



# BRAC Commission Staff visit to China Lake, CA

10-11 July 2005



**PROGRAM  
FOR**

**BRAC COMMISSION STAFF**

**10-11 JULY 2005**

**NAVAL AIR WEAPONS STATION HOST:**

**CAPTAIN MARK STORCH, USN**

COMMANDING OFFICER

NAVAL AIR WEAPONS STATION

CHINA LAKE, CALIFORNIA

AND

**NAVAIR WEAPONS DIVISION HOST:**

**REAR ADMIRAL MARK SKINNER, USN**

COMMANDER

NAVAL AIR WARFARE CENTER WEAPONS DIVISION (NAWCWD)

**SUNDAY, 10 JULY**

1330 CONVENE IN LOBBY OF HERITAGE INN HOTEL MET BY:

CAPTAIN MARK STORCH, USN

MR. BRAD HARLOW

DEPUTY, RESEARCH AND ENGINEERING

MS. DORIS SORENSEN

LEAD, DISTINGUISHED VISITORS PLANNING AND RESOURCE OFFICE

CORPORATE OPERATIONS

PROCEED TO NAVAL AIR WEAPONS STATION, MICHELSON LABORATORY

1345 CONVENE IN MANAGEMENT CENTER

WELCOME AND INTRODUCTIONS

REAR ADMIRAL MARK SKINNER, USN

CAPTAIN MARK STORCH, USN

1400 NAVAL AIR WEAPONS STATION (NAWS) OVERVIEW

CAPTAIN MARK STORCH, USN

1415 NAVAL AIR WARFARE CENTER WEAPONS DIVISION (NAWCWD) OVERVIEW

MR. SCOTT O'NEIL  
ACTING EXECUTIVE DIRECTOR  
NAVAL AIR WARFARE CENTER WEAPONS DIVISION (NAWCWD)

1500 WALK THROUGH WEAPONS AND RESEARCH DISPLAYS IN LOBBY

1525 PROCEED TO INTEGRATED BATTLESPACE ARENA (IBAR)

1530 CONVENE IN IBAR MAIN ENTRANCE. MET BY:

MR. BILL HARRIS  
DIRECTOR, INTEGRATED BATTLESPACE ARENA  
WEAPONS SYSTEMS ENGINEERING DIVISION  
WEAPONS AND ENERGETICS DEPARTMENT  
RESEARCH AND ENGINEERING

1545 PROCEED TO PRECISION ENGAGEMENT CENTER (PEC)

1550 CONVENE IN PRECISION ENGAGEMENT CENTER. MET BY:

MR. DANNY SEARLE  
DEPUTY, WEAPONS ENGAGEMENT OFFICE  
WEAPONS AND ENERGETICS DEPARTMENT  
RESEARCH AND ENGINEERING

1620 PROCEED TO ADVANCED WEAPONS LABORATORY (AWL)

1635 CONVENE IN AWL CONFERENCE ROOM 106. MET BY:

MR. BARRY DOUGLAS  
F/A-18 IPT LEADER, ADVANCED WEAPONS LABORATORY  
SYSTEMS ENGINEERING DIVISION  
SYSTEMS ENGINEERING DEPARTMENT  
RESEARCH AND ENGINEERING

1715 DAY ONE WRAP-UP

**MONDAY, 11 JULY**

0715 CONVENE IN LOBBY OF HERITAGE INN. MET BY:

CAPTAIN MARK STORCH, USN

MR. BRAD HARLOW

MS. DORIS SORENSEN

PROCEED TO NAVAL AIR WEAPONS STATION, MICHELSON LABORATORY

0730 CONVENE IN MANAGEMENT CENTER

EW CAPABILITIES

MR. MALLORY BOYD  
HEAD, INFORMATION WARFARE SYSTEMS DIVISION  
AVIONICS DEPARTMENT  
RESEARCH AND ENGINEERING

0830 BRAC FACILITIES PLANS

CAPTAIN MARK STORCH, USN

0930 WATER RESOURCES

MR. MIKE STONER

1015 PERSONNEL HIRING AND RETENTION

MS. NANCY CRAWFORD

1045 PROCEED TO CITY OF RIDGECREST

INVITED GUESTS OF COMMISSION STAFF

MS. SHELBY HAGENAUER (CONGRESSMAN THOMAS REPRESENTATIVE)

MR. JON MCQUISTION (COUNTY SUPERVISOR)

MR. CHIP HOLLOWAY (CITY MAYOR)

MR. VINCEN FONG (CONGRESSMAN THOMAS REPRESENTATIVE)

MR. RUSSELL JOHNSON (STATE ASSEMBLYMAN REPRESENTATIVE)



