the systemic and unique problems encountered. Most of these lessons learned and recommendations focus on organizational processes, management practices, and bureaucratic politics. It should be noted that without positive cost benefits when compared with other opportunities, even outstanding management and bureaucratic politics cannot make a program succeed. Success of large-scale defense programs requires the convergence of all three elements.

Chapter IV. Lessons Learned and Recommendations

Sapolsky noted in his study of the Polaris missile development that "For the partisan, goal attainment is the only appropriate standard by which to measure the success of government programs and organizations. The neutral observer, however, needs a more inclusive standard of success in order to evaluate objectively the performance of government He must . . . recognize that governmental organizations are required to serve not only the goals of programs within their jurisdictions, but also contextual goals of government, the goals of equity, due process, fiscal integrity, and the like which are the procedural norms of the society and which have their own partisans."¹ By this definition, the Army's NTC partisans certainly could feel that the program was a success. The NTC was established on schedule; the goal was attained. However, the neutral observer would undoubtedly note the cost overruns, inadequate planning, ambiguous designations of responsibility and authority, and ineffective coordination in questioning the success of NTC management.

Concept Development

The conceptual development of the NTC cannot be faulted. MG Gorman and COL Edwards laid down a detailed justification for the NTC and specific details of what was to become the training environment and method of operating the NTC. The concept was presented to the Army's senior leadership and given approval and high priority prior to developing detailed establishment plans. Securing such high priority at the outset proved to be critical in maintaining the NTC as a viable program. However, at this point the process began to falter.

Initial Planning

In a passage as pertinent to the NTC as it was to the Polaris,

Sapolsky makes the following observation:

A program's rank in official priorities is frequently used to explain its success or failure. Programs that rank high are said to be guaranteed the resources needed for completion; those that rank low are guaranteed starvation. Once a program has been placed at the top of a priority list, many assume that its success is assured This explanation of success, however, neglects the question of feasibility More importantly, the explanation is inadequate because it begs the question of how a high priority status is obtained or maintained A necessary condition for success, then, is the simultaneous agreement of the entire government, or at least its major components, on the high priority of a particular program Given the independence of governmental subunits, the process of achieving uniformity in priority rankings is necessarily political. Each agency and branch must be induced, cajoled, or persuaded to support a program not of its own invention. Since groups outside government influence the direction of public policy, their support must also be secured.²

The NTC had received the high priority of the Vice Chief of Staff of the Army and the technology upon which it was based was feasible. This served as a "shield" to protect the program during the first two years. However, proponents failed to secure the commitment of all subordinate commands and agencies to the high priority established at Army Headquarters level. They also failed to carry their case outside of the Army at the very outset in order to secure the conceptual support of affected administration agencies, State and local authorities, and Congressional committees and delegations. Essentially, there was no attempt to identify stakeholders. Although senior officers at FORSCOM were involved in the preliminary discussions that led to the NTC concept, they were not involved in concept development. As was noted previously, the commitment to the NTC's success at Army Headquarters and TRADOC was not fully shared at FORSCOM. Proponents failed to understand or appreciate the organizational dynamics and environment within which they operated. They were instigating organizational changes that required new repertoires. This naturally met with resistance which

was manifested by poor quality plans and resource estimates, negligible coordination with outstanding agencies, and a general lack of initiative.

FORSCOM was given the "lead" for a project conceived at TRADOC and was told to conduct all required planning with personnel already assigned. The personnel who conducted the initial NTC planning were inexperienced and unqualified for such an undertaking. Responsibilities and authority were ambiguous to all participants. Gaddis wrote in his 1959 article "The Project Manager," "The art of organization planning involves the correct tailoring of organizational structure to available individuals and vice versa Although the organizational structure of a project is important, if not vital, it will not make up for inadequate caliber of technologists in the organization Sound organization planning requires adroitness in recruiting scarce talent both from within and without the parent organization."³ Recognizing that such "organizational planning" was not accomplished, what should have been done?

Recommendations

A "rational" solution would be to have issued a much more precise directive and firm statement on the high priority attached to the NTC specifying clear command responsibility and authority, to FORSCOM and other commands and agencies. Senior TRADOC proponents should have visited these commands and agencies to secure their commitment to the project. Army Headquarters should have appointed a brigadier general or senior colonel, who was not just marking time to retirement, as Project Manager and assigned him to FORSCOM.

However, the problem confronting the NTC was an organizational process; a natural and common response of an organization to changes. Allison notes that "specific instances, particularly critical instances that typically do

not have 'standard' characteristics, are often handled sluggishly or inappropriately Since repertoires are developed by parochial organizations for standard scenarios that the organization has defined, programs available for dealing with a particular situation are often ill suited to it."⁴ He also states, "A considerable gap separates what leaders choose (or might have rationally chosen) and what organizations implement Projects that demand that existing organizational units depart from their established programs to perform unprogrammed tasks are rarely accomplished in their designed form. Projects that require coordination of the programs of several organizations are rarely accomplished as designed."⁵

Thus, NTC personnel were confronted with a classical organizational process which they attempted to deal with on a rational basis. The results were inevitable. If they had understood the organizational dynamics of the situation they faced, they could have been better prepared to cope with the process.

In fact, such situations can provide opportunities for more entrepreneurial action in the public sector. It allows the astute project manager to avoid the organization chain and use the media, outside agencies and private interest groups in managing stakeholders and developing the perception of success. As opposed to expecting the existing FORSCOM organization to prepare the essential planning and resource estimates, it would have been better to form a matrix organization under the Project Manager. Experts in the areas of environmental documentation, facility engineering, construction, logistics, training, health care, installation and financial management, communications, and Congressional liaison should have been temporarily assigned under such a matrix organization to assist the Project

Manager in planning the NTC's establishment (as they were after BG Bramlett took over in September, 1979).

Horwitch noted in his state of the art review of designing and managing large scale enterprises that "To achieve needed integration for a mission, the matrix organization approach to project management has been developed Under a matrix organization, the various participants in a mission have basically a dual-alliance--to their original function and permanent unit and to the temporary project to which they are currently assigned."⁵ McCollum explains that, "Authority over such project people thus comes from two directions, with crossing lines viewed as a 'matrix.'"⁷ Such a matrix organization would have provided the expertise required and would have involved other commands and agencies in the NTC planning process while, at the same time, bypassing the organizational resistance naturally occurring within FORSCOM headquarters.

