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COMMENTS ON

THE FUTURE OF THE WEAPONS DIVISION

by

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China Lake Defense Alliance
A Component of IWV 2000 Community and Economic Development Corporation

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Foreword

The NAVAIR Weapons Division is the western Research, Development, Test and Evaluation (RDT&E) Center of the Naval Air Systems Command. The major facilities are located at China Lake and Point Mugu in California. The scope of the Division's mission will become clear to the reader of this report.

The author of this report, Matt Anderson, is a member of the China Lake Defense Alliance and a former department head at the Naval Air Warfare Center Weapons Division China Lake. As a senior executive of the Weapons Division he was responsible for directing the BRAC Office for the four western sites at that time of the NAVAIR warfare centers during the 1995 BRAC round – China Lake, Point Mugu, Albuquerque, and White Sands Missile Range. The detachment at Albuquerque was closed and the White Sands detachment was transferred to another center subsequent to BRAC 1995. Mr. Anderson retired from the Weapons Division in 1999 and presently is employed in the defense industry and teaches finance and economics at Cerro Coso Community College.

The report was written for the China Lake Defense Alliance's base retention program to offer insights into China Lake's future role in supporting national defense in the 21st century. The China Lake Defense Alliance, a non-profit community organization, is part of the IWV 2000 Community and Economic Development Corporation. The China Lake Defense Alliance has no ties to the US Navy nor to the Naval Air Warfare Center.

China Lake Defense Alliance
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PREFACE

This paper presents a projection of future military functions that can serve as a basis for defining the future of the Naval Air Warfare Center Weapons Division to provide in-house technical support for the Department of Defense. One of the first critical steps in this effort is preparing for BRAC 2005, which in reality presents an unprecedented opportunity for growth and mission expansion.

According to a 2002 GAO report, the previous four rounds of BRAC have provided net savings of over $16 billion to date, and are currently providing annual savings of over $6 billion per year to DoD. Secretary of Defense Rumsfeld has made significant progress in his "Transformation of DoD", and he has written guidance for BRAC 2005, which focuses on cross-service use of bases to achieve a significant leap ahead in joint operations.

The Weapons Division (WD) gained two major new missions from prior BRAC rounds (the Naval Weapons Evaluation Facility Albuquerque and EP-3 Special Mission Facility), and it was considered for many more, but the lack of DoD and BRAC Commission resolve to enforce cross service consolidations resulted in numerous opportunities for WD mission expansion being "left on the table."

This paper traces the history of WD to show how it grew during the first forty years of its existence through a series of steady expansion in the scope of its mission. The decade of the 90s brought the end of the Cold War and a 50% drawdown in WD size. However, the emergence of new defense paradigms such as Network Centric Warfare, and the inherent high military value of WD such as its air, land, sea space, fortuitous geographic location, and its people and facilities could provide a golden opportunity for future growth and increased relevance in support of the DoD transformation.

It concludes with recommendations for each of the four elements of military value which must be addressed to posture WD to respond to the upcoming BRAC and be revitalized for the future: physical assets, community impacts, environmental considerations, and human resources.

Matt Anderson

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LIST OF ACRONYMS

AFB	Air Force Base
ASROC	Anti-submarine Rocket
BRAC	Base Realignment and Closure
BRAC 2005	2005 Round of Base Realignment and Closures
BRAC 95	1995 Round of Base Realignment and Closures
Caltech	California Institute of Technology
CARCO	A manufacturer of missile flight simulation equipment
C4I	Command, Control, Computers, and Intelligence
C4ISR	Command, Control, Computers, Intelligence, Surveillance and Reconnaissance
CES	Combat Environment Simulation
CTEIP	Central Test and Evaluation Improvement Program
DMT	Distributed Mission Trainers
DoD	Department of Defense
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EW	Electronic Warfare
FRS	Fleet Replacement Squadron
GPS	Global Positioning System
HLA	High Level Architecture
HR	Human Resources
IT	Information Technology
IT-21	Information Technology-21st Century
IW	Information Warfare
JSF	Joint Strike Fighter
M&S	Modeling and Simulation
MAST	Mission Avionics System Trainers
MC02	Millennium Challenge 2002
NAWC-WD	Naval Air Warfare Center - Weapons Division
NCW	Network Centric Warfare
NOTS	Naval Ordnance Test Station
NMTC	Naval Missile Test Center
OFP	Aircraft Operational Flight Program
OPNAV	Office of the Chief of Naval Operations
OSD	Office of the Secretary of Defense
R&D	Research and Development
RDT&E	Research, Development, Test and Evaluations
RAM	Rolling Airframe Missile
RFPs	Requests for Proposals
SETA	System Engineering Technical Assistance

LIST OF ACRONYMS (continued)

SPAWAR	Naval Space and Warfare Systems Command
TENA	Test and Training Enabling Architecture
UAV	Unmanned Air Vehicle
UCAV	Unmanned Combat Air Vehicle
UTTR	Utah Test and Training Range
VTOL	Vertical Take-Off and Landing
WD	Weapons Division
WSSA	Weapon System Support Activity
WSMR	White Sands Missile Range
WSISS	Weapon System Integration Support Services
WW II	World War II

Executive Summary

The Naval Ordnance Test Station and Naval Missile Test Center were established in the 1940s to develop and test weapons for the Navy. Over the 60 years of their existence the mission of the facilities, merged into the Weapons Division in 1992, has grown steadily in response to changing needs and advancing technology. By the early 1990s products and services had grown from development and test of unguided rockets and crude analog fire control systems to development, test, production support and in-service engineering of sophisticated guided missiles and development of advanced software to integrate weapons and aircraft into functional weapon systems.