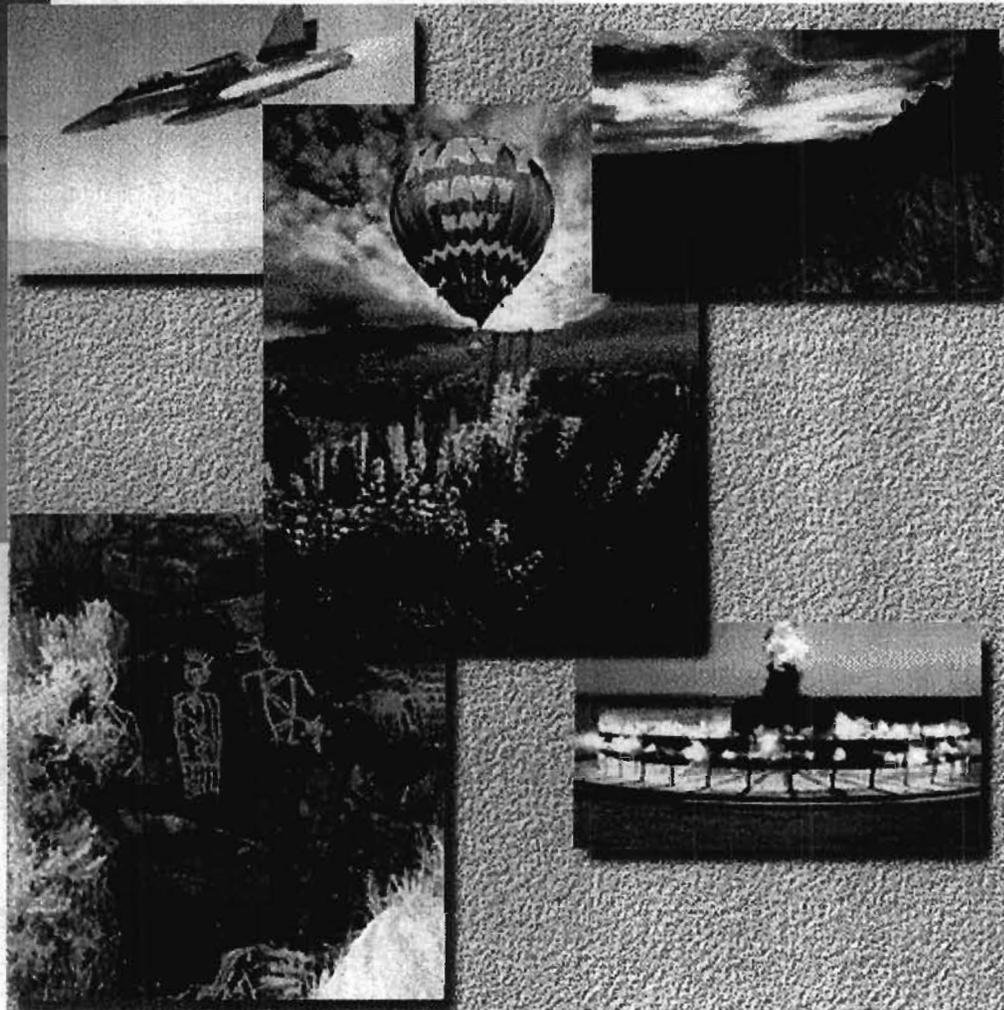
EVERY



July 2005



# **NAWS China Lake Overview for the BRAC Commission**



**Captain Mark Storch  
Commanding Officer**

# China Lake Mission

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- Support NAVAIR Weapons Division and other tenants:
  - Safety and Security
  - Base Operating Services/Public Works
  - Safe Airfield Operations
  - Weapons support (magazines and handling)
  - Environmental Planning and Execution
  - Morale, Welfare, Recreation services

# China Lake Vital Statistics

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**Land Area** 1,110,272 acres (1735 sq miles)

(less than 5% disturbed!) (34% of Navy's land)

**Restricted airspace** R-2508 = 19,600 sq miles

(Barstow to Bishop, Nevada to San Joaquin Valley)

**Buildings/Structures** 2,326

**Square Footage** 5,019,659 sq. ft

**Roads** 386 miles, paved

333 miles, unpaved

**Airfields** 1 (3 runways), (+1 expeditionary)

**Runways** 26,773 lineal ft

**Taxiways** 20,541 lineal ft

# Perspective on Size

■ 1,110,272 Acres



# China Lake facts

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- Started as a place to test air-to-ground rockets (Cal-Tech contract with Navy)
- Part of Manhattan Project in WWII
- One endangered (fish) and two threatened (tortoise and bird) species
- Maximum demonstrated NEW – 500K Lbs
- More civilians than military (6:1)
- 7 Federally recognized tribes
- No encroachment

# China Lake facts

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- Geothermal Power Plant (270MW)
- Subject to START and Chemical Weapons Convention Treaty inspections
- Supersonic Research Track (B-Busters)
- “MRI” facility for Trident boosters
- Dozens of National Register of Historic Places sites and districts
- Coso Rock Art National Historic Landmark

# NAWS China Lake Tenants

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Navair Weapons Division  
Airtevron Three One, VX-31 (Navair)  
Airtevron Nine, VX-9 (Optevfor)  
Public Works Det / ROICC  
Branch Health Clinic  
NCIS  
Defense Printing Service, Det  
Marine Aviation Detachment  
DRMO  
Defense Investigative Service  
Defense Commissary Agency (#1 Small Store in Conus)  
Navy Exchange  
Personnel Support Activity Detachment  
0176 & 0276 Reserve Units  
EOD Mobile Unit Three Detachment China Lake  
EOD Training and Evaluation Unit One Detachment  
SEABEE Well Drilling School  
SEABEE Quarry Blasting School

# NAWS China Lake

## Air Operations

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Past Calendar Year:  
22,446 sorties:

USN/USMC	Other Military	Air Carrier	General Aviation
20,839	1,190	144	273

Emergency Responses: 62

Field Arrestments: 16

# NAWS China Lake

## Air Operations

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Current and Recent Detachments and Aircraft:

