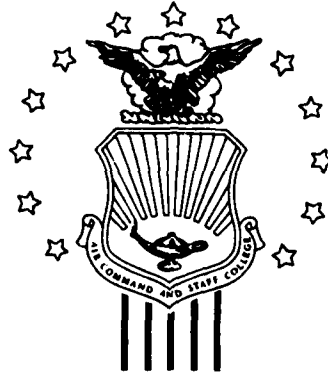


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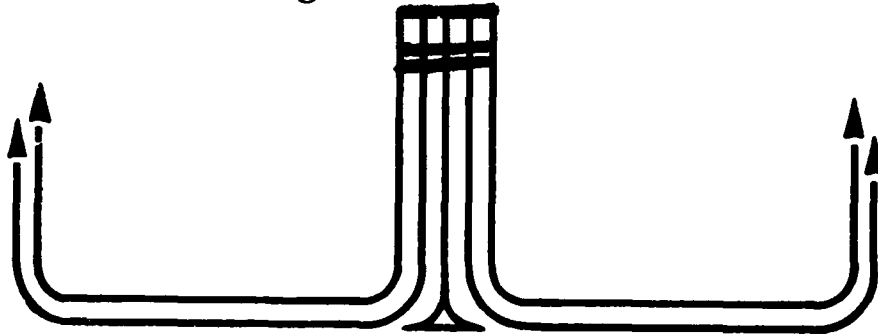
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STUDENT REPORT
"SPLITTING THE SEWERPIPES"
A LOOK AT SPLITTING LARGE CIVIL
ENGINEERING UNITS INTO
MULTIPLE SQUADRONS
MAJOR PATRICK A. BURNS ACSC #88-420
"insights into tomorrow"



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REPORT NUMBER 88-420

TITLE "SPLITTING THE SEWERPIPES"--A LOOK AT SPLITTING LARGE
CIVIL ENGINEERING UNITS INTO MULTIPLE SQUADRONS

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Submitted to the faculty in partial fulfillment of
requirements for graduation.

**AIR COMMAND AND STAFF COLLEGE
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PREFACE

Lieutenant General Leo Marquez, recently-retired Deputy Chief of Staff for Logistics and Engineering at HQ USAF, coined the term "stovepiped" to refer to constrained career fields or organizations that have a narrow focus. The author of this report adopted the term "sewerpiped" to similarly denote an organization that grows in size to handle an increasing "flow" of workload. At some point, organizations (like sewerpipes) can better control the net "flow" by branching out rather than simply enlarging for gross output.

The author first formulated the idea for this research paper while serving as an executive officer in the office of the Director of Engineering and Services, HQ USAF, in the Pentagon. Opportunities to travel with the Director, Deputy, and Associate to observe Engineering and Services units throughout the Air Force highlighted the extreme variations in the size of civil engineering (CE) squadrons. The 1000- to 1700-person CE squadrons at the top of the scale stimulated thoughts on growth in unit size to match workload and resulted in this research.

The purpose of this study is to examine the potential for dividing these large CE organizations into multiple squadrons and provide recommendations for further Air Staff analysis and implementation.

Any connotation between the term "sewerpiped" and 1000-person CE squadrons is intentional but in no way derogatory of the immense challenge CE commanders and personnel face at large bases.



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ABOUT THE AUTHOR

Major Patrick A. Burns graduated from the University of Wyoming with a Bachelor of Science Degree in Mechanical Engineering. After receiving his commission as an Officer Training School distinguished graduate, he was assigned to Plattsburgh AFB, New York, where he served as a CE Contract Programmer, Design Engineer, and Chief of Design. Major Burns was reassigned to Headquarters, Strategic Air Command, where he was the Command CE Contingency Force Manager, Energy/Engineering Consultant on the Civil Engineering and Services Management Assistance Team, and finally Executive Officer to the DCS/Engineering and Services. He then received a unique Education With Industry tour at Dallas/Fort Worth Airport, Texas. He subsequently served as Chief of Operations in Civil Engineering at Dyess AFB, Texas. Major Burns was selected for the Air Staff and served as Contingency Program Manager and then Assistant Executive Officer in the Directorate of Engineering and Services, HQ USAF. Major Burns has a Master of Science in Systems Management from the University of Southern California and is a Registered Professional Engineer in the Commonwealth of Virginia. He was a distinguished graduate of Squadron Officer School in 1980 and will graduate from Air Command and Staff College in 1988. Major Burns is a member of the Society of American Military Engineers and the American Society of Plant Engineers.

TABLE OF CONTENTS

Preface.....	iii
About the Author.....	iv
List of Illustrations.....	vi
Executive Summary.....	vii
CHAPTER ONE--INTRODUCTION	
Background.....	1
Why Size?.....	2
Methodology.....	3
CHAPTER TWO--BASELINE	
Size.....	5
Composition.....	5
Organization.....	7
Opportunities.....	7
Summary.....	9
CHAPTER THREE--PRECEDENT	
CE Precedent.....	10
Other Parallels.....	12
Comparison: Opportunities vs Precedent.....	14
Summary.....	15
CHAPTER FOUR--PROS AND CONS	
Base Perspective.....	16
MAJCOM Perspective.....	17
Air Staff Perspective.....	17
Summary.....	18
CHAPTER FIVE--SYNTHESIS	
Summary of Findings.....	20
Synthesis.....	21
Recommendations.....	24
BIBLIOGRAPHY.....	25

LIST OF ILLUSTRATIONS

TABLES

TABLE 1--Large CE Organizations (Over 600 personnel)....	6
TABLE 2--Ramstein Air Base Civil Engineering.....	11
TABLE 3--Kadena Air Base Civil Engineering.....	11
TABLE 4--Nellis Air Force Base Civil Engineering.....	12
TABLE 5--Unit Comparison.....	15

FIGURES

FIGURE 1--Model of Current CE Organizational Process....	23
FIGURE 2--Model of Ideal CE Organizational Process.....	23



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REPORT NUMBER 88-420

AUTHOR(S) MAJOR PATRICK A. BURNS, USAF

TITLE "SPLITTING THE SEWERPIPES"--A LOOK AT SPLITTING LARGE CIVIL ENGINEERING UNITS INTO MULTIPLE SQUADRONS

I. Purpose: To examine the potential for dividing large 600- to 1700-person civil engineering (CE) organizations into multiple 300- to 400-person squadrons.