Today the Weapons Division is a leader in applying advanced technology to meet the demands of network centric warfare; integration of the services in joint operations; application of unmanned air vehicles and unmanned combat air vehicles; and integrating modeling and simulation with actual flight systems. The system environment is changing with the introduction of acquisition reform; reduced research, development and procurement of missiles; spiral development; and the need to conduct operations on a scale that requires use of multiple range assets.

BRAC –2005 evokes concern in most communities because of the threat of closure or significant downsizing of bases, but it also represents a golden opportunity for growth. In the previous four BRAC rounds China Lake and Point Mugu lost no functions and gained from functional transfers from Albuquerque and Indianapolis. In the data calls for BRAC-95, the scenarios were all for moves to the Weapons Division except for a vigorously opposed GAO call to close Point Mugu and a reciprocal pair of scenarios involving China Lake and Eglin Air Force Base. It appears that on balance China Lake and Point Mugu have an opportunity to grow because of their advantages in land, sea and air space, encroachment resistance and superior capabilities.

To take advantage of the BRAC opportunity, the Weapons Division must broaden its mission beyond its traditional roles. It must posture physical assets to accept additional responsibilities and bring the community into the process. Specific areas supporting mission growth for the Weapons Division include:

- Exploiting its inherent advantage of being at the locus of the best networked collection of military test and training ranges in the world
- Broadening research and development to include more computer networking and software interfaces for the operational war fighter and working closer with the Fleet
- Exploiting technological change – data links, information technology, Global Positioning System, modeling and simulation, unmanned air vehicles and combat air vehicles
- Consolidating missions and taking on new missions
- Structure support contracts to enhance flexibility in responding to BRAC scenarios.

Comments on
The Future of the Weapons Division

How Did the WD Get Where It Is?

In order to answer this question, let's take a brief look at the past. This enables us to gain perspective about how the WD got where it is today.

During World War II the Navy working with the California Institute of Technology (Caltech) supported the Office of Scientific Research and Development (OSRD) in the development of a number of air launched rocket systems. This group also supported the Manhattan Project in related explosives design and testing. These cooperative efforts between the Navy and Caltech led to the need for a large land range and air space where the ordnance could be safely and effectively tested. The Navy quickly realized the longer term need for a permanent center devoted to the research and development of advanced weaponry.

On 2 November 1943, Admiral Blandy, Chief of the Navy Bureau of Ordnance, requested that the Secretary of Navy establish a Naval Ordnance Test Station (NOTS) at Inyokern, California. On 8 November 1943, the Secretary of the Navy authorized this action as an activity of the 11th Naval District. The primary function of the activity was the 'research, development and testing of weapons, and having the additional function of furnishing primary training in the use of such weapons.' Thus, NOTS Inyokern (later NOTS China Lake) was established to implement this function. The intent was to have a team of high-level civilian scientists and engineers working hand-in-hand with experienced military personnel to develop advanced weapon systems for the operational services.

In the mid-1940s, the Navy Bureau of Aeronautics established the Naval Missile Test Center (NMTC) at Pt. Mugu, California. This action provided the Navy with a much-needed expansive sea range. China Lake and Pt. Mugu were in 1992 merged into the Naval Air Warfare Center Weapons Division (NAWC-WD). This consolidation provided the Navy with one center having the most complete missile systems research, development, test and evaluation (RDT&E) capabilities in the Department of Defense (DoD) for air, land and sea operations.

This unique facility has grown to be one of the largest RDT&E complexes in DOD with laboratories and ranges that incorporate large amounts of real estate and protected air space. The large ranges provide various terrains from desert to mountains to the sea. China Lake ranges, about the size of the state of Delaware, has excellent flying

conditions, and both facilities are protected from commercial and civilian encroachment on land and in the air.
With the beginning of the Cold War in the 1950s, the threat posed to our national security by the Soviet Union created a need for the United States to greatly expand the DOD science and engineering capabilities. Technology was booming in numerous areas after WWII. Sputnik and the Soviet's ventures into space as well as its growing military capabilities created pressure on the technology, disciplined engineering and testing ... and to field mass produced conventional weapons and weapon systems. Certainly, the technical talent that already existed at China Lake and Pt. Mugu was extremely useful in building to that need, and they responded.