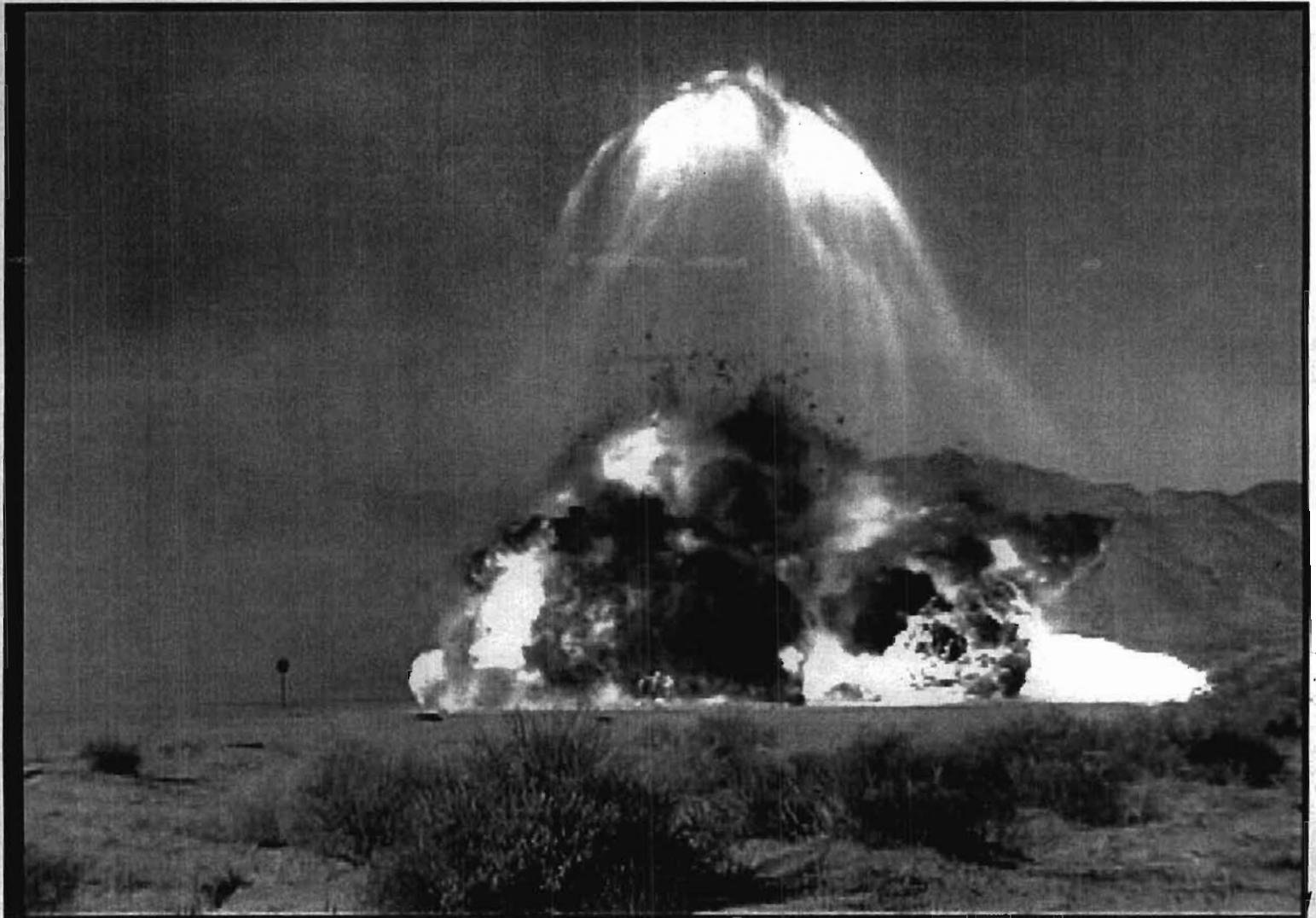
- MH-47/60
- DC-9
- Top-Gun
- HMM-163
- Australian & Canadian F-18
- V-22 (USMC and USAF)
- British Tornados
- British AV-8s
- Typhoon (Eurofighter)
- Italians
- C-130