Once the Project Manager and matrix organization were operational, rigorous, detailed planning should have begun. All aspects of the establishment effort should have been included in a PERT or CPM schedule which clearly identified the pace setting or critical events. (Such detailed planning is also useful in "demonstrating" managerial expertise thus creating the perception of a winning management style.) Detailed plans of all aspects of the NTC establishment should have been developed and coordinated with all interested agencies and commands. Gaddis noted that such "Advance planning is vital in a project It is unfortunately true that most crises that arise during the course of a project can be traced to lack of adequate advance planning."⁸ This was certainly the case for the NTC.

During the planning stage, the Project Manager and key subordinates should have begun a bureaucratic political offensive through a systematic

series of coordination or lobbying visits to all concerned Federal, State and local agencies, Congressional committee staffs and delegations, and private interest groups. They should have presented a strong justification for the NTC but then listened to any potential concerns. Positive and negative stakeholders should have been identified and strategies developed to manage them. Where potentially destructive problems or negative stakeholders were identified, they should have developed a strategy to solve the problem or turn the potential adversary into an ally. Selznick labels one such strategy process as "co-optation" which he defines as a method of sharing power or the burdens of decision-making with potentially destructive political entities in order to gain their support. He argues that when adversaries have control over decisions vital to their interests, they develop a vested interest in the success of the venture.⁹ Had this been done in the case of California's Resource Agency, a major conflict could have been averted. Such coordination visits also would have served to apprise all organizations of the full implications of the project and how it would impact them. This would have led to better planning, fewer assumptions and would have avoided the bitterness that developed when some commands and agencies felt that they had been "blindsided" by the NTC.

The NTC Project Manager should have established an "NTC Communications Center" where anyone could obtain factual and current information on the project. The failure to formally establish such a center resulted in inaccurate and untimely information frequently being provided to senior decision-makers which inevitably engendered their animosity toward the NTC.

The subject of resource estimation deserves a special discussion. The reasons for inaccurate initial resource estimates have been identified. Preventing such estimates in the future is inexorably linked to assigning

qualified personnel to the effort, properly organizing them, and then preceeding the resource estimation process with detailed planning of the entire project. None of these steps were accomplished prior to the initial resource estimates being submitted to Army Headquarters.

All resource requirements should have been systematically developed and the methods of development preserved to provide an audit trail for analysts to use in evaluating the requirements. Resource requirements for all facets of the project should have been compared for consistency and coordinated with all commands and agencies concerned to avoid duplication or oversight. Finally, necessary revisions to the estimates should have been thoroughly documented and justified. Resource projections should never intentionally be underestimated in order to secure initial project approval and funding--trying to get the camel's nose under the tent. Such hedging, besides being professionally dishonest, presupposes that the project is not worth the resources ultimately envisioned that it will cost; it places the proponents in the parochial and disloyal position of essentially ascribing incompetence to their superiors by effectively removing them from the decision-making process; and it eventually creates ill-will and places the project into a vulnerable position when the undercosting surfaces. Integrity demands that a project succeed or fail on its own merits. The proponent can increase the chances of success by proper planning, coordination and bureaucratic lobbying, but should never resort to intentional misrepresentation. Recognizing that cost growth for such large scale projects is inevitable, managers should devise plans for dealing with such situations. One method would be to maintain "best case" and "worst case" cost scenarios as internal working papers and to devise both rational as well as bureaucratic-political plans to deal with all possibilities.

Once established, the NTC General Officers Steering Committee provided the priority, visibility, direction, and immediate access to senior decision-makers which proved essential to establishing the NTC on schedule. The members also became the "champions" of the program and senior stakeholder managers--essential functions to the program's success. For such one-of-a-kind projects, the Army should establish, upon concept approval, a "Board of Directors." Such "directors" should be hand picked general officers, selected for their experience and ability, not necessarily because of their current positions. They should serve on the "board" for the duration of the project, despite probable assignment changes, in order to maintain continuity and stability. The purpose of the "board" would be to provide guidance and direction to the project manager and general officer priority in problem solving as required. They would become the program's champions and the managers of senior stakeholders. In the case of the NTC, MG Gorman would have been an ideal choice as the "Chairman-of-the Board." The "board" should have been composed of general officers with expertise in engineering, installation and financial management, operations, logistics, training, health care and communications. The "board" would have remained in existence until at least the NTC was established and Fort Irwin reactivated. The cost of such general officer oversight would be minimal, but the potential gains could be incalculable.

Shields, Management and Bureaucratic Politics

Management of large projects, although complex, is not a science or art as mysterious as reading the entrails of sheep. Nor should it be viewed as simply an expansion of procedures and skills required in the management of small projects. Horwitch noted that such large-scale public-private projects involve "the interactions of complex organizations with increasingly

complex environments."¹⁰ Horwitch and Prahalad later defined such projects as Multi-Organization Enterprises (MOE). They note that "defense MOEs usually had a protective national defense cloak . . . to shield them from outside criticism and scrutiny . . . (and because) the function of the end product was primarily noneconomic . . . pure economic profitability and return-on-investment evaluation methods were usually inappropriate in military MOEs."¹¹ Such definitions and characterizations are appropriate to the NTC although the environmental documentation process exposed the project to considerable outside scrutiny. As was noted previously, such a "shield" saved the NTC during its first two critical years. In an earlier article, they suggested that successful managers of such complex projects "must be more flexible, adaptive and political . . ." than managers of small projects.¹² In addition to the detailed planning requirements presented previously in this chapter, such large defense projects require that project managers develop a management strategy to deal with the inherent instability and ambiguity of the project. Until late 1979, the NTC had no such strategy and thus, each stochastic shock created a major crisis which caused the NTC management to appear disorganized and forced a "grab-bag" search for solutions. Horwitch and Prahalad suggested that the project manager "devise a strategy that has at least three different dimensions: a process for monitoring and providing feedback from the external environment, a relevant perspective or set of attitudes by the top management group, and an appropriate internal organization structure."¹³ This is not esoteric management theory but instead is basic strategic management practice: maintain a thorough external environmental scan to avoid surprises; develop a "corporate" or management philosophy to serve as a guidepost through

turbulent times and complex issues; and develop an organization structure to cope with such instability.