II. Background: CE organizations vary in manpower size according to measurable workload factors related to base mission/size. As a result, CE squadrons range in size from 200 to over 1700 personnel. There are obvious reasons to be concerned with the size of large CE squadrons. Management experts point out the importance of size in organizational span-of-control and performance. The application of leadership through the appropriate span-of-control is also a recognized organizational fundamental in AFR 26-2 and a critical wartime employment element. Closer-to-home for CE leadership, the large CE squadrons are well above typical Air Force squadron size and usual squadron commander rank, impacting peacetime and wartime efficiency and affecting career decisions of an already depleted O-5/O-6 CE officer corps. Nineteen bases remain with large, single CE squadrons in the 600- to 1700-person range, primarily because of the predominance of traditional CE peacetime

CONTINUED

organizational guidelines. The author selected three of these bases which present sample opportunities for reorganization into multiple squadrons: Wright-Patterson AFB, OH; Vandenberg AFB, CA; and Clark AB, PI. Wright-Patterson AFB, with its three distinctly-separated base areas, offers a geographic case for multiple CE squadrons. Vandenberg AFB's two CE division setup appears adaptable to a split along functional lines. Clark AB's multiple tactical aircraft squadrons offer a possible peacetime split in line with CE wartime taskings to support deploying flying squadrons.

III. Discussion: There is clear precedent for using multiple squadrons at large bases. The aircraft maintenance community has long-used multiple squadrons, further enhancing them with integral wartime capability. Security police has similarly used multiple squadrons at large-mission bases. And, within the CE community itself, three large CE organizations, Ramstein AB, Kadena AB, and Nellis AFB, are already divided into multiple CE squadrons. Commanders of large CE units, parent MAJCOM CE managers, and Air Staff CE policy makers provided pros and cons of having multiple CE squadrons. On the plus side, multiple-squadrons present a job-enriched O-6 position free of squadron commander people problems with time for planning and guidance. They put CE squadron commander positions at the appropriate O-5 level, like the majority of the Air Force, and with appropriate size squadron (and thus span-of-control) for visibility of people and issues. On the minus side, multiple CE squadrons potentially create "we/they" attitudes and competition for resources. Finally, there are resource concerns for shop facilities, equipment, and overhead the Air Force may not be able to afford.

IV. Conclusions: The research concludes that sufficient rationale, precedent, and opportunities exist to divide large CE units into multiple squadrons. It also identifies foundations for assessing a CE multiple-squadron initiative. Recently-published Air Force Engineering and Services "decentralization" and "warfighting" principles of excellence provide a basis for considering squadron size in CE organizational policy. And, the wartime CE Prime BEEF squadron provides the essential core for peacetime organizational methodology. The resultant benefits may not be as spectacular as General Creech's successes in TAC in the 1970s, but the potential may be worth the risk.

V. Recommendations: The author believes this research surfaces sufficient observations to warrant formal study at the Air Staff and MAJCOM levels.

Chapter One

INTRODUCTION

The interaction of elements that combine to form military effectiveness is, by its very nature, a complex process. Two authors on the subject, Beaumont and Snyder, believe military effectiveness is based on the integration of four variables-- "people, machines, organizational structure, and operational doctrine" (2:36). This research focuses on one aspect of organizational structure--size--specifically as it relates to civil engineering (CE) squadrons.

CE squadrons in the 600- to 1700-person range, among the largest squadrons in the Air Force, stimulated the title of this report--"Splitting the Sewerpipes." Lieutenant General Leo Marquez, recently-retired Deputy Chief of Staff for Logistics and Engineering at HQ USAF, coined the term "stovepiped" to refer to constrained career fields or organizations that have a narrow focus. The author of this report affectionately adopted the term "sewerpiped" to similarly denote organizations that have grown large in size to handle the increasing "flow" of workload.

The purpose of this study, therefore, is to examine the potential for dividing these large "sewerpiped" CE organizations into multiple squadrons. The report identifies potential opportunities, discusses sample precedent, analyzes resultant pros and cons, and provides recommendations for further Air Staff analysis and implementation.

To set the stage for subsequent chapters, a basic understanding of the CE mission and organization, the concerns for CE squadron size, and the methodology for addressing the issue is important.

BACKGROUND

The peacetime mission of Air Force civil engineering is to "acquire, construct, maintain, and operate Air Force real property facilities" and provide related CE services (12:2). Because of inherent differences in Air Force base missions, CE units vary in manpower size according to measurable workload

factors related to base size. As a result, some large bases such as Wright-Patterson AFB, Ohio, and Kadena AB, Japan, have CE squadrons which exceed 1000 personnel, while at other bases the squadrons barely reach 200 (23:1-146).

A common thread throughout all CE units, with a few exceptions, is a standard organizational structure based on policy guidelines in AFR 26-2, Organization Policy and Guidance, and AFR 85-10, Operation and Maintenance of Real Property. Several CE organizational studies, particularly the Air Force Engineering and Services Center Project Innovative Management Achieves Greater Effectiveness (IMAGE) effort, have explored flexible CE organizational structures to improve peacetime productivity (31:--; 32:--). However, none have approached the fundamental issue of squadron size that is the basis for this paper.

WHY SIZE?

Why be concerned with the size of CE squadrons? Experts in organization and management theory recognize the impact of the variable of size on an organization's span-of-control and resultant performance. Koontz and O'Donnell point out how span-of-control affects a manager's and leader's effectiveness for delegation, planning, communication, training, and personal contact (1:Ch 12). Obviously, a squadron commander in a 1000-person squadron does not have the opportunities for planning, personal contact, and so on that a commander of a 300-person unit does.

AFR 26-2 also emphasizes span-of-control as an important principle of Air Force organization (10:4). AFR 26-2 relates that "span-of-control depends on mission complexity," affecting how much time a commander can devote to management--"overall planning, direction, coordination, and control of the organization" and leadership--"guiding and motivating subordinates to perform at top effectiveness" (10:4-5).

For the Air Force CE community specifically, decreasing manpower and dollar resources, critical wartime employment requirements, and increasingly severe CE O-5/O-6 shortages all dictate concern for the size of CE organizations.