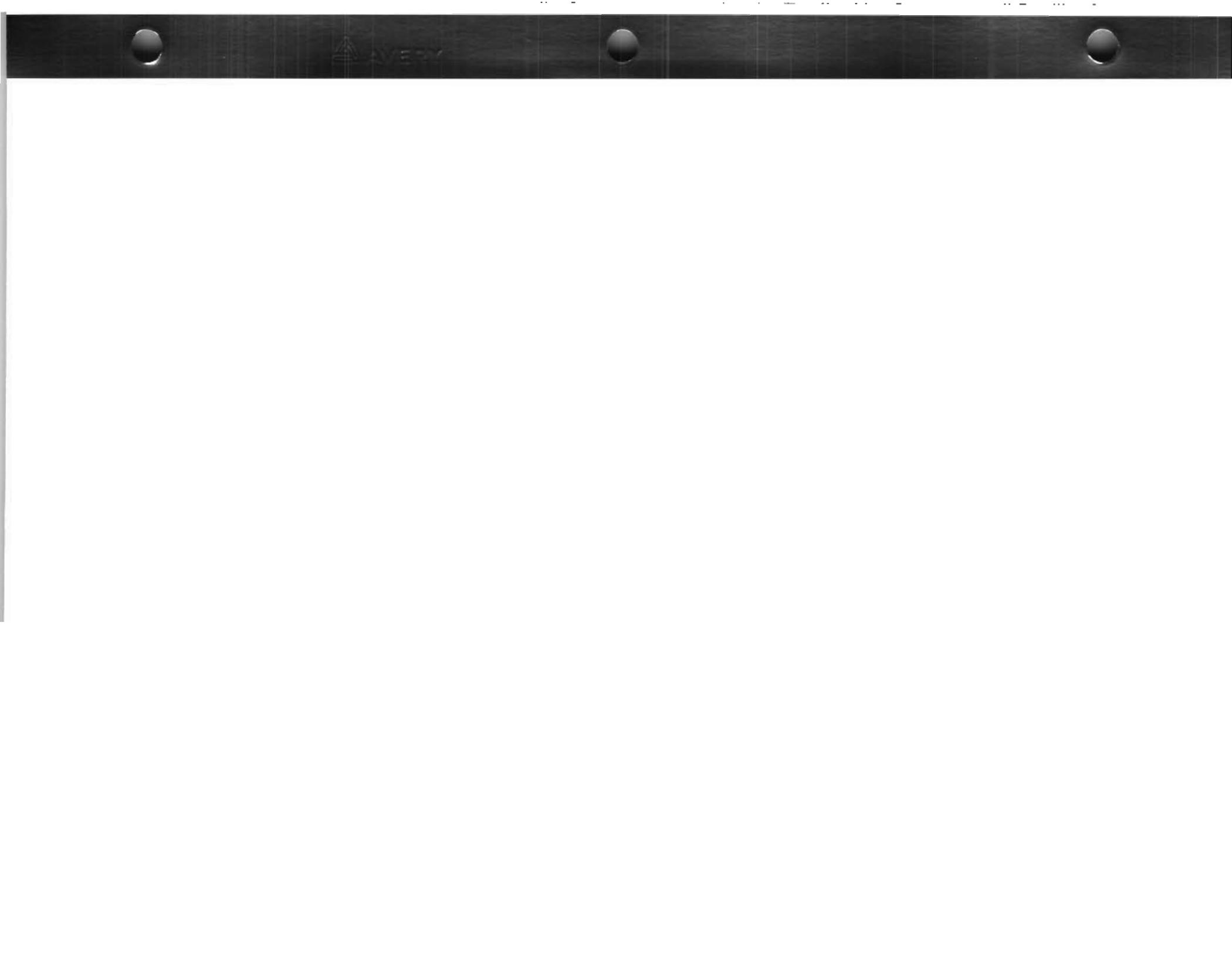
# BRAC Realignment at CL

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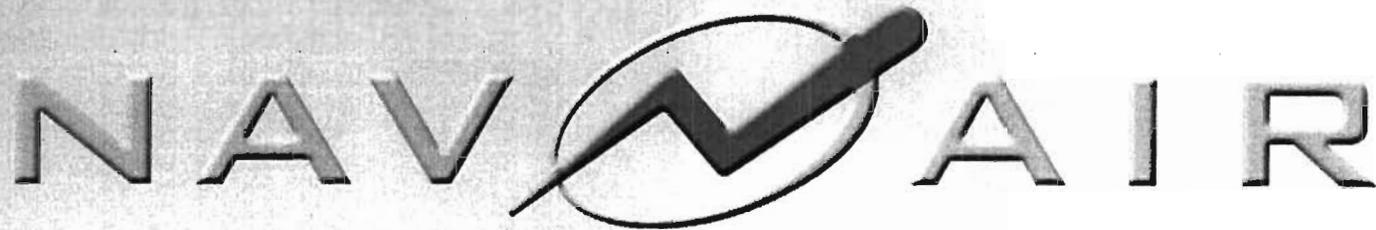
- Transfer in. Consolidate seven different sites at China Lake for “Weapons and Armament” RDAT&E
- Transfer in. Sensors, EW and Electronics RDAT&E
- Transfer in. USAF Fixed Wing Live Fire testing
- Transfer out “Guns and Ammunition” RDAT&E to Picatinny Arsenal
- Transfer out Aircraft Intermediate Maintenance Activity to Lemoore (consolidation)