Management of such large defense projects requires considerable bureaucratic political skills. Sapolsky noted that "The success of the Polaris program depended upon the ability of its proponents to promote and to protect the Polaris. Competitors had to be eliminated; reviewing agencies had to be outmaneuvered; congressmen, admirals, newspapermen, and academicians had to be co-opted. Politics is a systemic requirement. What distinguishes programs in government is not that some play politics and others do not, but, rather than some are better at it than others Success requires skills in bureaucratic politics. Only through the exercise of such skills does a favorable environment yield sustained support for a program."¹⁴ NTC personnel did not even play in this arena until the environmental crisis of mid-1979. As a result, the program was almost killed by California environmentalists. However, a new and experienced NTC team became expert in playing bureaucratic politics--an essential element of success--and the NTC was established.

Conclusion

The NTC case study supports the hypothesis that there are three essential elements of successful large-scale defense programs for which the Services are the sole users of the programs' products: positive cost benefits when compared to other uses of defense dollars, application of appropriate management practices, and effective exercise of bureaucratic politics. Eventually all three elements were present and the NTC succeeded. But, prior to the institution of appropriate management practices and effective application of bureaucratic politics, the program was severely endangered by environmentalists and Pentagon analysts. It survived these

challenges because of the national security shield provided by the commitment of senior Army leaders to its success which was based on the promise of better training. However, such a shield could not have ensured the program's success; the other elements were required.

A major problem facing the NTC was the organizational process which impeded progress and yet was never understood by management personnel. Organizational inflexibility or inertia against change is a normal situation. Implementation of the NTC forced radical changes in organizational priorities, perceptions, issues, procedures, and repertoires. Naturally it met organizational resistance. Future proponents of large-scale defense projects should recognize that such organization dynamics exist and that they offer opportunities and advantages to the astute manager as well as pitfalls and disasters to the "rationally acting" manager. Managers should recognize the inevitability of organizational inflexibility, cost escalations, uncertainty, and ambiguity and be prepared to deal with them.

A key factor in management and bureaucratic politics which the NTC case study emphasizes is stakeholder management. Initially, stakeholders were not identified and as a result several negative stakeholders almost killed the program. Such actions are essential to successful programs. Program champions can greatly assist in this and, being so important, should not be left to chance. Creation of the previously described "Board-of-Directors" to oversee the project, guide the project manager, resolve problems, provide visibility and priority, identify and manage senior stakeholders, and champion the project would greatly improve the quality and increase the success rate of such large-scale projects.

Many of the personnel involved with planning the NTC have reflected in the aftermath of the project that if they only had known then what they

know now Experience is unquestionably the best teacher and through their NTC experience those individuals developed skills in management and bureaucratic politics that will aid them far into the future. But, their inexperience and lack of qualifications at the outset caused most of the problems which later plagued the project. Yet it did not have to be that way. While it is true that this project, taken in whole, was breaking new ground that no one in the Army had ever crossed, it is also true that the Army did have experts in the individual specialties that were required in planning the project. But these specialists, plus an outstanding project manager, were not called upon until the project was in an environmental crisis with the State of California. By then the NTC planners had gained sufficient experience to also be considered fully qualified. A good team was finally formed--but almost too late because both the Fiscal Years' 1980 and 1981 budgets had been formulated and the NTC was grossly underfunded. However, like a phoenix rising from the ashes, the NTC recovered, was provided sufficient resources and was established on schedule at Fort Irwin.

Many future projects will not be allowed such a "luxury" of developing their own talent and will fail because of poor personnel assignments. The project manager should be selected because of his demonstrated expertise in management and bureaucratic politics. His staff should be organized in a matrix and consist of experienced, quality personnel with expertise in all essential specialties who are drawn from the various organizations involved in the program. This point is so important and yet so easily circumvented by organizations that it deserves the personal attention of senior Army proponents of projects. If left to chance, the experience of the NTC's first two years will be repeated.

Summary

This case study illustrates the common lessons applicable to almost all large defense projects. Foremost among these lessons is that a thorough appreciation of the organizational process impacting the program is essential. Additionally, rigorous initial planning, including accurate resource estimation, while not guaranteeing success can certainly grease the skids. The NTC was not successful because of such organizational process appreciation and rigorous planning--indeed, the organizational processes were never understood and planning initially was almost non-existent. Such failures almost killed the project. The NTC was saved from these initial failures because it was a concept that sparked a commitment from the Army's senior leaders ensuring a high priority and thus a national security shield.

It later succeeded because of the convergence of positive cost-benefits when compared to other potential uses of defense dollars, application of appropriate management practices, and effective exercise of bureaucratic politics. Additionally, the convergence of technological opportunity with the consensus that such technological developments should be applied to Army training greatly facilitated the program's success.

Understanding the lessons of the NTC requires a readjustment in traditional military thinking about large-scale projects. Basically, members of the Services are "rational actors:" failures have their rational causes which have specific solutions. But, large-scale defense projects invariably involve multiple, complex organizations. Inevitably they require organizational revisions to priorities, perceptions, procedures, and repertoires. These changes WILL be resisted. No rational directions will alter this fact. Proponents and managers of such projects must be prepared to operate

successfully with such organizational processes. This requires different skills than the traditional "straight-arrow" approach. That so many projects have succeeded in the past using rational approaches does not diminish this argument. Many succeeded in the past simply because of a national security shield. Such shields are no longer sufficient to guarantee a program's success. Because military officers are trained to deal with conditions of uncertainty and ambiguity, they frequently operate satisfactorily in such an arena without appreciating the dynamics of their environment--essentially, they luck-out. But we can no longer tolerate such happenstance. We must adjust our rational perspective to understand the organizational processes within which we operate. We must learn how to use such conditions to the advantage of the program. If we do this, then the benefits derived from the NTC will include a major advance in defense project management, as well as the enhanced training readiness of the force.