With hard-hitting reductions dwindling the Air Force budget for the near future, Air Staff managers believe they have to place even more emphasis on "increasing the productivity of the current workforce" (3:3). The Air Force CE Project IMAGE initiative addressed this challenge superbly at the CE shop and branch levels, striving to improve peacetime efficiency "through increased flexibility, responsiveness, pride of ownership,

system responsibility, and maintainability" (32:1). However, it did not address the issue of a large CE unit as a consolidated squadron. While commanding TAC, General Creech recognized "The problem with consolidation is that. . . it has indirect and negative effects on people--morale, motivation, enthusiasm, creativity" (5:50). The sheer size of larger CE squadrons restricts tapping that morale and motivation potential for improving productivity.

Organization is even more important in wartime, providing the "framework for effective force employment during the heat of combat" (7:11). Recent CE experience in the major airbase survivability SALTY DEMO exercise showed effective leadership and management of rapid runway personnel and equipment was CE's "major apparent shortfall," despite intensive rapid runway repair task training (14:x). This warfighting capability "evolves with training, and is sustained by leadership, which reinforces unit cohesion" (9:3-6). Thus, leadership must be active throughout a squadron on a daily basis to enhance unit cohesion. The massive size of large CE squadrons is not conducive to building the day-to-day links needed for wartime unit capability.

And finally, several Air Force officials who manage CE lieutenant colonel and colonel assignments see the massive size of large CE squadrons as also affecting career decisions of CE O-5s and O-6s--a serious concern with the current 55 percent O-5 manning and 81 percent O-6 manning (18:Atch 1; 21:3; 34:--). With the significant number of large CE squadrons, almost one-half of CE O-6s (58) serve as CE squadron commanders (21:1-3). "The result is we ask CE O-6 selectees to do the same [squadron commander] duties as an O-6 that they accomplished as an O-5, and in a unit three to five times as large--a career choice we don't force on other career fields" (21:3).

METHODOLOGY

Analyzing the potential for splitting large CE units and the anticipated pros and cons is a more difficult challenge than readily apparent. Some generalizations can be made on obvious opportunities based on factors such as installation size and geographic layout. Multiple CE squadrons already operating at three bases provide important precedent. Related parallels in similar aircraft maintenance organizational initiatives are also of benefit. But most important, the perspectives of the large CE units themselves, their parent MAJCOMs, and Air Force civil engineering leadership determine the ultimate viability of any aspect of this study.

This report therefore analyzes the issue as follows:

- Chapter Two establishes the baseline for the organization of CE units and identifies units in 600-person range and above (i.e., large CE units for purposes of this study).
- Chapter Three looks at the precedent of three CE units that are already split into multiple squadrons and other parallels with aircraft maintenance and security police multiple-squadron units.
- Chapter Four discusses the pros and cons of splitting large CE units and offers common threads. Finally,
- Chapter Five synthesizes the results into concluding remarks and recommendations.

Chapter Two

BASELINE

The next steps in this research are to compare the size, composition, and organization of CE units (the size of the "sewerpipes") and then identify CE organizations (types of "piping") and workloads ("flow rates") that present sample opportunities for multiple-squadron operations.

The three variables of size, composition, and organization offer a baseline for general comparison of CE units.

SIZE

The size of CE units is directly tied to workload factors associated with base size (i.e., the larger the base the bigger the "sewerpipe"). The Air Force manpower database shows that CE squadrons vary significantly in size from approximately 100 personnel to in excess of 1700 personnel (23:1-146; 26:1-14). In fact, CE squadrons in the 600- to 1700-person range are among the largest squadrons in the Air Force (19:1). Since average combat support and maintenance squadrons are in the 300- to 400-person range, this study looks at CE units over 600 personnel in size (i.e., units divisible into 300- to 400-person squadrons) which are listed in Table 1 on the next page.

COMPOSITION

Comparison of the baseline large CE units in Table 1 reveals several similarities and differences. The units vary significantly in military/civilian balance, primarily as a result of mission. The scale stretches from one-third military/two-thirds civilian at AFLC logistics centers, to two-thirds military/one-third civilian at TAC fighter bases. The listing of large CE units also represents a variety of missions in all the major commands, from SAC dual-wing (bomb/missile) to PACAF multi-squadron fighter and MAC airlift. The largest two CE units (Ramstein AB, Germany, and Kadena AB, Japan) are already split in multiple squadrons, as is Nellis AFB, Nevada. Chapter Three will discuss these three split CE units in more detail.

<u>Unit</u>	<u>Base</u>	<u>Officers</u>	<u>Airmen</u>	<u>Civilians</u>	<u>Total</u>	<u>Sqdrns</u>
377 CEG	Ramstein	18	585	1114	1717	2
18 CEG	Kadena	12	414	1014	1440	2
2750 CES	Wright-Pat	16	363	854	1233	1
3 CES	Clark	13	475	553	1041	1
4392 CES	Vandenberg	19	490	423	932	1
2849 CES	Hill	15	374	538	927	1
3202 CES	Eglin	11	542	371	924	1
2854 CES	Tinker	17	362	516	895	1
2853 CES	Robins	16	336	458	810	1
2852 CES	McClellan	12	280	477	769	1
544 CEG	Nellis	27	475	205	707	3
50 CES	Hahn	14	347	361	700	1
1776 CES	Andrews	15	343	334	692	1
55 CES	Offutt	11	378	296	687	1
475 CES	Yokota	10	210	451	671	1
21 CES	Elmendorf	23	407	233	663	1
6510 CES	Edwards	13	346	297	656	1
1606 CES	Kirtland	13	239	467	620	1
7625 CES	USAF Acemy	9	190	420	619	1

TABLE 1. LARGE CE ORGANIZATIONS (Over 600 personnel)

Source: (23:1-146)

ORGANIZATION

CE organizational policies have traditionally focused on strictly one CE squadron per base, regardless of size. As mentioned in the introduction, CE units are primarily built along standard organizational guidelines contained in AFR 26-2 and AFR 85-10. AFR 26-2 encourages standard organizations to promote stability, facilitate management improvements, foster performance standards, lessen transfer orientation time, and improve communications (10:5). Resultant AFR 85-10 policy has always focused on single CE squadrons, with only slight variations, depending on locally-available services. Air Force Engineering and Services Center Project IMAGE initiatives in the past two years have stimulated changes to base-level CE organizational structure. As a result, recently-revised CE organizational policy guidelines now allow "optional configuration of shops to meet varying base needs" (32:10). Thus, these changes have contributed to organizational efficiency at the branch and shop level, without consideration for the effects of overall squadron size.