# Questions?





Unclassified



***Naval Air Warfare Center Weapons Division  
Overview***

Unclassified

# Naval Air Systems Command

## Weapons Division

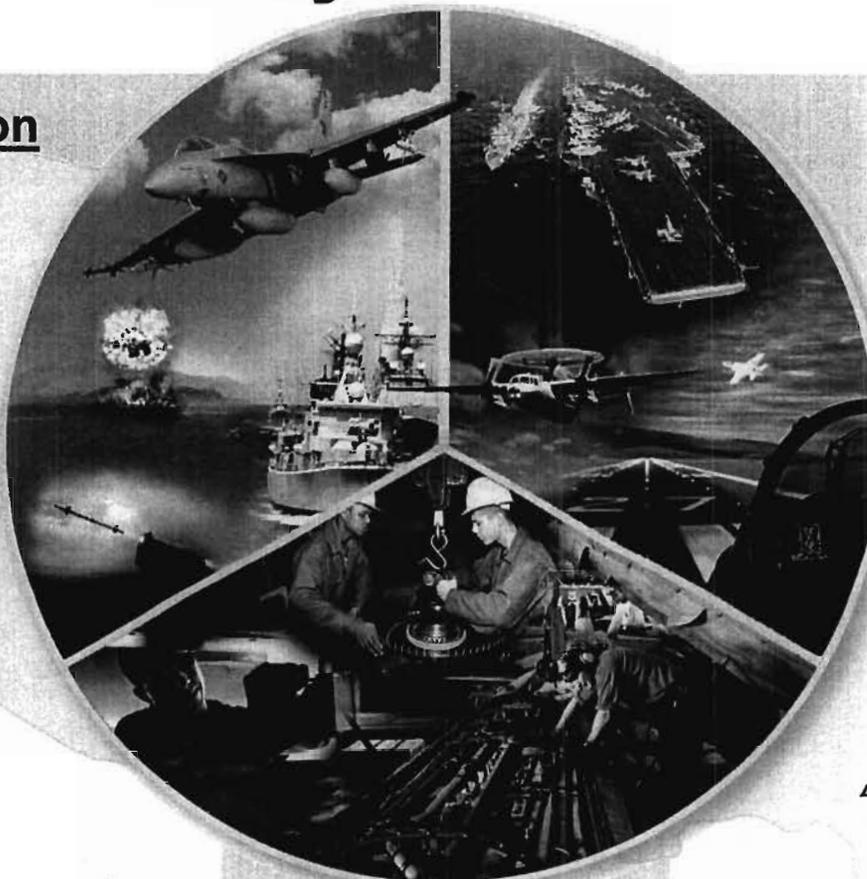
China Lake  
Point Mugu

## Aircraft Division

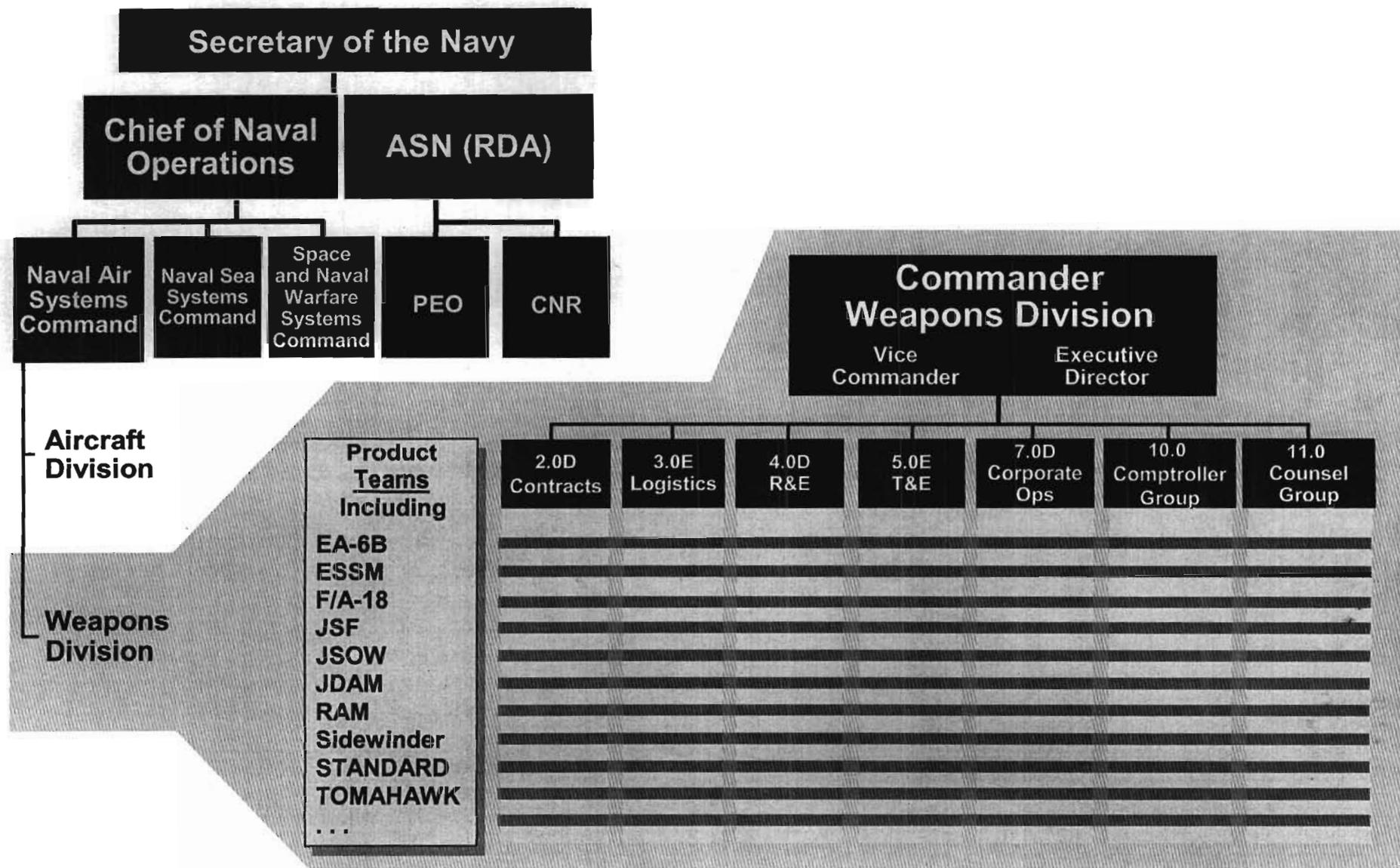
Lakehurst  
Patuxent River  
Orlando

## Depots

Cherry Point  
Jacksonville  
North Island



# An Integrated Organization



# The Weapons Division Workforce

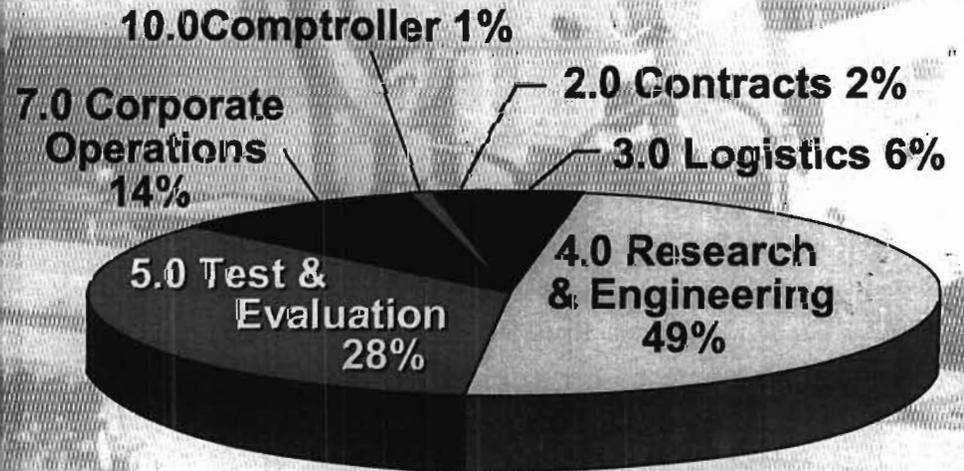
	China Lake	Point Mugu	Totals
*Full-time Civilians	2,589	1,509	4,098
Military Onboard	307	239	546
Contract Support	1,245	173	1,418
<b>WD Total</b>	<b>4,141</b>	<b>1,921</b>	<b>6,062</b>
Other Navy Onboard			939

**Workforce Total 7,001**

## 2004 Summary

WD Payroll- \$260-million  
 Other Navy Payroll- \$63-million  
 Contracts Valued at \$476-million  
 Average Age 47 years  
 Average Salary \$80,347

## Workforce Distribution



# Weapons Division Full-Spectrum RDT&E

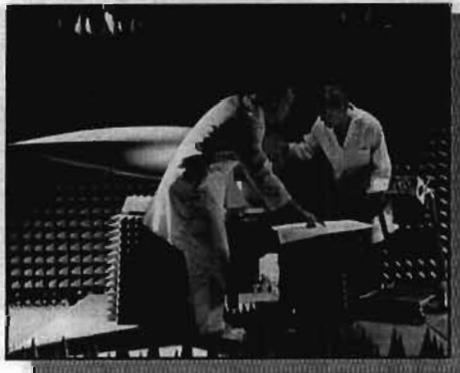
**Our Mission** is to provide effective, affordable, integrated, interoperable warfare systems to the warfighter, and to support those systems for life.