China Lake, Pt. Mugu and the whole of the United States' defense industry responded to this need by developing and producing advanced weapons such as Sidewinder, Shrike, Walleye, Polaris, the 'Eye' series of free-fall weapons and supporting aircraft fire control systems. Development and testing of Electronic Warfare (EW) systems also increased at both facilities resulting in an additional product line and, hence, a broader mission for the Center.

The Vietnam War period of the 1960s into the 1970s led to the growth of the number of weapons programs at China Lake and Pt. Mugu. Major programs of the timeframe included Harpoon, Tomahawk, Standard Missile, High Speed Anti-Radiation Missile (HARM), Vertical Launch Anti-Submarine Rocket (ASROC), and Rolling Airframe Missile (RAM) as well as numerous free-fall weapons and laser guided bombs. In fact, China Lake was developing 80% of the free world's air weapon systems during this period.

In the 1960s the complexity of the fire control systems on the delivery aircraft stimulated the need for a disciplined process to develop and test the software that operated the aircraft's mission computers. This led to the establishment of "Weapon System Support Activities" (WSSAs) at China Lake for the A-4, A-7, A-6, AH-1, F/A-18, AV-8B; and at Point Mugu for the F-14 and EA-6B aircraft.

During the 1970s, the Fuze, Missile Systems, and Research Departments from the Naval Ordnance Laboratory, Corona, California, and the National Parachute Test Facility from El Centro, California, were moved to China Lake.

In the 1980s the Reagan defense buildup led to a tremendous growth in Production Support Activities at both China Lake and Point Mugu. This was largely driven by the desire to have two competing Industrial sources for each major weapon system (for example Sidewinder, Shrike and Sparrow). "Dual sourcing" reduced costs due to competition and provided insurance for DoD's industrial base in case of natural disaster or sabotage. The number of guided missiles in the US Navy inventory grew from about 15,000 in 1980 to over 54,000 in 1990. The imposition of billet ceilings for civil servants resulted in a huge growth in the support contractor workforce. The Engineering

Department at China Lake and the In-Service Engineering Department at Point Mugu grew to over 700 and 400 people respectively. By 1990 the military and civil servants at the two Centers numbered about 10,000, and the combined budget was about $2 billion per year.

Then came the dissolution of the Soviet Union and the fall of the Berlin Wall. The sophisticated technological and industrial weapons threat from the Soviet Union to US national security evaporated. The end of the Cold War brought on a steady downsizing of the Defense Department over the last decade of the 20th century. The first four rounds of Base Realignment and Closure (BRAC) from 1989 to 1995 reduced the size of the defense military base infrastructure by 20%. However, the operational forces and the defense budget declined by about 30% in the 1990s. An additional round of BRAC is scheduled for year 2005 to further reduce the military base infrastructure. The military and civilian headcount at the Weapons Division (WD) (China Lake and Point Mugu) has declined to about 5000, half of its 1990 level. The support contractor workforce has seen even greater percentage draw-down.

In the 1980s and the early 1990s the A-4, A-7, and A-6 were taken out of the fleet and their WSSAs were disestablished. One WSSA was added to the WD mission, the EP-3 Special Mission Support Activity in the late 1990s as a result of BRAC 95 after an experiment with privatization. This is significant because the EP-3 is a surveillance platform, not a strike fighter, and hence strengthens WD's position in the world of Network Centric Warfare.

For the first 40 of the past 50 years we see a pattern of steady growth, largely due to the requirement for advanced weaponry to meet a major threat. This was followed by a decade of decline as the Soviet threat to our national security evaporated and some of those missions became less relevant. The biggest part of this decline can be attributed to the production support related to manufacture of missiles and weapons. The Engineering Department at China Lake went from a 700-person Department to a 50-person branch. The engineering support services contract is now about 100 people, a major drop from 700 in 1990. The root cause of this is simply that the US Defense Department doesn't need to manufacture the large quantities of missiles it did during the Cold War because the precision guidance techniques used today, such as GPS, have reduced the number of missiles needed to hit a given number of targets.

Major declines in workforce at WD also occurred in administrative support and R&D of missile systems.

Interestingly, during the 1990s, the testing workload on the land and sea ranges has held up fairly well, as have the WSSAs. Also, some new areas of technology have emerged -- particularly the area of mission planning and remote weapons targeting using off-board sensors from surveillance platforms like the U-2, Predator, and satellites. In the next

section we'll look forward at these emerging trends, and then examine the effects of the next round of BRAC.

So What's Different Now?

The following trends have emerged during the 1990s and, while it is always risky to extrapolate into the future, these trends provide a roadmap to see what's ahead.

• **The emergence of Network Centric Warfare.** This idea started in the Navy with Admiral Jerry Tuttle's Copernicus concept, followed by Admiral Art Cebrowski's 1998 article published by the Institute of Naval Proceedings that coined the term Network Centric Warfare (NCW). Simply put, this concept says that you can defeat your enemy using much less manpower and equipment (platforms and weapons) if you have far superior intelligence about your enemy's location, size and intentions of force. This superior intelligence comes from using better surveillance vehicles, sensors and data links to network information about the battle space into a clear comprehensive operational picture. This breaks the old Lanchester's laws about predicting the outcome of a battle based on the size and firepower of the opposing forces.