CE wartime organizational methodology is also an important consideration. AFR 93-3, Air Force Civil Engineering Prime Base Engineer Emergency Force (BEEF) Program, provides the policy to "organize CE forces for worldwide combat support" (13:6). The Prime BEEF program forms CE mobility assets from the peacetime manpower structure in standard increments to meet wartime taskings. This wartime CE organizational methodology has also been recently revised by the Air Force Engineering and Services Center to focus more on unit integrity and cohesion. The new AFR 93-3, published 20 November 1987, contains two important policy changes. First, the basic CE mobile force is now a 200-person Prime BEEF combat support squadron, replacing previous 3- to 70-person teams. And second, these Prime BEEF squadrons are now tied to specific flying units instead of deployment locations (13:6-17). Many large, 600-person-plus peacetime CE squadrons analyzed in this study now split into multiple 200-person Prime BEEF squadrons in wartime. Chapters four and five discuss this important peacetime/wartime transition as well as the importance of unit integrity and cohesion.

OPPORTUNITIES

Since three bases from varied commands and missions already have multiple squadrons, the author selected three bases with comparable large CE units which present sample opportunities for reorganization into multiple CE squadrons. The bases are Wright-Patterson AFB, Ohio (AFLC); Vandenberg AFB, California (SAC); and Clark AB, Phillipines (PACAF). An overview of base/mission workload factors, along with the variables of CE unit size,

composition, and organization, for each of these bases is as follows:

Wright-Patterson Air Force Base, Ohio, is a very diverse AFSC base with three separate major base areas which contain 17 million square feet of facilities and cover 8,145 acres (6:171; 36:--). Major operations include Headquarters Air Force Logistics Command, Headquarters Aeronautical Systems Division, Air Force Institute of Technology, four major logistics centers, AFRES 906th Tactical Fighter Group, and 78 other government agencies (6:171; 15:15). The base is operated by one of the largest workforces of any Air Force base, comprised of 9,500 military, 17,500 civilian, and 6,000 contract service personnel (6:171). Wright-Patterson AFB, therefore, has the third-largest CE unit in the Air Force--over 1200 personnel (16 officers/363 airmen/854 civilians) (23:75-76). The CE unit operates as a single CE squadron--the largest in the Air Force--and has an O-6 squadron commander (29:4).

Vandenberg Air Force Base, California, (SAC) is comprised of almost 9.4 million square feet of facilities and has one of the larger areas--98,400 acres (6:170; 36:--). Major operations include 1st Strategic Aerospace Division (SAC), Space and Missile Test Organization (AFSC), several AFSC Space Test Groups, and numerous USAF/DoD/NASA space-related activities (6:170; 15:14). The base workforce is comprised of 3,982 military, 1,197 civilians, and 8,658 contractor personnel (6:170). Vandenberg AFB is SAC's largest CE unit with 932 personnel (19 officers/490 airmen/423 civilians) (23:110). Again, the unit is a single CE squadron with an O-6 squadron commander. The CE squadron has operated for many years with two O-5 division chiefs (an operations division and a professional services division) in a non-traditional CE workload split (20:3). However, Vandenberg AFB's current CE squadron commander has proposed a reorganization to the traditional AFR 85-10 format to eliminate this layer of supervision above the operating branches (20:4).

Clark Air Base, Phillipines, (PACAF) is one of the Air Force's larger overseas bases in terms of area, covering 11,309 acres, and has 9.7 million square feet of facilities (36:--). Major operations include Headquarters 13th Air Force, 3rd Tactical Fighter Wing, 374th Tactical Airlift Wing, and many other functions such as the Pacific Jungle Survival School. The base military population is 8,949 and the civilian workforce is 2,147 (15:19). CE at Clark AB is the fourth largest in the Air Force--1041 personnel (13 officers/475 airmen/553 civilians) (23:85). CE is also a single squadron commanded by an O-6 and has an AFR 85-10 traditional CE organizational structure (24:1).

SUMMARY

There is no compelling reason why the bases in Table 1 remain with large, single CE squadrons other than the predominance of traditional CE peacetime organizational guidelines. Just as three other CE units of similar size are split into multiple squadrons, the opportunities to have done so with Wright-Patterson AFB, Vandenberg AFB, and Clark AB exist. Wright-Patterson AFB, with its three distinctly-separated base areas, appears to offer an ideal geographic case for multiple CE squadrons. Vandenberg AFB's two CE division setup also appears readily adaptable to a split along functional lines. Clark AB's multiple tactical aircraft squadrons offer a possible peacetime split in line with CE wartime taskings to support each deploying fighter or retained airlift squadron.

The next chapter looks at the precedent for multiple-squadron units.

Chapter Three

PRECEDENT

The next element of this research is a search for any precedent based on similar large-organization initiatives (i.e., cases where a massive organizational "sewerpipe" was converted to a multiple-squadron unit).

The three CE organizations already operating as multiple squadrons and similar multi-squadron operations in both aircraft maintenance and security police functional areas offer important precedents.

CE PRECEDENT

Ramstein Air Base, Germany, has one of the largest military strengths of any overseas military base--8,254 military and 3,125 civilian personnel (15:21). This USAFE Headquarters base covers 3,165 acres and is comprised of 8.2 million square feet of facilities (15:21; 36:--). Major operations include Headquarters United States Air Forces in Europe, Headquarters Allied Air Forces Central Europe, three air divisions, four tactical fighter squadrons, two airlift squadrons, and extensive associated support units (15:21). Ramstein AB also has the largest CE organization in the Air Force--approximately 1700 CE personnel (18 officers/585 airmen/1717 civilians) (23:22-23). Because of this enormous workload and personnel size, CE at Ramstein AB is comprised of a CE group containing two separate CE squadrons. The CE squadrons are split along clear geographic lines to support two areas of responsibility--the Ramstein main base and the Einsiedlerhof housing area. The O-6 CE group commander focuses on long-range planning/programming, provides a "buffer" interface with the wing commander and major customer commanders, and guides/integrates the operation of the two CE squadrons. The two O-5 CE squadron commanders provide the leadership to apply their personnel and resources to getting the actual work accomplished in their geographic areas (35:--). The size and composition of the CE squadrons at Ramstein AB are shown in Table 2.