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## Our Foundation

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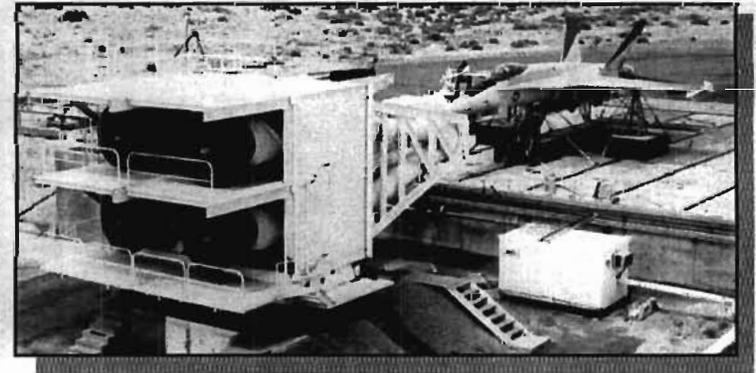
**People**



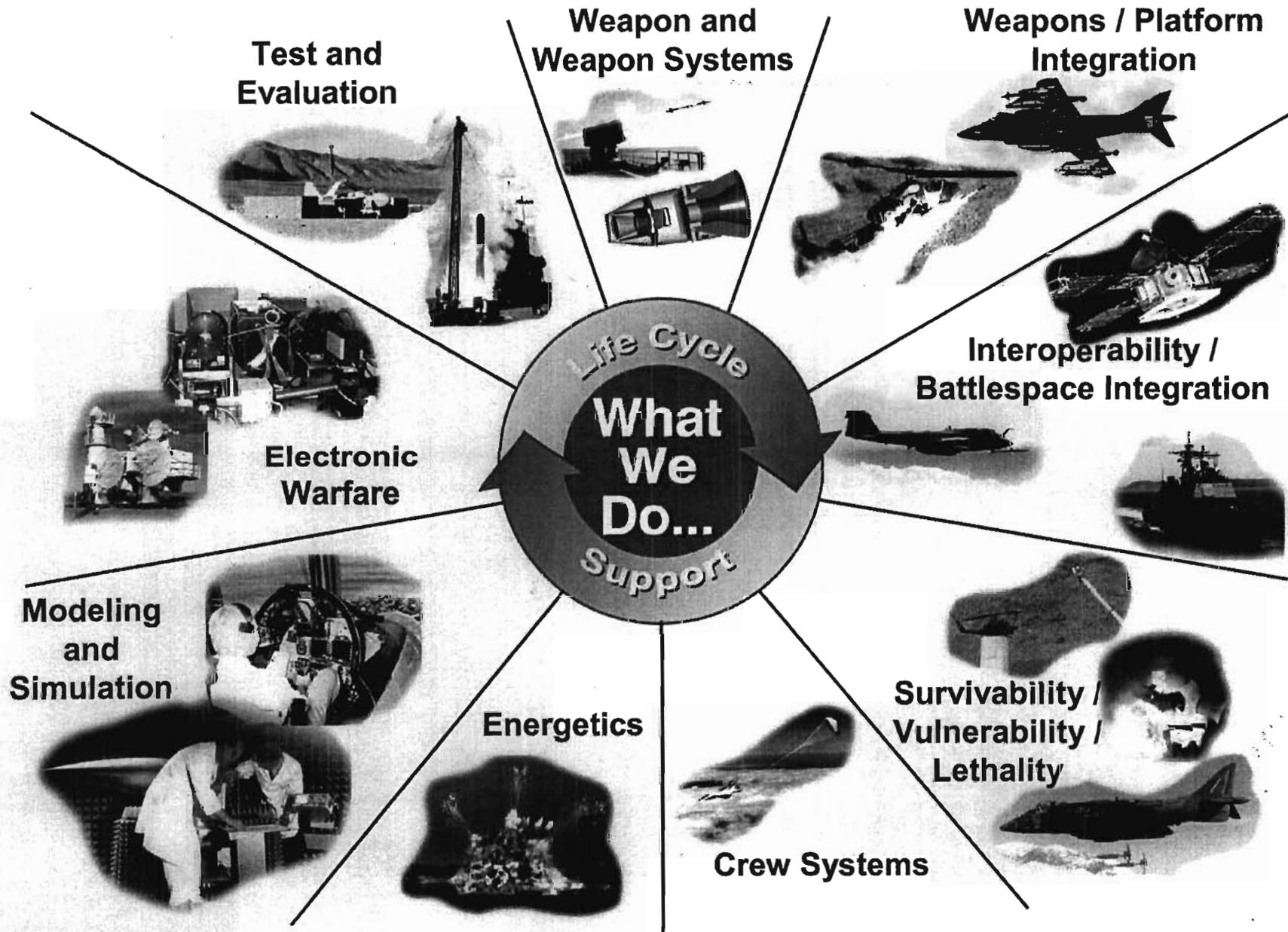
**Ranges**



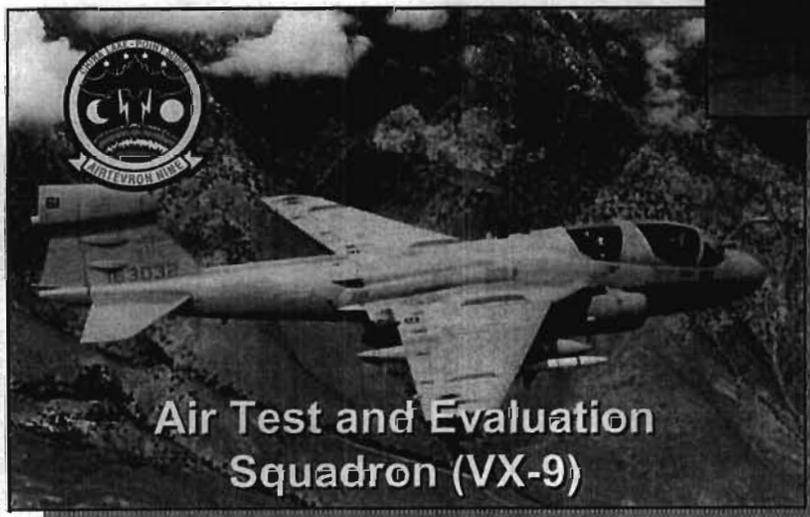
**Laboratories**



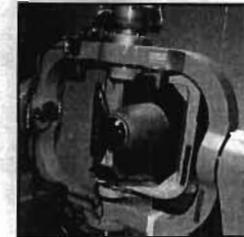
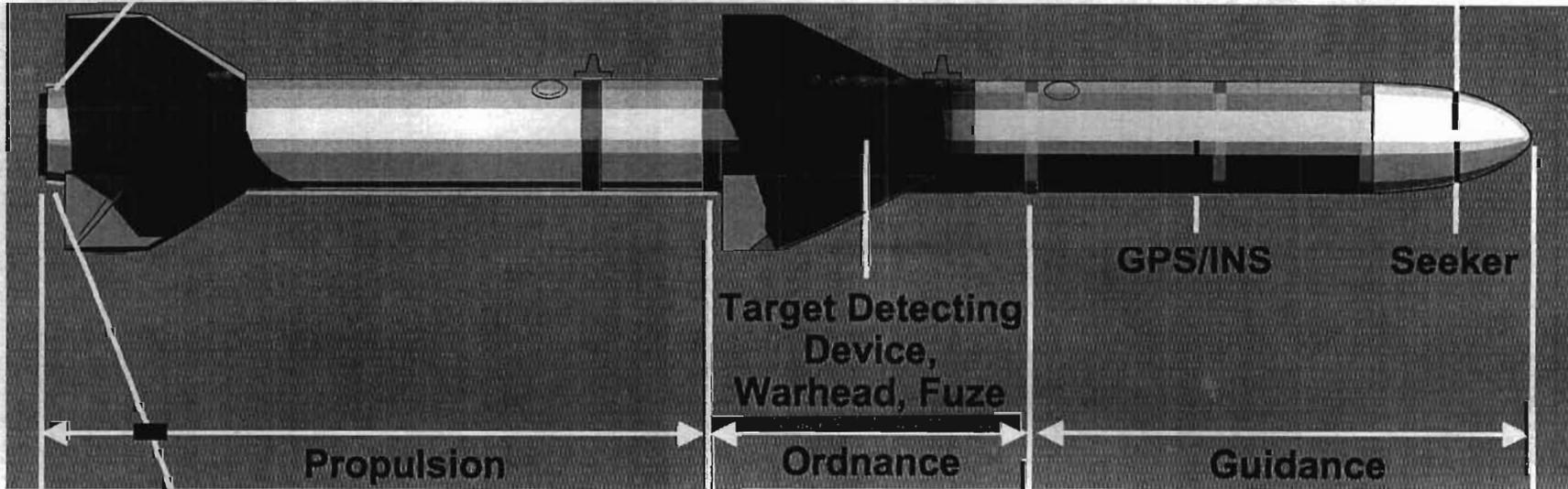
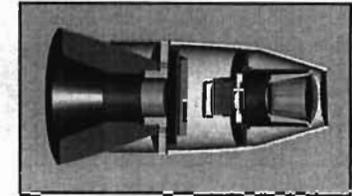
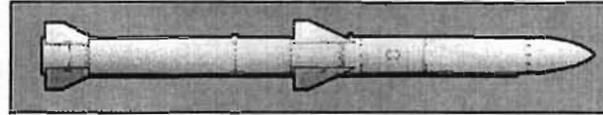
# What We Do For The Fleet



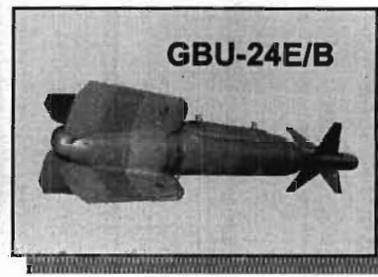