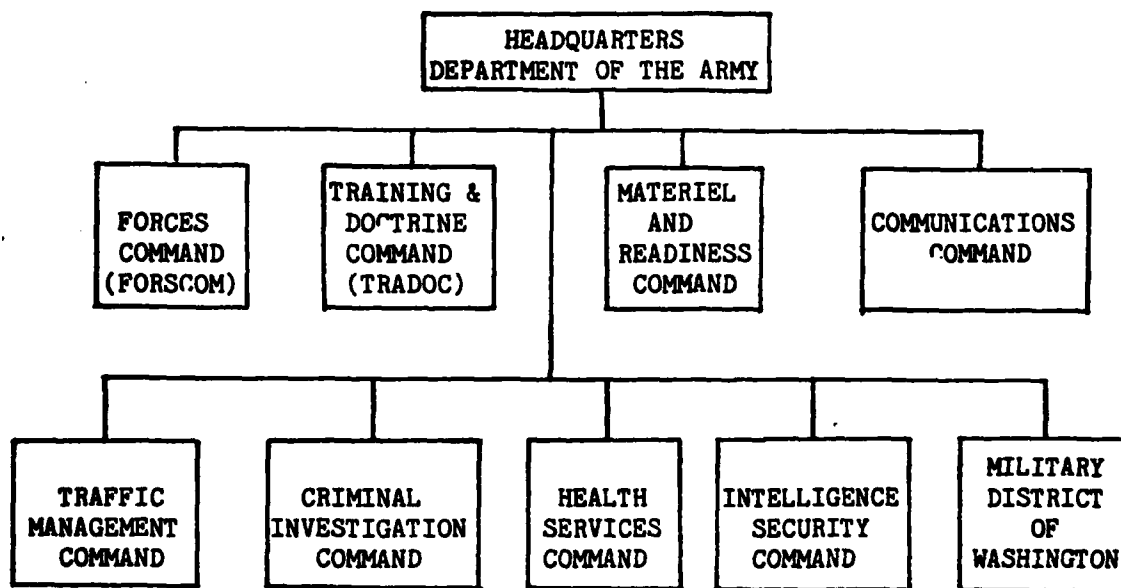
Appendix A. The Army Environment Applicable to the NTC

A brief explanation of the Army's organization and Planning, Programming and Budgeting System will aid in understanding the environment and bureaucratic culture in which the NTC was developed.

Organization

As Figure 3 indicates, Forces Command (FORSCOM) and Training and Doctrine Command (TRADOC) are co-equal major commands under Headquarters, Department of the Army. Each is commanded by a four-star general.

Figure 3. MAJOR ARMY COMMAND STRUCTURE IN THE UNITED STATES*



*1977 Command Structure which was applicable during NTC planning.¹ Minor changes to this structure took effect in 1979 but did not impact the NTC Planning.

FORSCOM has the responsibility for combat readiness of the active and reserve units in the Continental United States, Alaska, Panama, Puerto Rico

and Virgin Islands.² As such, FORSCOM has command of all units that will train at the NTC which was the rationale for assigning the NTC to FORSCOM. TRADOC is responsible for coordinating the Army development of tactical doctrine, training of individual soldiers, and training developments for unit training.³ It was under this unit training and tactical doctrine aegis that TRADOC developed the NTC concept and has remained a primary player by designing and operating, under FORSCOM's direction, the training environment at the NTC.

Besides these two primary commands, other commands also are responsible for specific facets of the NTC. The Materiel Development and Readiness Command is responsible for materiel acquisition functions and logistics support to the NTC. The Communications Command is responsible for communications support (radios and telephones) to the NTC. The Traffic Management Command is responsible for upgrading of Defense Access Roads serving the NTC. The Health Services Command is responsible for medical treatment facilities at the NTC. Within Army Headquarters, the Training Directorate of the Office of the Deputy Chief of Staff for Operations and Plans acts as the focal point for setting NTC policy; collects, assesses and programs all resource requirements for the NTC, and shepherds all NTC actions through the Army, the Office of the Secretary of Defense, the Office of Management and Budget, and Congress.⁴

The Army's Planning, Programming and Budgeting System

The Army's Planning, Programming and Budgeting System is the Army's systematic procedure for annually converting national strategy into a five-year program and the next fiscal year's budget. The system has its origins in the McNamara era and has been evolving ever since. Prior to 1961, each Service prepared its own program and submitted its budget to the President

for approval and inclusion in the Presidential Budget. Secretary of Defense McNamara changed that by consolidating the Services' programs into a single Department of Defense program. Changes to that program required the personal approval of the Secretary of Defense. The Services eventually learned how to play this game and began swamping the Secretary of Defense with change requests on the assumption that the more requested, the higher the probability that at least some will be approved. To accommodate this inundation, a new office was created under the Secretary of Defense called Planning, Analysis and Evaluation. This office was to evaluate all requests and to recommend to the Secretary of Defense those proposals that had merit. As resource constraints began to be a major factor in Defense programming, this new office changed its focus from objective technical analysis to affordability. Soon, proposals were being disapproved "under the guise of technical deficiency when, in fact, it was affordability problems."⁵

As the system evolved and began to discipline itself, a procedure was established whereby "program changes would be submitted on a cyclic basis . . . and (Defense) would provide guidance"⁶ This procedure became known as the Planning, Programming, and Budgeting System. The Army's system was developed to support the Defense system, but it has features which help in highlighting and solving problems which are unique to the Army. Its objective was "to articulate the strategy; size, structure and equip the force; set programming priorities; allocate resources; and ensure readiness of the total force."⁷ In effect, the system is the primary decision process within which the Department of Defense and Department of the Army determine their requirements. It is the management system for building and maintaining the Five-Year Defense Program, which is the official record of major resource allocation decisions made by the Secretary of

Defense. Quite simply, "it is a way of progressing from the general (the articulation of national military strategy) to the specific (the organizations, training and support of the forces necessary to carry out that strategy)."8 Although the basic framework for the system has remained constant over the past several years, there are minor adjustments to the system annually which result from internal evolutions as well as from pressures external to the Department of Defense.

Major General Patrick M. Roddy, the Army's Director of Program Analysis and Evaluation from 1979 to 1982, succinctly defined the various elements of the system as follows:

Planning . . . includes the definition and examination of alternative strategies, the analysis of changing conditions and trends, threat and technology assessment, and efforts to understand both change and long-term implications of current choices. Programming includes the definition and analysis of alternative forces, weapon systems, and support systems, together with their resource implications; and the evaluation of options for variation therein. Budgeting includes formulation, justification, execution, and control of the budget.⁹

A key facet of the system is that it integrates planning with management and control. The Secretary of Defense, Secretary of the Army and Chief of Staff of the Army provide policy direction and control during the planning phase. They also guide the development of the Five-Year Defense Program and the annual budget estimates for financing the first year of the five-year program. This integration carries down to the Army Staff proponents (middle-grade officers who manage all aspects of a program within Headquarters, Department of the Army). These proponents provide input to the planning cycle, ensure that their program conforms to Defense and Army policy, guide the program through the Army, Defense and Congressional approval process, and monitor execution of the program.