Admiral Archie Clements, when he was Commander of the Third Fleet, began to put NCW into practice with his Information Technology – 21st Century (IT-21) program. NCW's latest manifestation is titled FORCEnet; this program is being led by Admiral Mayo in OpNav N6, and Admiral Ken Slaght, Commander of the Naval Space and Warfare Systems Command (SPAWAR) and Chief Command, Control, Communications, Computers and Intelligence (C4I) Architect of the Navy.

• Since **interoperability** among the Military Services is key to successful NCW, it has been made the #1 priority of the newly established Naval Systems Commanders Council. When the author of this paper recently visited the Offices of the OSD Central Test and Evaluation Improvement Program (CTEIP), it became apparent that the issue of "testing for interoperability" is at the top of their agenda. The importance of interoperability is currently so pervasive that it is being raised to the top of all new systems' requirements list. The development, testing, training, and integration of **data Links are becoming more important than platforms and weapons.**

• The use of **experimental events** involving large numbers of operational forces engaged in exercises has become a new way to develop technologies for DoD. Experimentation in this context, encompassing elements of RDT&E, training, and operational use, squeezes all necessary steps into a time frame measured in weeks instead of years. This started in the mid-1990s with events like Roving Sands in New Mexico. It has progressed in the Navy with a whole series of Fleet Battle Experiments, and recently reached an enormous scale involving tens of thousands of troops in a massive joint service exercise called Millennium Challenge 2002 (MC02). This process of large scale test and training events called "**experiments**" has been formally designated as "SEA TRIAL" under the current

CNO, Admiral Clark. Commander of Fleet Forces Command in Norfolk, VA, Admiral Natter, is designated to lead this effort for the Navy.

A driving force behind this new way of doing business is the speed at which information technology (IT) changes, and IT is at the heart of NCW. Because new information technologies become obsolete every 18 months, it is impossible to use the old DoD Instruction 5000 series of steps that took 5 to 12 years to go from concept to fleet introduction.

Once developed, the production of software is quick and virtually free, the essential element of introducing a new IT system into service use is the acceptance by the operational user, and the integration into other systems. Therefore, the Acquisition process of important technologies has undergone a profound transformation within DoD.

• **The intrusion of operational forces into the RDT&E process – i.e., the actual end user becomes part of the RDT&E process.** Since the "war fighter" is the actual ultimate user of a new technology, it imperative to determine early in the acquisition cycle that the new system is acceptable to the war fighter. Integrating the "War Fighter as End User" into the RDT&E process is also necessary to introduce and test the new information technologies that enhance "interoperability", thus expanding the necessity of Joint Service "**Experiments**".

Also, since the commercial marketplace is producing advanced and readily usable IT systems, military operational commanders can simply buy what they need from commercial vendors rather than go through a DoD Acquisition Organization such as a systems command or government laboratory.

The chain of command for the major claimancy of both the Point Mugu and China Lake bases will soon be under a fleet infrastructure command rather than an acquisition systems command.

• **The scale of experiments has grown beyond the boundaries of any single range.** Satellites, unmanned air vehicles (UAVs), and surveillance aircraft operate hundreds of miles from the target area; therefore, to test NCW systems that involve these items, it is necessary to network several ranges to fully exercise the capabilities of the various sensors and data links. MC02 was an example of this networking of large complexes of ranges.

• **Expanding the range's traditional roles.** The workload at the China Lake Land Range and the Point Mugu Sea Range has recently increased significantly. This is due in part to the demands of NCW, and also to range management's foresight to invest in infrastructure for networking the China Lake, Point Mugu, Edwards Air Force Base and other ranges in the Southwest Defense Complex. The training and experimentation events have added significantly to the T&E mission of these ranges.

• **The use of UAVs and Unmanned Combat Air vehicles (UCAVs) is rapidly growing.** The use of unmanned vehicles saves pilot lives and permits greater performance. Greater performance is possible because the restrictions due to human limitations on-board an aircraft have been removed. Ordnance delivery from Predators has already occurred in the Middle East. Approximately half of the flight tests at Edwards AFB now involve UAVs. The opportunity here is that the mission systems of UAVs need the same care and feeding as manned aircraft. The superb systems engineering processes developed at WD for operational flight programs provide solid credibility for the UAV WSSAs to reside at WD. The next time the WSSA contract is re-awarded its scope should include UAVs and UCAVs.

• **Open systems computer software is becoming pervasive.** Previous tactical aircraft operational flight programs used assembly languages to program their functions. The computing power of the next generation of mission computers will enable use of higher order languages, such as C++.

The use of object-oriented programming and open architecture has been demonstrated in the operational flight program of the AV-8, and is expected to be the foundation for the F/A-18 Operational Flight Program (OFP) in the near future. This enables certification of changes to an OFP without the massive regression testing previously required.