<u>Unit</u>	<u>Base</u>	<u>Officers</u>	<u>Airmen</u>	<u>Civilians</u>	<u>Total</u>	<u>Sqdrns</u>
377 CEG	Ramstein	18	585	1114	1717	2
337 CEG		(12)	(15)	(204)	(231)	
377 CES		(3)	(341)	(353)	(705)	(1)
564 CES		(3)	(232)	(549)	(781)	(1)

TABLE 2. RAMSTEIN AB CE

Kadena Air Base, Okinawa, Japan, (PACAF) has a large base population, comprised of 9,331 military and 2,596 civilian personnel. It covers 4,990 acres and has over 11.4 million square feet in facilities (15:17; 36:--). Major operations include Headquarters 313th Air Division, 18th Tactical Fighter Wing, as well as airlift, rescue, and strategic flying missions (15:12). Kadena AB has the second largest CE unit in the Air Force--1440 personnel (12 officers/414 airmen/1014 civilians) (23:89). Because of large workload and unit size, CE at Kadena AB is also split into a CE group and two CE squadrons. However, the Kadena AB CE squadrons are split along traditional CE organizational lines. The CE operations squadron performs the day-to-day work, and the CE support squadron conducts the remaining engineering, fire protection, and family housing management. Again, the O-6 CE group commander serves as the integrator of the two squadrons, and the O-5 squadron commanders concentrate on the people and resources and the actual mission support work (33:--). The size and composition of the CE squadrons at Kadena AB are shown in Table 2.

<u>Unit</u>	<u>Base</u>	<u>Officers</u>	<u>Airmen</u>	<u>Civilians</u>	<u>Total</u>	<u>Sqdrns</u>
18 CEG	Kadena	12	414	1014	1440	2
18 CEG		(3)	(11)	(32)	(46)	
18 CEO SQ		(2)	(313)	(749)	(1064)	(1)
18 CES SQ		(7)	(90)	(233)	(330)	(1)

TABLE 3. KADENA AB CE

Nellis Air Force Base, Nevada, is TAC's largest base, covering over 11,200 acres with over 3 million acres in training ranges (15:11). It is comprised of 10,718 military and 1,032 civilian personnel, and contains 5.5 million square feet of facilities (15:11; 36:--). Major operations include Headquarters USAF Tactical Fighter Weapons Center, 477th Tactical Fighter Wing, and tactical fighter training ranges (15:11). Nellis AFB has the eleventh largest Air Force CE organization, totaling 707 personnel (27 officers/475 airmen/205 civilians) (23:141-142). Nellis AFB CE is a three squadron operation, comprised of an O-6 Operation Support Wing Deputy Commander for Civil Engineering and three CE squadrons commanded by O-5s. Two of the CE squadrons serve the main Nellis AFB area and are functionally split into an operations squadron and a support squadron. The two squadrons have defined peacetime facility maintenance responsibilities, but share a wartime Prime BEEF commitment. The third squadron serves an outlying base area (34:--). Table 4 depicts the Nellis AFB CE units.

<u>Unit</u>	<u>Base</u>	<u>Officers</u>	<u>Airmen</u>	<u>Civilians</u>	<u>Total</u>	<u>Sqdrns</u>
544 OSW CE	Nellis	27	475	205	707	3
544 OSW CE		(4)	(5)	(17)	(26)	
544 CEO SQ		(5)	(235)	(112)	(352)	(1)
544 CES SQ		(11)	(83)	(76)	(170)	(1)
4461 CES		(7)	(134)	(0)	(141)	(1)

TABLE 4. NELLIS AFB CE

Just as these three CE organizations represent precedent for multiple CE squadron operations at large bases, other Air Force organizations also have multiple-squadron operations that would otherwise be massive single-squadron units.

OTHER PARALLELS

Both aircraft maintenance and security police also face the challenge of effectively integrating people, equipment, and doctrine in extremely large organizations.

Aircraft Maintenance

Aircraft maintenance manpower is tied to the number and type of aircraft assigned to a base. A typical large fighter wing with three flying squadrons requires up to 1,800 aircraft maintenance personnel (3:3). Recognizing the inherent challenges in efficiently operating a single maintenance unit of that size, the aircraft maintenance community divided their operation into four functional squadrons: avionics maintenance, field maintenance, munitions maintenance, and organizational maintenance (11:Ch 1). Their objective, stated in AFR 66-1, is to "organize, train, and equip to support operational missions in the most effective and productive manner, while ensuring effective transition from peacetime operations [to wartime] at any time" (11:5).

In the late 1970s, the aircraft maintenance community altered this organizational structure for tactical air forces (TAF) to improve sortie generation capability (27:Atch 3). The resultant TAF maintenance functions were an aircraft generation squadron to support aircraft launch/recovery, and equipment maintenance and component repair squadrons to shop repair individual aircraft components (27:Atch 3). More recently, "increased manpower costs coinciding with altered concepts of [wartime] force employment compel us [aircraft maintenance] to change the way we train and manage the maintenance workforce" (3:3). Specifically, the TAF reorganized large aircraft generation squadrons around 250-person independent aircraft maintenance units (AMUs) and created multiple aircraft generation squadrons at larger wings (17:1-1; 25:10). Air Force leaders feel current aircraft generation squadrons with core AMUs produce both peacetime and wartime benefits. They have an "integrated capability (do not have to reorganize to go to war), improved span-of-control and unit cohesion (commander knows his people/supervisors know their capabilities/people know their jobs and each other), and enhanced survivability (tighter command and control/decentralized specialists)" (27:Atch 6).

Several general parallels to CE are evident. The organizational size of both aircraft maintenance and civil engineering is tied to workloads that correspond to the size of the base mission. Both are organized along functional lines with supporting administrative sections. Both have recognized wartime missions with resultant core wartime mobile elements (Prime BEEF for CE and the AMU for aircraft maintenance). In contrast, aircraft maintenance is primarily military and performs easily identifiable work for finite aircraft requirements. CE varied military/civilian workforces meet functional, seasonal, and base-wide work requirements.