Because a single fiscal year's cycle takes over 15 months from the time the first planning guidance is recieved by the Army from Defense until the President submits his Budget to Congress, many stages of various fiscal years' cycles are being worked simultaneously. The best way to understand the system is to follow one cycle (Fiscal Years 80-84) from programming start to the beginning of the budget year of the cycle (Fiscal Year 80-- which was the first year the National Training Center appeared in the Army Budget).

- Mid-September, 1977 -- Joint Chiefs of Staff publish their annual Joint Strategic Planning Document that outlines the planning objectives which provide "reasonable assurance" of being capable of executing national military strategy for the next fifteen fiscal years (1980-1994). As a member of the Joint Chiefs of Staff, the Army Chief of Staff provides direct input to this document.
- November, 1977 -- The Army Chief of Staff issues the Army Guidance. The first volume of this document is called the Army Plan and it assigns responsibilities and provides guidance to be used by the Army Staff and subordinate agencies and by Major Army Commands in the preparation of their Fiscal Years 83-84 Program Analysis and Resource Reviews.
- January, 1978 -- Defense Department publishes Defense Guidance which has been developed with Service input.

Defense Guidance includes military strategic concepts; force levels; manpower, support, and fiscal guidance for the five-year program period (Fiscal Years 80-84).

- Major Army Commands and Army agencies submit their Fiscal Years 80-84 Program Analysis and Resource Reviews, which contain their prioritized program input and requests and which focus on Fiscal Year 80.

January-June, 1978

- Army Staff proponents for programs analyze Program Analysis and Resource Reviews and Army Staff generated programs for consonance with Army Plan and Defense Guidance. Programs are summarized by Program Development Increment Packages which contain all resources (dollars and military and civilian strength) connected with a particular mission, function or objective. These "packages" serve as building blocks to compete for resources. The Programming and Budgeting Committee, composed of senior Army Staff officers sets an initial priority of programs. A committee of the Senior Army Staff, called the Select Committee, makes final priority adjustments and decides on a funding line conforming to Defense Guidance.

- Mid-June, 1978 -- Army Program Objective Memorandum for Fiscal Years 80-84 is submitted to Defense. It contains the Army's prioritized program and costs for the five-year period. It highlights the forces, manpower, training, materiel acquisition, and logistics support required to meet the strategy and objectives.
- June-August, 1978 -- Defense reviews the Memorandum and develops "Issues" which are sent to the Army for comment or reclama. A series of Defense Review Board meetings are held to thrash out decisions on these "Issues."
- Late August, 1978 -- Defense issues Program Decision Memorandum which approves the Army Memorandum as modified by specific changes and locks the Army's fiscal levels and major program initiatives for the five Program years.
- September, 1978 -- The Army Staff converts the first year of the approved-as-modified program into budget format (Fiscal Year 80).
- Early October, 1978 -- The Fiscal Year 80 Army Budget is submitted to Defense.
- October, November 1978 -- Defense and the Office of Management and Budget jointly review the Army Budget; issues are raised which are resolved at Defense Review Board meetings.
- December, 1978 -- The Fiscal Year 80 Budget is fine-tuned.

Mid-January, 1979 -- The President submits his Fiscal Year 80 Budget to Congress. The Secretary of the Army and Chief of Staff of the Army provide Posture Statements to justify the Army's budget request before Congressional Committees. These unclassified statements provide a comprehensive articulation of Army management strategy.

January-October, 1979 -- Department of Defense officials defend the budget before Congressional Committees.

October, 1979 -- Fiscal Year 80 begins.¹⁰

As the above timetable illustrates, the Planning, Programming and Budgeting process is time sensitive. Critical deadlines allow minimal flexibility; proponents either meet suspenses or wait until the following year's cycle. When a program is time sensitive but detailed resource requirements are not available or are not sufficiently precise by a suspense date, proponents frequently resort to "best guessing" the resource requirements in order to get the program included and avoid a year's delay. Additionally, no matter how precise the estimates are upon initial submission, 21 months will elapse prior to the beginning of the fiscal year during which the program is to be executed and resources are to be obligated. Many changes may occur during that period which would render the initial estimates, which may have become the budgeted amount, erroneous. These situations may present the program manager with a dilemma of executing a mission with an outdated and insufficient budget. If the discrepancy is too large for the program manager or his command to accommodate by internal reprogramming, the Army may direct a reprogramming action, may lower the objectives commensurate with the funding level, or may request additional resources from Congress. There is no

set procedure to obtain additional funding in such cases; success primarily depends on the priority of the program.

REFERENCES

I. Introduction

1. Graham T. Allison, Essence of Decision, (Little, Brown and Company, Boston, MA, 1971), p. 5.
2. Ibid., p. 13.
3. Ibid., pp. 28, 30.
4. Ibid, pp. 67, 68.
5. Ibid., p. 146.
6. Mel Horwitch, "The Convergence Factor for Large-Scale Programs: The American Synfuels Experience As A Case In Point," (M.I.T. Working Paper No. MIT-EL 82-064WP, December 8, 1982).
7. LTC Robert L. Herndon, "National Training Center (NTC) Program Summary" (Internal working paper, Headquarters, Department of the Army (DAMO-TRS), May 6, 1981).
8. National Training Center (U.S. Army Forces Command and Training Doctrine Command brochure, September, 1979), pp. 2-8.

II. The National Training Center Concept Formulation

1. Operations FM 100-5 (Headquarters, Department of the Army, Washington, D.C., July 1, 1976), p. 1-1.
2. LTC Richard I. Edwards, National Training Center Development Plan (U.S. Army Training and Doctrine Command, Fort Monroe, VA, April 3, 1979), p. I-1.
3. MG Gorman, "Toward National Training Centers for the U.S. Army," (U.S. Army Training and Doctrine Command Concept Paper, May 23, 1977), p. 1.
4. Herbert K. Weiss, "Systems Analysis Problems of Limited War," Annals of Reliability and Maintainability (AAIA, New York, July 18, 1966).
5. MG Gorman, "Toward a Combined Arms Training Center, (Concept Paper, November 9, 1976), pp. 2-6.
6. National Training Center, op cit, pp. 3-4.
7. MG Paul F. Gorman, "Toward a Combined Arms . . .," op cit.
8. MG Sniffin interoffice note to LTG Meyer on TRADOC concept for a Combined Arms Training Center (November 22, 1976).