All of the DoD ranges are being networked using an open architecture system called TENA (Test and Training Enabling Architecture) to permit reconfiguration of combinations of ranges for tailored large scale events involving both simulations and live flights in a matter of hours instead of weeks.

The next generation of test range instrumentation for all the military services will require commercial standards for items such as the bus interfaces so that the vehicle instrumentation can be easily reconfigured to meet each unique test requirement--so called "plug and play"--rather than rewiring the instrumentation pod.

These are examples of the power of open architecture systems which will be the foundation of much of the development of future military systems.

• **Desert Storm dramatically highlighted the need for high-speed strike to counter SCUDs.** This was the one area where the Coalition forces did not achieve great success. The Iraqi forces were able to keep launching SCUD missiles throughout the war, and our forces could not quickly find and destroy them before they were able to set up, launch, disassemble and hide again. The time to find and hit these targets must be greatly shortened, which means much better sensors and data links and much faster (hypersonic) missiles.

• **The use of modeling and simulation (M&S) is pervasive in all aspects of DoD system acquisition,** including R&D, testing, training, and experimentation. Cheap, available, high-speed computers can accurately replicate actual live flight performance in many cases. We can test thousands of data points of a flight vehicle's operational envelope for a fraction of the cost of a single live flight test ... and do it with fidelity that satisfies even the independent operational test community. Of course live firings will still be required, but in smaller numbers to validate the simulations and establish system reliability and serviceability. M&S is so much faster, more flexible, and cheaper than live flight testing, that it greatly shortens the acquisition cycle -- even for complex systems. "Simulation based acquisition" is the new term. For NCW this is important because the costs of getting a large number of surveillance and strike aircraft in the air at one time to perform a coordinated event involving interoperability is almost prohibitive.

An illustrative example of this simulation phenomenon is the use of Distributed Mission Trainers (DMTs) in the flight training community. The Air Force installed four F-15 DMTs at the Air Combat Command in Langley and four at Nellis a couple of years ago. The Navy installed a four seat suite of EP-3 mission Avionics System Trainers (MAST) at Fallon a couple of years ago; this enabled the EP-3 crews to train with the Naval Air Wings as they went through their preparation for going to Sea with a Battle Group. Since there was no way an EP-3 aircraft would ever be available to fly with the Air Wings as they went through Fallon, this was the only practical way to bring the EP-3 community into the battle group before going to sea.

The Navy recently awarded a major contract for development of F/A-18 DMTs; four at Oceana, and an option for four more at Lemoore. Once DMTs are developed for several platform types, they can be networked using High Level Architecture (HLA) to simulate a complex mix of aircraft flying together on a mission at a fraction of the cost of a live flight exercise. The real advantages are the ease and low cost of high quality pilot training, and improving interoperability with other aircraft as an important element of their training syllabus. The aircrews go through the same mission rehearsal, "simulated" flight, and playback experience as they now do with live flight training but at much lower cost and greater availability. They can be mixed with live flights to expand the scope of the event. This is clearly a megatrend that will expand beyond the boundaries of the training community.

• **The use of spiral development is becoming more common.** The idea behind spiral development is that all of the requirements of a new system do not need to be satisfied within the first iteration of development. New technology gets into the hands of the operational forces sooner. This was recently demonstrated by Global Hawk to enable its use in Afghanistan. Spiral development is now being specified in numerous DoD Requests for Proposals (RFPs). Subsequent spirals keep adding more capability until the full potential of a new system is realized.

• **The R&D and production support of weapons has declined.** The accuracy of precision guided missiles negates the need for large quantities to be used during combat. Production numbers of missiles has declined. Dual sourcing and producing to a Government-owned data package has almost disappeared. The production of guided missiles is now largely located at Raytheon in Tucson where about 80% of the conventional missiles are built. This geographic concentration of the nation's conventional weapons manufacturing capability has some ominous implications for our National Security because of terrorist attacks. Perhaps there is a role for WD to provide backup to this overly concentrated industrial base.

• **The concept of "Acquisition Reform" has taken hold.** The Government is now writing major acquisition contracts for systems (like the Joint Strike fighter) where the prime contractor is responsible to a performance specification and will unilaterally decide how to deliver that system to DoD. The implications are that the role of government facilities like WSSAs for manned aircraft and weapons is in question. The main role that WD has traditionally performed on systems integration of weapons and avionics with the air platform is at risk. The F/A-18 WSSA is probably secure for the next decade or two; but the opportunity to bring more WSSAs, like the JSF to WD, may be in doubt unless the Marine Corps were to replace the AV-8B WSSA with the JSF Vertical Take-Off and Landing (VTOL) WSSA. However, there may be a potential for WSSA growth in newly emerging platforms such as UAVs and UCAVs as they become more frequently used for weapons delivery and surveillance.

• **Consolidation of business support functions has greatly reduced manpower at field stations.** The regionalization of HR and Finance and the use of productivity-enhancing tools like Enterprise Resource Planning has created major downsizing in the field station administrative support workforce. The number of administrative people may continue to decline as business productivity-enhancing tools get more efficient.