Security Police

At larger Air Force bases, security police also face the challenge of large unit manning. Security police provides day-to-day and emergency protection for Air Force combat elements and supporting installations and are sized based on those elements (10:36; 16:8-6). Security police organizations at major Air Force bases are correspondingly large in size. At SAC dual-wing (missile wing and bomb wing) bases such as Malmstrom AFB, 1100 security police personnel form a security police group with four distinct squadrons--one security police squadron and three missile security squadrons (16:8-6). At other large bases like Vandenberg AFB, 560 security police personnel are also organized into a security police group with two security police squadrons (16:3-13). The security police squadrons share common unit administration, equipment, and training functions (16:8-6).

Again a few basic parallels are important. Obviously, the size and assets of a base create large workloads and thus require large security police organizations, just as they require large CE units. At missile bases, the widely-dispersed missile sites present workloads markedly different than the main bases for both security and facility maintenance. In contrast, security police units are almost entirely military and have traditionally organized in squad/flight/squadron configuration for both peacetime and wartime. However, CE units have a varied military/civilian mix in a functionally-organized peacetime unit, with an all-military wartime Prime BEEF team/squadron configuration.

A direct comparison of CE, security police, and/or aircraft maintenance units at individual bases is also beneficial.

COMPARISON--OPPORTUNITIES VS PRECEDENT

Table 5 compares the size and composition of the CE units the author selected as opportunities for multiple CE squadrons versus security police and/or aircraft maintenance units at the same three bases. The size variation between squadrons is quite evident. The CE squadron at Clark AB is almost twice as large as any of the three aircraft maintenance or security police units at the same base. At Vandenberg AFB, the CE squadron is three times the size of the largest of two Vandenberg AFB security police squadrons. And, at Wright-Patterson, the CE squadron is six times the size of the base's security police squadron. Commanders of these three CE squadrons recognize the impact of that size disparity--their comments form the base-level perspective of splitting into multiple squadrons discussed in Chapter Four.

Base	Unit	Officers	Airmen	Civilians	Total	Sqdrns
CLARK						
	Civil Engineering					
	3 CES	13	475	553	1041	1
	Aircraft Maintenance					
	3 AGS	10	638	3	641	1
	3 CRS	4	464	8	476	1
	3 EMS	8	472	30	510	1
	Security Police					
	3 SPG	2	94	36	132	
	3 LES	8	480	151	639	1
	3 SPS	8	294	95	397	1
VANDENBERG						
	Civil Engineering					
	4392 CES	19	490	423	932	1
	Security Police					
	4392 SPG	3	48	5	56	
	4392 SPS	1	137	0	138	1
	4393 SPS	7	361	0	368	1
WRIGHT-PATTERSON						
	Civil Engineering					
	2750 CES	15	363	854	1233	1
	Security Police					
	2750 SPS	2	146	81	229	1

TABLE 5 - UNIT COMPARISONS

SUMMARY

Within the limits of this study, the dominant observation is that elements of the Air Force recognize the variable of size in squadron operations. CE leaders at three large bases split their organizations geographically or functionally for more manageable squadron size. Aircraft maintenance managers have historically used functionally-split squadrons and integrated their wartime mobility element as the core of their aircraft generation squadron. Security police leaders also use multiple squadrons at larger bases to maintain desired span-of-control.

The next chapter reviews the pros and cons of multiple CE squadrons.

Chapter Four

PROS AND CONS

Obviously, the pros and cons of splitting large CE units into multiple squadrons will vary depending on the viewpoint of the proponent/opponent (i.e., the operator of the "sewerpipe" may not share the salesman's enthusiasm for more "piping and valves" nor the parent company's desire to install them).

Three distinct perspectives are important to analyze the pros and cons for this report: commanders of the large CE units, parent MAJCOM CE managers, and Air Staff CE policy makers.

BASE PERSPECTIVE

Previous and current commanders of the three existing CE multiple-squadron units (Ramstein AB, Kadena AP, and Nellis AFB) and the three test opportunities (Clark AB, Wright-Patterson AFB, and Vandenberg AFB) provided valuable insights:

Pros

Using multiple CE squadrons at large bases provides needed distribution of a difficult management and leadership workload (19:3). "There are tremendous multiple demands for a Commander/Base Engineer's time at a large base--that coupled with the never-ending commander duties because of the massive squadron doesn't leave enough time to (1) get out to the base customers and squadron people, and (2) pay attention to mid- and long-term planning" (24:1). Multiple CE squadrons improve span-of-control for oversized units, allowing squadron commanders to devote needed time to people and resource problems while the CE group commander serves as a buffer with senior base leadership. It also allows more squadron commander opportunities at the appropriate O-5 level and under tutelage of a CE O-6 (19:3).

Cons

A base with multiple CE squadrons produces potential competition for resources and a "we-they" attitude rather than traditional "teamwork" approach (19:3). It could also confuse

the rest of the base on what squadron does what unless the split is along clear geographic or functional lines (20:4).

MAJCOM Perspective

Consolidated inputs from three MAJCOM staffs provided the following opinions:

Pros

A multiple-squadron CE organization improves visibility of "people in the trenches working day-to-day" and long-range programs that guide its efforts (19:3). It also provides "healthy competition for base priorities and resources" and stimulates responsiveness (19:2). And finally, it elevates the O-6 engineer and places the O-5 squadron commanders closer to their wartime responsibilities like other base units (19:3).

Cons

With CE squadrons split functionally (i.e., an operations squadron and a support squadron), "development/coordination of priorities [is] more difficult. . . for joint engineering-operations projects" (19:3). And, if wartime mobility tasking doesn't follow the peacetime split-squadron lines, it "dilutes team training concepts and thus readiness (work together, deploy together, and fight together)" (19:3).

AIR STAFF PERSPECTIVE

Finally, the last perspective came from CE policy makers at the Air Staff in the Pentagon and at the Air Force Engineering and Services Center. Their experiences as CE squadron commanders and/or in dealing with large CE squadrons provided the following comments on both sides of the issue:

Pros

Multiple CE squadrons are an "effective structure for [bases with] very large or geographically spread-out areas of responsibility. Normal CE commanders would be unable to dedicate sufficient time [to all responsibilities]" (19:1). This reduction in span-of-control is "good to [avoid] loss of visibility of key issues for those at the 'bottom' of the chain" (28:1). Thus, an organizational setup with a CE group commander over multiple CE squadrons allows all the CE commanders to apply their officer skills to their essential duties--"the group commander on long-range planning and the squadron commanders on people, resources, and procedures" (19:2).