9. MG Ross, "Combined Arms Tactical Unit Training Center (CATUTC)," (Headquarters, Department of the Army (DAMO-ZB) message to MG Haldane, MG Gorman, and MG Ott, 192035Z April 1976).
10. MG Paul F. Gorman, "Toward National Training Centers . . .," op cit.
11. "Combined Arms Tactical Unit Training Center Program," (HQDA Memorandum For Record, April 12, 1977).
12. MG Ross message, op cit, p. 2.
13. LTC Herndon, Question and Answer TR-12 for Congressional Testimony Preparation Book (January 27, 1981).

III. National Training Center Project History 1977-1981

1. MG Haldane, "Combined Arms Tactical Unit Training Center" (FORSCOM (AFOP-TAT) message to MG Ross, MG Gorman and MG Ott, 091105Z June 1977).
2. "Project Manager" (Message from FORSCOM (AFOP-TAT), 241505Z June 1977).
3. Army Regulation 350-50, National Training Center (NTC) (Headquarters, Department of the Army, Washington, D.C., March 15, 1980), pp. 1-2.
4. Allison, op cit, p. 123.
5. MG Ross message, op cit, p. 2.
6. LTC David Barth, Personal Interview (August 24, 1982).
7. Ibid.
8. National Training Center Alternative Sites Analysis (U.S. Army Forces Command, Fort McPherson, GA, September 1, 1977), pp. 8-10.
9. MG John K. Singlaub, "Alternative Sites Analysis for National Training Center" (Letter from Headquarters, U.S. Army Forces Command (AFOP-FSS) to HQDA (DAMO-ZB), August 31, 1977).
10. Reactivation Ceremony, Fort Irwin, California (Fort Irwin Pamphlet, July 1, 1981), p. 8.
11. National Training Center Alternative . . ., op cit, pp. 13-14.
12. Gerald P. Dinneen, "DOD/NASA Memorandum of Understanding on Compatible Operations in the Mojave Desert Area" (OSD letter to DOD agencies, February 13, 1979).
13. Final Environmental Impact Statement, National Training Center: Fort Irwin Site (U.S. Army Forces Command, January 12, 1979).

14. MG James C. Smith, "Supplemental Information to Final Environmental Impact Statement, National Training Center; Fort Irwin Site" (Headquarters, Department of the Army, Washington, D.C., May 31, 1979).
15. Deni Greene and Huey Johnson, Letter to Joseph P. Addabbo, Chairman, House Subcommittee on Defense Appropriations (July 6, 1979).
16. MG James C. Smith, "National Training Center Environmental and Socio-Economic Meetings 9-10 August 1979" (Headquarters, Department of the Army (DAMO-TR) Memorandum, August 14, 1979), p. 1;

"Political Battle Resolved," Sagebrush Soldiers (Supplement to San Bernardino Sun-Telegram, San Bernardino, CA, June 28, 1981), p. 34.
17. Ibid.;

Jerry Lewis, Telegram to Jerry Brown, Governor of California (August 1, 1979).
18. "Legislature Urges Passage of Funds for Fort Irwin," San Bernardino Sun-Telegram, (San Bernardino, California, September 6, 1979), p. A-1.
19. MAJ Bob Herndon, "National Training Center (NTC) Update" (Information Paper (DAMO-TRS), October 17, 1979);

"Political Battle . . .," op cit, p. 34.
20. Horwitch, "The Convergence Factor . . .," op cit.
21. MG James C. Smith, et al, "Site Selection for the Army's National Training Center -- Decision Memorandum" (Headquarters, Department of the Army (DAMO-TRS) memorandum with attachments, June 7, 1979).
22. Army Program Objective Memorandum, FY 79-83 (Headquarters, Department of the Army, June, 1977), pp. III-4-7.
23. LTC Barth interview, op cit.
24. Ibid.
25. Horwitch, "The Convergence Factor . . .," op cit, p. 17.
26. William F. Hederman, Jr., Prospects for the Commercialization of High-BTU Coal Gasification (Rand Corporation Report #R-2294-DOE, Santa Monica, California, April, 1978), pp. v-viii;

"DOD Analyst Raps Weapons Cost Estimates," (Army Times, March 14, 1983), p. 23.
27. COL Richard I. Edwards, Personal Interviews (August 24, 1982 and January 12, 1983).

28. LTC Herndon, ". . . Program Summary," op cit.
29. COL Edwards Interview, op cit.
30. LTC Herndon, ". . . Program Summary," op cit.
31. LTC Richard I. Edwards, "Concept for a National Training Center" (TRADOC NTC Project Office, March 21, 1978). p. 4.
32. MG Haldane message, op cit, p. 2.
33. MAJ Barth interview, op cit.
34. Pat Sigleo, "OCE In-Process Review, National Training Center, Fort Irwin, CA" (Headquarters, Department of the Army (DAEN-ZCI) memorandum, January 15, 1980), p. 5.
35. MAJ Robert L. Herndon, "National Training Center In-Progress Review - 17 Jan 80" (Headquarters, Department of the Army (DAMO-TRS) memorandum, January 21, 1980), p. 3.
36. LTC Robert L. Herndon, "Third National Training Center (NTC) General Officer Steering Committee (GOSC) Meeting -- 9 Jan 81" (Headquarters, Department of the Army (DAMO-TRS) memorandum, June 23, 1981), p. 5.
37. Ibid., p. 1-2.
38. Economic Adjustment Program; Barstow, California (Report prepared by President's Economic Adjustment Committee, OEA, OSD (MRA&L), Washington, D.C., September, 1980), pp. 83, 90.
39. LTC Herndon, "Third . . .," op cit, p. 2.
40. Ibid., p. 5.
41. Ibid., p. 2.
42. LTC Herndon ". . . Program Summary," op cit.
43. Gunn McKay, Chairman, House Appropriations Subcommittee on Military Construction, letter to Jack R. Borsting, Assistant Secretary of Defense (Comptroller) (September 30, 1980).
44. "FORSCOM PARR Issue 16, National Training Center" (U.S. Army Forces Command (AFOP-PM), January, 1978), p. II-145;

LTC Harvey, "Military Construction Army Program for National Training Center (NTC) Fort Irwin, CA" (Headquarters, Department of the Army (DAEN-ZCP-R) Information Paper, June 12, 1981), pp. 2-6.
45. "Combined Arms . . ." memorandum, op cit, p. 7.