What about BRAC 2005?

Although the BRAC process evokes an immediate concern about the risk of closure or major realignment (downsizing), BRAC also provides an opportunity to grow, either by expansion of the current missions, or by the addition of new missions to NAWCWD. If properly prepared, the opportunity for growth will outweigh the risks.

We know that the basic ground rules for BRAC 2005 will remain the same: close bases with low military value and consolidate functions at those bases with the highest military value.

Military value consists of several pieces. First are the physical assets of the base: the land, air and sea space, runways, hangars, piers, laboratory and office space, availability of power and water, etc. Second are the community aspects supporting the base. Is the local community willing and able to accommodate more missions or is it encroached by urban growth? Does it have the affordable housing, medical, educational, recreational facilities, and infrastructure to support more people? Third are the environmental factors such as clean air. Finally, there are the human resources at the base. This includes the military, civilian, and support contractor workforce at the base. The initial data calls in previous BRACs asked for detailed information about the number of military, civilian, and System Engineering Technical Assistance (SETA) contractors at each base and their experience, educational levels, numbers of scientific papers and patents, and their awards received. In the previous four rounds of BRAC both China Lake and Point Mugu enjoyed the advantages of marvelous physical facilities and broad mission capabilities, strong community support, low encroachment, and excellent human resources. The result was that China Lake and Point Mugu were rated No. 1 and No. 2 in Military Value amongst over 70 Technical Centers in the Navy during BRAC 95.

Let's look at the specifics of what happened in previous BRAC rounds. WD did not lose any missions. It gained from the closure of the Naval Weapons Evaluation Facility in Albuquerque which was moved to China Lake, and the realignment of the EP-3 Special Missions Support Facility from Naval Avionics Facility in Indianapolis to China Lake. (There were also a few billets administratively transferred to WD from the targets group at Naval Air Development Center in Warminster although no people ever actually relocated in these cases).

In BRAC 95 nearly all of the fifty Data Calls generated by the BRAC commission involved adding to the mission capability of WD. These included scenarios involving closure of the Naval Surface Warfare Center, Indian Head and moving all the Energetics work to China Lake; closure of the Naval Warfare Analysis Center in Corona, California and moving its functions to China Lake, Point Mugu and North Island Naval Air Station; realignment of some rocket propulsion work from the Phillips Lab at Edwards AFB to

China Lake; consolidation of weapons development work from Redstone Arsenal and Eglin AFB to WD; and numerous Data Calls involving movement of various operational squadrons from places as far away as New Brunswick to WD. In the end many of these Data Calls were deemed uneconomical, or in several cases, last minute political maneuvering got the scenario taken off the BRAC list.

Only two significant data calls involved reductions to WD. The first of these was one originated by the General Accounting Office (GAO) to close Point Mugu. It resulted in the highest levels of the Navy uniting in their support of Point Mugu, so it was taken off the BRAC list. The other was a data call originated by OSD to examine consolidation of weapons development from WD to Eglin. It was accompanied by another "mirror image" Data Call to consolidate weapons development from Eglin to WD. No action resulted from either of these two data calls. In fact, in all the previous rounds of BRAC, almost all of the closures and realignments occurred within the military services. There was an attempt to force cross service consolidations in BRAC 95, which was advertised as "the mother of all BRACs" by OSD, but in the end only a very few actions involved cross service realignments.

However, for BRAC 2005, it appears that Defense Secretary Rumsfeld is far more personally engaged in transformation of the Military than was Secretary Deutch in 1995, so we can expect much more focus on cross service consolidations. In fact "The impact on joint warfighting, training, and readiness" has been included in the list of military value factors by the Defense Authorization Act guidance. Furthermore, Secretary of Defense Guidance states, "The primary objective of BRAC 2005, in addition to realigning our base structure to meet our post-Cold War force structure, is to examine and implement opportunities for greater joint activity."

It is clear from the above recap that there is <u>far more opportunity to grow</u> as a result of BRAC than there is risk of closure. The irreplaceable land and air space at China Lake, and the Sea Range at Point Mugu are very likely to be preserved for flight testing and training. What could be at risk is the R&D mission, although you don't need a BRAC to reduce the scope of R&D at WD; it shrank in half over the past decade without a BRAC downsizing. Some of this is due to the fact that there is less overall need for development of missiles in the Post Cold War environment, and some is due to the view in Washington that research is better done in universities and development and production of missiles is better done by Industry than Government Laboratories.

The bottom line as we look at the <u>upcoming BRAC</u>, is that on balance it would appear to provide an <u>historical golden opportunity for WD to grow</u> in terms of its current mission as well as to accommodate more missions to broaden its Military Value. The key is to posture China Lake and Point Mugu to be in a position to accept more missions.

Where Does WD Go from Here and What Are the New Missions?

For WD to grow, it must broaden its mission beyond the traditional roles of weapons development, manned aircraft WSSAs, EW, and range use for primarily weapons T&E.