Multiple CE squadrons could also benefit CE peacetime to wartime transition. The split squadron focus on operations provides needed "commander emphasis on operations shops, where the majority of the workforce is, and is more aligned to wartime configuration where heavy requirement would be on operations" (19:2). In addition, a multiple-squadron CE organization peacetime concept matches quite well with the new Prime BEEF squadron concept for large units (34:--).

Finally, having multiple CE squadrons at larger bases provides key changes to CE O-5/O-6 officer utilization. It creates job-enriched CE group commander or deputy commander for CE positions, "reducing disdain many CE O-6s have for returning to base level" (21:4). It also "aligns CE units more closely to squadron size and squadron commander rank of most base support and maintenance squadrons" (19:2). In addition, it would facilitate putting rated O-6 engineers with experienced CE O-5 squadron commanders, or vice-versa, to help overcome the severe CE O-5/O-6 officer shortage (19:21).

Cons

A simple functional split to an operations and a support squadron doesn't solve the major problems. "Kadena AB is functionally split, but the 1100-person operations squadron is still too cumbersome a span-of-control in peacetime and disconnected from officers in the support squadron who marry-up with it in wartime" (30:1-2). Also, long-standing initiatives to minimize the lack of communication between operations, engineering, and fire department could again be "exacerbated" (28:2).

Having multiple CE squadrons potentially creates new challenges. It could require additional shop facilities, vehicles, and equipment to implement in a period of decreased budget availability--"taking from the 'tooth' (productive shops) to man the 'tail' (admin overhead)" (28:2). And, split squadrons can have an adverse implication on wartime readiness if formed just to satisfy peacetime effectiveness (22:1).

SUMMARY

Although these pros and cons of having multiple CE squadrons primarily depend on the viewpoint of the respondent, there are common threads evident.

On the plus side, multiple-squadron operations present a job-enriched O-6 position free of squadron commander people problems with time for planning and guidance. They put CE squadron commander positions at the appropriate O-5 level, like the majority of the Air Force, and with the appropriate size

squadron (and thus span-of-control) for visibility of people and issues. And, multiple peacetime squadrons may also benefit CE transition to wartime Prime BEEF squadrons.

On the minus side, multiple CE squadrons potentially create "we/they" attitudes and competition for resources. Functionally-split squadrons can still be too cumbersome in size (unless further split) and may not marry-up fully with the wartime organization. Finally, there are resource concerns for shop facilities, equipment, and administrative overhead the Air Force may not be able to afford.

The concluding chapter addresses this "coin toss" dilemma and offers recommendations.

Chapter Five

SYNTHESIS

Now comes the tough question for civil engineers--should they "dig up" large CE organizational "sewerpipes" and replace them with multiple squadrons, or will the units function quite well and "flow on" efficiently for many years undisturbed? The answer lies in a favorite saying of Brigadier General Ahearn-- "Every organization has to decide what kind of 'company' it wants to be." The Air Force civil engineering "company" has strived to be evolutionary and innovative. The Air Force Engineering and Services Center Project IMAGE program initiated promising changes within the internal functional elements of CE squadrons. It's now time to similarly examine the larger external perspective of CE squadrons as a whole--overall squadron size is an important part of that perspective.

This concluding chapter summarizes the research findings, synthesizes the results, and provides recommendations.

SUMMARY OF FINDINGS

First, there are obvious reasons to be concerned with the size of CE squadrons. The literature search for this study revealed that management experts like Sarkesian or Koontz and O'Donnell point-out the importance of size in organizational span-of-control and performance. The application of leadership through the appropriate span-of-control is also a recognized organizational fundamental in AFR 26-2 and a critical wartime employment element. Closer-to-home for CE leadership, the large CE squadrons are well above typical Air Force squadron size and usual squadron commander rank, impacting the peacetime and wartime efficiency of large CE squadrons and affecting career decisions of an already depleted O-5/O-6 CE officer corps.

Second, there is clear precedent for using multiple squadrons at large bases. Other Air Force major functional areas have recognized similar problems and utilized multiple squadrons. The aircraft maintenance community has long-used multiple squadrons, further enhancing them with integral wartime capability. Security police has similarly used multiple squadrons at large-mission bases. And, within the CE community

Itself, three large CE organizations, Ramstein AB, Kadena AB, and Nellis AFB, are divided into multiple squadrons.

And last, CE large-unit commanders, parent MAJCOM CE managers, and Air Staff CE policy makers revealed both pros and cons of multiple CE squadrons. On the plus side, they agree that multiple CE squadrons at larger bases enrich the O-6 position, put the squadron commander position at the appropriate O-5 level for visibility of people and issues, and may facilitate the wartime Prime BEEF mission. On the minus side, all three also are concerned about cooperation between squadrons and resource implementation requirements.

SYNTHESIS

Therefore, should large CE squadrons be divided into multiple squadrons? This research points out that many opportunities and rationale to "split the sewerpipes" exist. Large CE organizations like Wright-Patterson AFB, Vandenberg AFB, and Clark AB appear to offer ideal opportunities. The single CE squadron at Wright-Patterson AFB has over 500 personnel than the total of the three CE squadrons at Nellis AFB. Wright-Patterson AFB also has clear geographically-separated base areas which could form the basis for a multiple-squadron operation. The single Vandenberg AFB CE squadron has almost twice the personnel the combined security police squadrons at Vandenberg AFB have, and has a long-term two division framework that could transition to two squadrons. And, Clark AB's single CE squadron has a lot of similarities with PACAF-neighbor Kadena AB (which has two CE squadrons) in both base mission and overall CE organizational size/facility workload. Similar opportunities to these three bases exist with most of the large CE units listed in Table 1.

What is the policy implication of evolving to multiple CE squadrons? Although AFR 26-2 encourages standard organizational structures, it also emphasizes appropriate span-of-control for effective management and leadership. The aircraft maintenance and security police functional areas successfully use that guidance in their multiple-squadron operations. Within the Air Force Engineering and Services community, Major General Ellis's emphasis on "decentralization" and "warfighting" as principles of excellence provides a foundation for this proposal. The principle of decentralization is consistent with the need to reduce squadron size and stimulate responsibility and authority at lower organizational levels. The principle of warfighting has led to squadron integrity and cohesiveness in 200-person Prime BEEF squadrons. The specific policy implication, then, is primarily up-front recognition of the factor of squadron size in guiding CE peacetime organizational regulations.