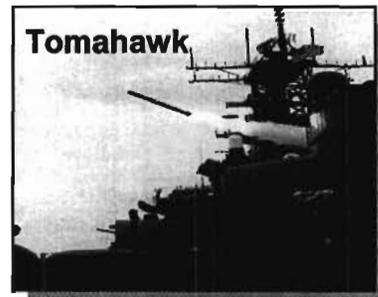
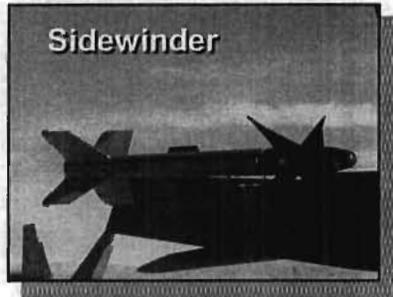
# Military / Civilian Team



# The Weapon and Its Subsystems



# Family of Weapons



# Weapon Platform Integration

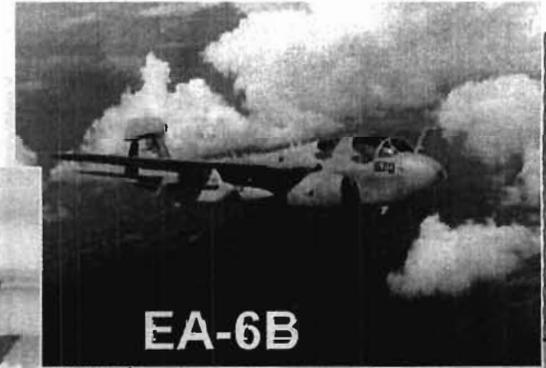
F/A-18



F-14



EA-6B



EP-3



AH-1



AV-8B



F-22

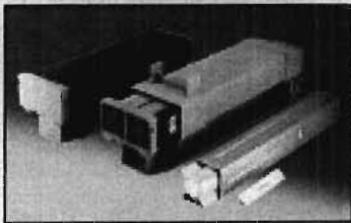
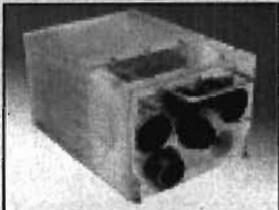
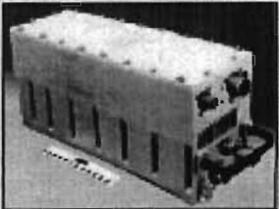
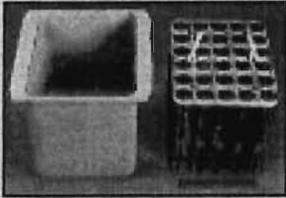