WD must exploit its inherent advantage of being at the locus of the best networked collection of military test and training ranges in the world. In this Southwest Defense Complex, aircraft and missiles can fly un-encroached and interconnect with land and sea platforms. More joint operations involving neighboring ranges such as Edwards, Fallon, Fort Irwin, Nellis, etc., are apt to increase significantly. The focus of testing, training and experiments will be on interoperability versus only missile or platform performance.

A greater scale of events, whether live flight or simulated, will be necessary to examine NCW system performance where the targeting is enabled by surveillance assets hundreds of miles from the target and strike platform.
An even stronger link to Edwards Air Force Base, Nellis Air Force Base, Fort Irwin, Utah Test and Training Range, White Sands Missile Range, Fort Huachuca, Pacific Missile Range Facility, Camp Pendleton, Twentynine Palms, Yuma Army Missile Proving Grounds, Barry M. Goldwater Range, Fallon Naval Air Station, and the Third fleet operating off Southern California will strengthen the capability to do large scale events in the Southwest.

The future scope of R&D must broaden to include more computer networking and software interfaces for the operational war fighter. Classical weapons development must morph into more mission planning, using tools such as the Precision Targeting Workstation and the Joint Fires Network. Using open architecture software and hardware will greatly reduce the time from concept to employment. The ability to easily and quickly reconfigure and upgrade networks, i.e., "plug and play", is critical to future military operations.

The basic result is that the **type** of work will be different -- it will involve a much closer working relationship with the fleet. The "Sea Trial" process outlined by the Chief of Naval Operations demands that scientists and engineers take their new products to sea. This enables them to evaluate their effectiveness, acceptance, and interoperability with other systems. WD must exploit its advantage of having a close relationship with fleet, as well as other Service operators, and have a workforce that is willing to travel and spend time aboard ship or at ranges engaged in operations.

Future WD work will emphasize data links. Data links are the raw material of NCW. New waveforms will pack more information into narrower slices of the increasingly scarce electromagnetic spectrum. WD could see an expanded role in C4ISR if the

Weapons component of NCW needs a home, i.e., the COMBAT piece of NCW. Perhaps a more formal relationship could evolve with SPAWAR whereby WD could become the test range for C4ISR.

Future work will depend more heavily on the Global Positioning System (GPS). Increased precision by new algorithms will enable accuracies down to 30 cm in a dynamic jet fighter environment. The use of GPS has created a major breakthrough in missile technology -- the accuracy is no longer a function of range to target, hence, future systems will have high precision regardless of range.

Modeling and simulation use will increase and be integrated into live flight testing, training, and experimentation. These simulations will be interconnected across wide geographic sites using High Level Architecture standards to enable joint Service events. There will be more emphasis on development of credible "virtual" threats as opposed to hardware threat simulators. WD could expand its role in connecting live flying to modeling and simulation. This could involve R&D, Testing, Training, and Experimentation.

More UAVs and UCAVs -- perhaps in conjunction with the Naval Air Station Fallon, which is currently embarked on a multi-year program to develop the tactics for use of organic Naval UAVS and UCAVs in the Fleet. WD's proximity to Fallon and superior instrumentation, as well as its links to Ft. Irwin, Edwards and Nellis, are natural extensions of their mission.

WD may be an ideal location for the Joint National Training Center because it is located between Ft. Irwin, Nellis Air Force Base, Camp Pendleton, Twentynine Palms and Fallon Naval Air Station-- the Service Training Centers.

It may be possible to base the fleet Replacement Squadron of JSF, or an Operational wing of Navy JSFs, at China Lake.

WD could see an expanded role in energetic materials, warheads and propulsion.

BRAC 2005 could consolidate all air weapons development and testing at WD, and all fixed-wing aircraft testing at Edwards Air Force Base if DoD carries out the recommendations of the draft copy of the Year 2000 Defense Science Board Report by Heebner, Krings, Christie, et. al,.

In order for WD to be prepared for these new missions, it must address military value. The next section does this.

What Can WD Do to Prepare for These Opportunities for Growth?

PHYSICAL ASSETS TO SHOW MISSION CAPABILITY. The first thing is to posture the physical assets to show that WD is capable of absorbing more missions. Obtaining MILCONs for facilities such as the new Propellants and Explosives Laboratory, the hot refueling pits for either JSF or F/A-18, and hangars for UAVs are very important; as well as the more subtle things such as expanding the geothermal power capability. In BRAC 95 WD had an important asset which has declined lately, its excess buildings. Numerous data calls required WD to identify the costs of providing lab and office space to accept new missions. Since WD had several million square feet of excess space available at that time, it was possible to show that these new missions could be fit into existing buildings with only minor modification costs, as opposed to major new construction via MILCON. This made the cost analysis for moving new functions to WD come out very favorably. Unfortunately, much of this excess space has been torn down over the past few years.