46. COL Diez, "National Training Center Briefing to the Vice Chief of Staff, Army" (U.S. Army Training and Doctrine Command (ATTNG-TDD) memorandum, February 10, 1978), pp. 2-4.
47. LTC Barth Interview, op cit.
48. "General Orders No. 16, Fort Irwin, California" (Headquarters, Department of the Army, Washington, D.C., June 22, 1981).
49. LTC Barth Interview, op cit.
50. Ibid.
51. MAJ Herndon, ". . . In-Progress Review," op cit, p. 1.
52. LTG Otis, "National Training Center General Officer Steering Committee," message to LTG Ross, et al (Headquarters, Department of the Army (DAMO) 272023Z Mar 80).
53. MAJ Bob Herndon, "National Training Center General Officers Steering Committee Meeting 12 May 80" (Headquarters, Department of the Army (DAMO-TRS) memorandum, May 14, 1980), p. 1.
54. LTC Herndon, "Third . . .," op cit, p. 6.

IV. Lessons Learned

1. H. M. Sapolsky, The Polaris System Development: Bureaucratic and Programmatic Success in Government (Cambridge: Harvard University Press, 1972), p. 230.
2. Ibid., p. 14.
3. Paul O. Gaddis, "The Project Manager," Harvard Business Review, (May-June, 1959), p. 93.
4. Allison, op cit, p. 89.
5. Ibid., pp. 93-94.
6. Mel Horwitch, "Designing and Managing Large-Scale, Public-Private Technological Enterprises: A State of the Army Review," Technology in Society, (Vol 1 1979), p. 187.
7. James K. McCollum, "Cords: Matrix for Peace in Vietnam," Army, (July, 1982), p. 48.
8. Gaddis, op cit, p. 93.
9. Philip Selznick, "Co-optation: A Mechanism for Organizational Stability," in Robert Merton, et al, editors, Reader in Bureaucracy (Glencoe, Illinois: Free Press, 1952), p. 135.

10. Horwitch, "Designing . . .," op cit, p. 180.
11. Mel Horwitch and C. K. Prahalad, "Managing Multi-Organization Enterprises: The Emerging Strategic Frontier," Sloan Management Review (Massachusetts Institute of Technology, Volume 22, Number 2, Winter, 1981), p. 3.
12. Mel Horwtich and C. K. Prahalad, "Managing Technological Innovation -- Three Ideal Modes," Sloan Management Review (Massachusetts Institute of Technology, Volume 22, Number 2, Winter, 1981), p. 3.
13. Horwitch and Prahalad, "Managing Multi-Organization . . .," op cit, pp. 10-11.
14. Sapolsky, op cit, p. 244, 246.

Appendix A. The Army Environment Applicable to the NTC

1. Briefing on Organization of the United States Army, ODCSOPS (DAMO-ODU) Briefing Pamphlet (Headquarters, Department of the Army, Washington, D.C., 1977), Tab C, p. 2.
2. Ibid., Tab C, p. 5.
3. Ibid., Tab C, p. 7.
4. Army Regulation 350-50, op cit, pp. 2-3.
5. Army Command and Management: Theory and Practice, Reference Text for U.S. Army War College (US Army War College, Carlisle Barracks, PA, August 2, 1982), p. 7-1.
6. MG Patrick M. Roddy, Planning, Programing and Budget System; An Executive Primer (Headquarters, Department of the Army, Washington, D.C., November 1981), p. 2.
7. Army Regulation 1-1, The Army Planning, Programing, and Budgeting System (Headquarters, Department of the Army, Washington, D.C., May 25, 1976), p. 1.
8. Army Command . . . , op cit, p. 7-1.
9. MG Roddy, op cit, p. 3.
10. Ibid., pp. 10-19;
Army Command . . . , op cit, pp. 7-3-6.

BIBLIOGRAPHY

- Allison, Graham T., Essence of Decision, Little, Brown and Company, Boston, MA, 1971.
- Army Command and Management: Theory and Practice, Reference Text for U.S. Army War College, Carlisle Barracks, PA, August 2, 1982.
- Army Program Objective Memorandum, FY 79-83, Headquarters, Department of the Army, June, 1977.
- Army Regulation 1-1, The Army Planning, Programing and Budgeting System, Headquarters, Department of the Army, Washington, D.C., May 25, 1976.
- Army Regulation 350-50, National Training Center (NTC), Headquarters, Department of the Army, Washington, D.C., March 15, 1980.
- Briefing on Organization of the United States Army, Headquarters, Office of the Deputy Chief of Staff for Operations and Plans (DAMO-ODU), Briefing Pamphlet, Washington, D.C., 1977.
- Barth, LTC David, Personal Interview on NTC Experiences, August 24, 1982.
- "Combined Arms Tactical Unit Training Center Program," Headquarters, Department of the Army Memorandum-for-Record, April 12, 1977.
- Diez, COL, "National Training Center Briefing for the Vice Chief of Staff, Army," U.S. Army Training and Doctrine Command (ATTNG-TDD) Memorandum, February 10, 1978.
- Dinneen, Gerald P., "DOD/NASA Memorandum of Understanding on Compatible Operations in the Mojave Desert Area," OSD Letter to DOD Agencies, February 13, 1979.
- "DOD Analyst Raps Weapons Cost Estimates," Army Times, March 14, 1983, pp. 23-24.
- Economic Adjustment Program; Barstow, California, Report prepared by President's Economic Adjustment Committee, OEA, OSD (M&RAL), Washington, D.C., September, 1980.
- Edwards, LTC Richard I., "Concept for a National Training Center," U.S. Army Training and Doctrine Command NTC Project Officer Concept Paper, March 21, 1978.
- Edwards, LTC Richard I., National Training Center Development Plan, U.S. Army Training and Doctrine Command, Fort Monroe, VA, April 3, 1979.
- Edwards, COL Richard I., Personal Interviews on NTC Experiences, August 24, 1982 and January 12, 1983.

Final Environmental Impact Statement, National Training Center: Fort Irwin Site, U.S. Army Forces Command, January 12, 1979.

"FORSCOM PARR Issue 16, National Training Center," U.S. Army Forces Command (AFOP-PM), January, 1973.

Gaddis, Paul O., "The Project Manager," Harvard Business Review, May-June, 1959.