What are the resource implications of evolving to multiple CE squadrons? Although the limits of this research do not allow a complete answer, several possible impacts are evident. Readjustment of existing manpower authorizations would have to occur, since implementation would probably be only on a zero-balance manpower basis (i.e., without additional manpower slots). Each base evolving to multiple squadrons would have to make shop facility and equipment decisions, just as aircraft maintenance went through previously. Administrative and orderly room functions should probably be shared to minimize overall administrative overhead, just as security police does currently. These resource implications may be difficult, but are workable.

How should large CE squadrons be divided? Although the author would like to conclude there are clear points for dividing large CE units, the question is more complex than the limits of this research. The answer is not simply a split functionally, since CE units in the 1000- to 1800-person range would still end up with oversized operations squadrons as Kadena AB does (1100 personnel). A simple geographic split as in Ramstein AB's case can still leave oversized squadrons and may not apply to many bases because of their individual mission and facility layout. The answer may lie in the fundamentals from which squadrons are built--the variables of military effectiveness mentioned in Chapter One. How these variables of people and machines (resources), doctrine, and organization interact is important to both peacetime and wartime capability.

The model at Figure 1, on the next page, depicts the author's view of how CE organizational methodology currently appears. Peacetime facility workload factors determine a manpower and equipment resource base. Peacetime CE doctrine then evolves AFR 85-10 organizational policy and AFR 8X-series operational procedures which apply these resources to form current capability. Parallel to this effort, CE AFR 93-3 Prime BEEF policy applies these same CE resources in contingency-only doctrine, organization, and operating procedures toward a wartime capability.

In the author's opinion, any initiative to reassess the size of CE squadrons should be built based on a model similar to the one at Figure 2. In this version, the peacetime workload factors and wartime threat combine to form the CE resource base. The doctrine, organization, and operating procedures are integrated from that point. The basis for the model in Figure 2 is AFM 1-1 basic doctrine: "To function effectively in war, organization, procedure, and channels of communication must be exercised in peacetime on a daily basis. . . . Commanders must organize and exercise forces as they intend to fight" (8:4-3).

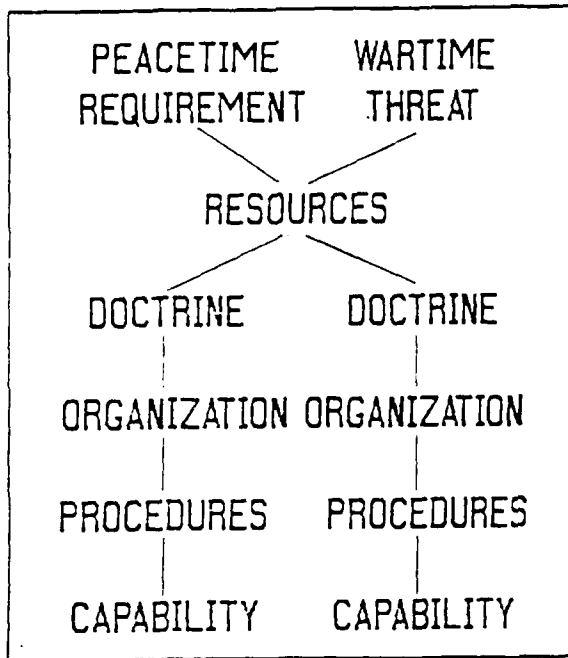


FIGURE 1. CURRENT CE ORGANIZATIONAL PROCESS

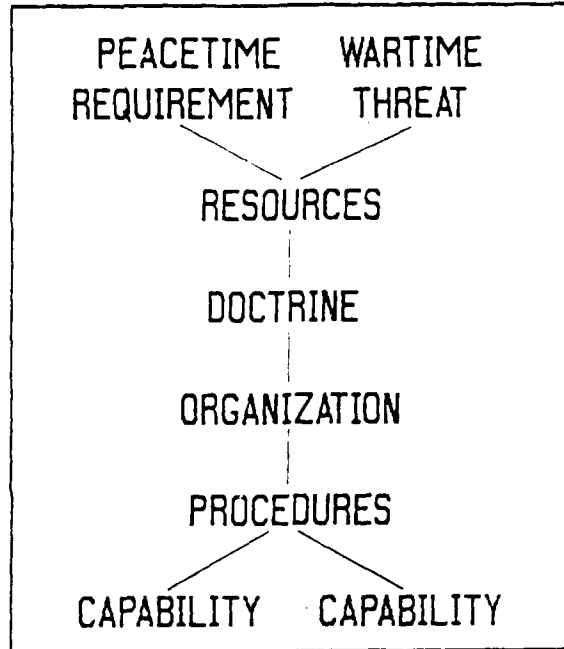


FIGURE 2. IDEAL CE ORGANIZATIONAL PROCESS

The precedent for following the second ideal model is the TAF initiative to organize their critical aircraft generation squadrons around 250-person mobile cores. The newly-formed 200-person CE Prime BEEF squadrons appear to offer that same potential organizational core.

If there isn't a perfect case for dividing large CE units into multiple squadrons and an ideal way to do it, is the change worth the trauma and effort? Perhaps General Creech's beliefs and successes in stimulating far-reaching changes throughout TAC in the 1970s provide the answer:

I learned a long time ago that you have to not let the perfect be the enemy of the good. The fact is that it is never too late to change. . . . And it's amazing how once you take those first steps, suddenly a thousand flowers bloom, and the organization takes off in ways that nobody could have predicted (5:51).

The Air Force CE business has been adaptive to change in the past. The need, opportunity, and precedent exist to "split the sewerpipes" and change even further. The resultant benefits may not be as spectacular as General Creech's successes, but the potential for improvements in CE peacetime/wartime efficiency and CE O-5/O-6 retention may be worth some risks.

RECOMMENDATIONS

The author therefore believes this research surfaces sufficient observations to warrant formal study at the Air Staff and MAJCOM levels. Specifically, the author recommends the Air Staff:

1. Charter a Project IMAGE II effort to further analyze the issue of CE squadron size. Participants should have squadron commander experience to focus the issue properly.

2. Survey the O-6 commanders of the large CE bases to take advantage of their experience and perspective of the issue.

3. Expand the data search of other functional area experience in squadron size/organization for comparison.

4. Integrate the "organize for war in peacetime" philosophy in current Engineering and Services Project Foundation doctrine development.

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