The important data to have on-hand is the utilization rate of current facilities. For example, in BRAC 95 we were able to show that our missile simulation labs were only being partially utilized, so we could accommodate the same type of work from either Eglin Air Force Base or Redstone Arsenal without moving their CARCO tables to WD. Another important capability is for the Public Works Department to have a data base of all the Class 2 property (buildings) so they can quickly respond to data calls of all kinds to modify the existing space into new configurations.

Another important asset is the degree of current range utilization versus the historical use. In BRAC 95 we were able to show that in the late 1980s China Lake performed over 70,000 sorties in our airspace over a one year time span. In the late 1990s China Lake was only doing slightly over 50,000 sorties per year and therefore had sufficient range airspace capacity to accept more aircraft in the R2508 restricted airspace. One of the things that the Range Department should do is prepare a contingency plan to accommodate more missions such as training or an operational squadron, by folding it into our current T&E mission, or perhaps add another shift.

COMMUNITY IMPACT. In BRAC 95 certified letters were obtained from community groups such as the Ridgecrest Board of Realtors and the IWV Water District to provide evidence that the local community had the capacity to accommodate an influx of personnel. In terms of defense against base closure, certified documents were obtained from city officials showing the economic impact if China Lake were to be closed. It showed that DoD would incur a cost of something like a billion dollars to buy all the homes in Ridgecrest which would no longer be valued at anywhere near their current market value if the only major industry was moved out of the community.

It was necessary to coordinate community impact issues with city and county governments, school districts, medical facilities, utility companies, law enforcement agencies (to obtain data on crime rates), etc. The more of this which can be done ahead of time, before the data calls arrive, the easier it will be to respond accurately, in a timely manner to the data calls on the various scenarios.

ENVIRONMENTAL IMPACT. The base and community support organizations such as IWV 2000 have done an excellent job of getting ahead of environmental issues such as getting the proper clean air designation for ozone and PM-10 established with the Environmental Protection Agency (EPA) and the California Air Quality District, and preparing a new Environmental Impact Statement (EIS) which prepares the base for an increase in missions such as aircraft sorties, and land vehicle testing on Airport Lake.

HUMAN RESOURCES. The other major assets which must be postured to allow WD to grow are its human resources. The military billets will always be a scarce resource, but perhaps some gains can be made as the nature of WD's work edges closer to the operational forces via the "experimentation" process. The progress made recently in recruiting new civil service employees is certainly essential to revitalizing the in-house workforce.

However, there may be an important third leg to this stool that is being overlooked. That is the support contractor workforce. The SETA contractors were definitely an important element in the previous BRAC scenarios. The BRAC cost model allowed for relocation for the Government employees, but made no provisions for moving contractors. Therefore, a base with a robust support contractor structure in place is in an advantageous position to accept new missions under BRAC. One thing that WD can do, which doesn't even cost any money, is to examine the scope and ceiling of each of its support contracts which are up for renewal between now and BRAC 2005, and make contingency plans to accept the kinds of new work which is described above.

Let's look at the current workforce breakdown at WD. As of August 2002 the China Lake site had 3048 civilian, 358 military (not including approximately 700 from tenant commands such as VX-9), and 1304 contractors for a total of 4710 personnel. At the Point Mugu site there were 1695 civil servants, 122 military, and 280 contractors, a total of 2197 personnel (not including the other major tenants at Naval Base Ventura County such as the Naval Surface Warfare Center, Port Hueneme; the SeaBee Battalion; the Naval Space Command; the E-2C Wing, etc. Contractors represent about a quarter of the workforce. Their role is to supplement base manpower and provide capabilities that the base does not have or need as part of its core competency.

There are three features of the support contractor structure that give the base a significant degree of flexibility to grow and accommodate new missions.

First is the composition of the current support contractor workforce (size, education, experience, unique skills and availability in proximity to the base, as well as the flexibility in terms of scope and ceiling of the contracts to allow for emerging types of work). This contractor workforce sometimes provides a valuable pool for hiring proven employees into government service, as billets become available on the base.

Second is their "reach back" capability from other parts of their parent corporations to bring new skills and talent to support emerging base requirements for new technologies. This can only be realized if the base awards its support contracts to companies which have substantial corporate capabilities that are relevant to the cutting edge technologies needed for future base missions.

Finally, the support contractors provide the base the capability to access the very substantial latent workforce represented by base retirees who still have a desire to work, either part or full time. For WD this represents a buffer talent pool of several thousand very experienced individuals, some of whom are recognized National experts in their fields of weapons RDT&E.

The WD support contractors provide approximately one quarter of the workforce, they are an integral part of the WD community, and in some cases provide unique capabilities. Several contracts will come up for re-award before 2005, therefore the scopes and ceilings of these contracts should be re-examined for expansion in order to accommodate the new technologies described earlier in this paper, and the new missions which could be moved to WD as a result of BRAC 2005.

For WD to optimize its chances for growth and viability far into the future, it is important to look forward, see the big picture, and configure itself to fully cover the emerging mission needs. Doing so is a prudent step in posturing WD to grow and remain relevant to the changing demands of DoD.