General Orders No. 16, Fort Irwin, California," Headquarters, Department of the Army, Washington, D.C., June 22, 1981.

Gorman, MG Paul F., "Toward a Combined Arms Training Center," TRADOC Concept Paper, November 9, 1976.

Gorman, MG Paul F., "Toward National Training Centers for the U.S. Army," U.S. Army Training and Doctrine Command Concept Paper, May 23, 1977.

Greene, Deni and Johnson, Huey, Letter to Joseph P. Addabbo, Chairman, House Subcommittee on Defense Appropriations, July 6, 1979.

Haldane, MG, "Combined Arms Tactical Unit Training Center," U.S. Forces Command (AFOP-TAT) message to MG Ross, MG Gorman and MG Ott, 091105Z June 1977.

Harvey, LTC, "Military Construction Army Program for National Training Center (NTC) Fort Irwin, CA," Headquarters, Department of the Army (DAEN-ZCP-R) Information Paper, June 12, 1981.

Hederman, William F., Jr., Prospects for the Commercialization of High-BTM Coal Gasification, Rand Corporation Report #R-2294-DOE, Santa Monica, California, April, 1978.

Herndon, MAJ Bob, "National Training Center General Officer Steering Committee Meeting 12 May 80," Headquarters, Department of the Army (DAMO-TRS) memorandum, May 14, 1980.

Herndon, LTC Robert L., "Third National Training Center (NTC) General Officer Steering Committee (GOSC) Meeting -- 9 Jun 81," Headquarters, Department of the Army (DAMO-TRS) memorandum, June 23, 1981.

Herndon, MAJ Robert L., "National Training Center In-Progress Review - 17 Jan 80," Headquarters, Department of the Army (DAMO-TRS) memorandum, January 21, 1980.

Herndon, LTC Robert L., "National Training Center Program Summary," Internal Working Paper, Headquarters, Department of the Army (DAMO-TRS), May 6, 1981.

Herndon, MAJ Bob, "National Training Center (NTC) Update," Headquarters, Department of the Army Information Paper (DAMO-TRS), October 17, 1979.

Herndon, LTC, Question and Answer TR-12 for Congressional Testimony
Preparation Book, January 27, 1891.

Horwitch, Mel, "Designing and Managing Large Scale, Public-Private
Technological Enterprises: A State of the Art Review," Technology in
Society, Vol. 1, 1979.

Horwitch, Mel, "The Convergence Factor for Large-Scale Programs: The
American Synfuels Experience As A Case In Point," M.I.T. Working
Paper No. MIT-EL 82-064WP, December 8, 1982.

Horwitch, Mel and Prahalad, C. K. "Managing Multi-Organization Enterprises:
The Emerging Strategic Frontier," Sloan Management Review,
Massachusetts Institute of Technology, Volume 22, Number 2, Winter
1981, pp. 3-16.

Horwitch, Mel and Prahalad, C. K., "Managing Technological Innovation --
Three Ideal Modes," Sloan Management Review, Massachusetts Institute
of Technology, Volume 17, Number 2, Winter 1976, pp. 77-89.

Legislative Urges Passage of Funds for Fort Irwin," San Bernardino Sun -
Telegram, San Bernardino, California, September 6, 1979, p. A-1.

McCollum, James K., "Cords: Matrix for Peace in Vietnam," Army, July,
1982.

McKay, Gunn, Chairman, House Appropriations Subcommittee on Military
Construction, letter to Jack R. Borsting, Assistant Secretary of
Defense (Comptroller), September 30, 1980.

National Training Center Alternative Sites Analysis, U.S. Army Forces
Command, Fort McPherson, GA, September 1, 1977.

National Training Center, U.S. Army Forces Command and Training and
Doctrine Command brochure, September, 1979.

Operations FM 100-5, Headquarters, Department of the Army, Washington,
D.C., July 1, 1976.

Otis, LTG, "National Training Center General Officer Steering Committee,"
Headquarters, Department of the Army (DAMO) message to LTG Ross, et
al, 272023Z Mar 80.

"Political Battle Resolved," Sagebrush Soldiers, Supplement to San
Bernardino Sun-Telegram, San Bernardino, CA, June 28, 1981, p. 34.

Project Manager," U.S. Army Forces Command (AFOP-TAT) message 241505Z June
1977.

Reactivation Ceremony, Fort Irwin, California, Fort Irwin Pamphlet, July 1,
1981.

- Roddy, MG Patrick M., Planning, Programing & Budgeting System; An Executive Primer, Headquarters, Department of the Army, Washington, D.C., November 1981.
- Ross, MG, "Combined Arms Tactical Unit Training Center (CATUTC)," Headquarters, Department of the Army (DAMO-ZB) message to MG Haldane, MG Gorman, and MG Ott, 192035Z April 1976.
- Sapolsky, H. M., The Polaris System Development: Bureaucratic and Programmatic Success in Government, Cambridge: Harvard University Press, 1972.
- Selznick, Philip, "Cooptation: A Mechanism for Organizational Stability," in Robert Merton, et al, editors, Reader in Bureauracy, Glencoe, Illinois: Free Press, 1952.
- Sigleo, Pat, "OCE In-Process Review, National Training Center, Fort Irwin, CA," Headquarters, Department of the Army (DAEN-ZCI) memorandum, January 15, 1980.
- Singlaub, MG John K., "Alternative Sites Analysis for National Training Center," Letter from Headquarters, U.S. Army Forces Command (AFOP-FSS) to Headquarters, Department of the Army (DAMO-ZB), August 31, 1977.
- Smith, MG James C., "National Training Center Environmental and Socio-Economic Meetings 9-10 August 1979," Headquarters, Department of the Army (DAMO-TR) memorandum, August 14, 1979.
- Smith, MG James C., et al, "Site Selection for the Army's National Training Center -- Decision Memorandum," Headquarters, Department of the Army (DAMO-TRS) memorandum with attachments, June 7, 1979.
- Smith, MG James C., "Supplemental Information to Final Environmental Impact Statement, National Training Center: Fort Irwin Site," Headquarters, Department of the Army, Washington, D.C., May 31, 1979.
- Sniffin, MG, Interoffice note to LTG Meyer on TRADOC Concept for a Combined Arms Training Center, November 22, 1976.
- Weiss, Herb K., "Systems Analysis Problems of Limited War," Annals of Reliability and Maintainability, AAIA, New York, July 18, 1966.