F-35



# Electronic Warfare

## IDECM



EA-6B



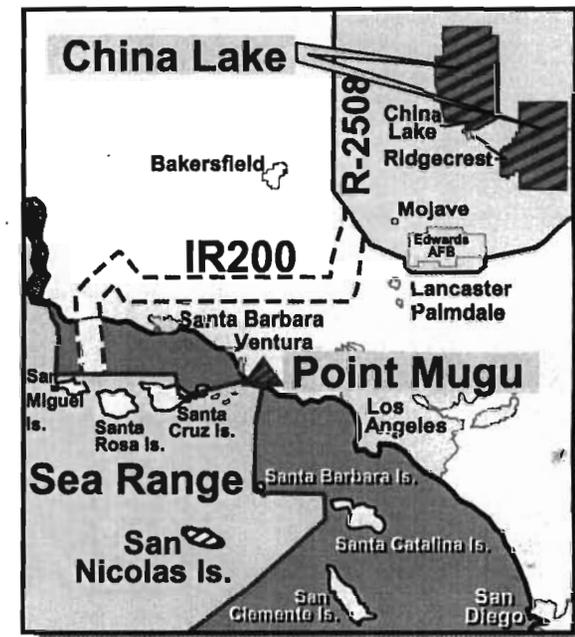
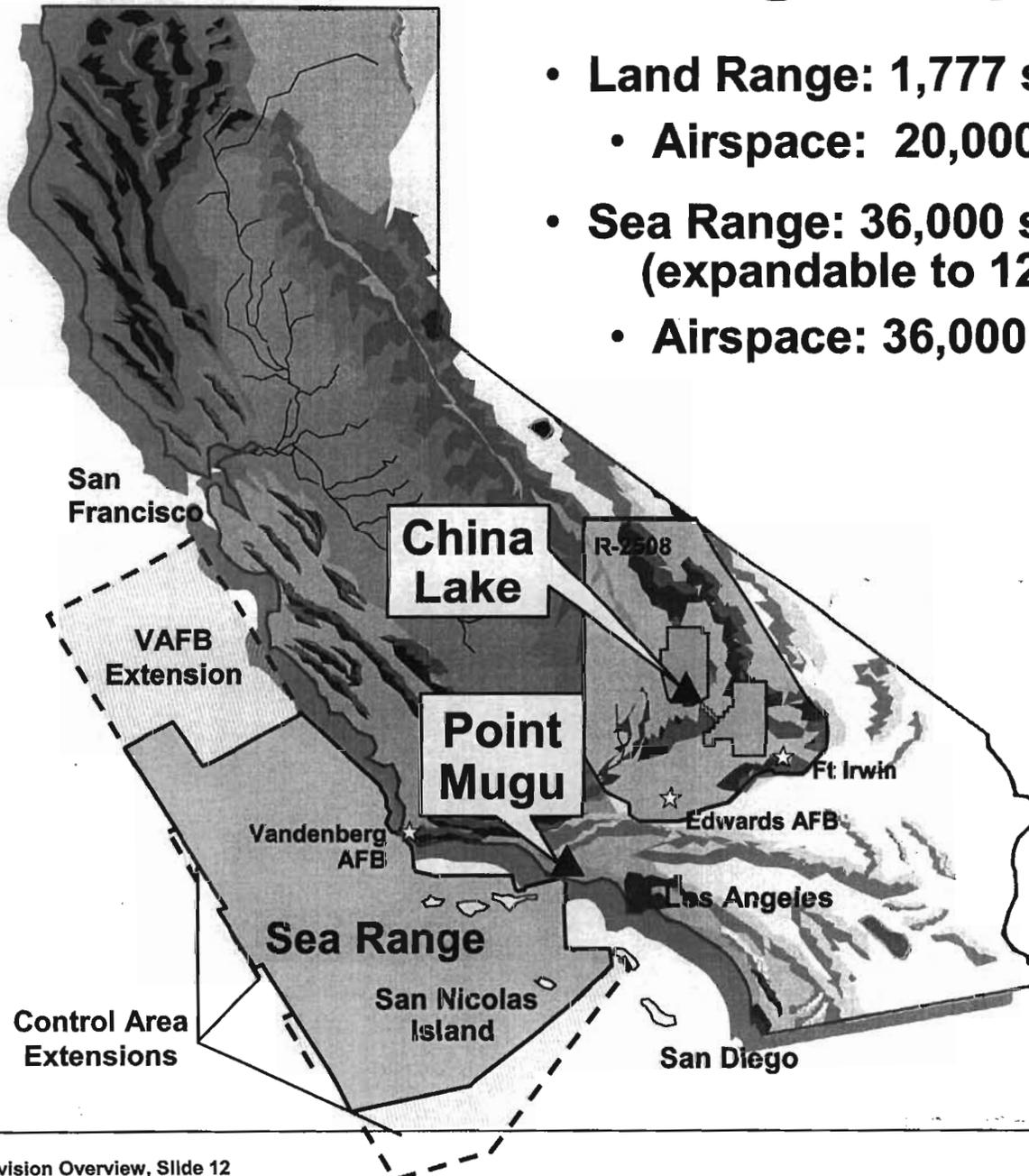
EA-18G



Electronic Combat Range

# Pacific Range Capabilities

- Land Range: 1,777 square miles
  - Airspace: 20,000 square miles
- Sea Range: 36,000 square miles (expandable to 125,000 square miles)
  - Airspace: 36,000 square miles



# Land and Sea Range FY04

## Testing and Training

### Test / Training events

Land \_\_\_\_\_ 1,371

Sea \_\_\_\_\_ 1,138

Electronic Combat  
Range \_\_\_\_\_ 603

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Total 3,112

### Training Sorties

Superior Valley \_\_\_\_\_ 3,895

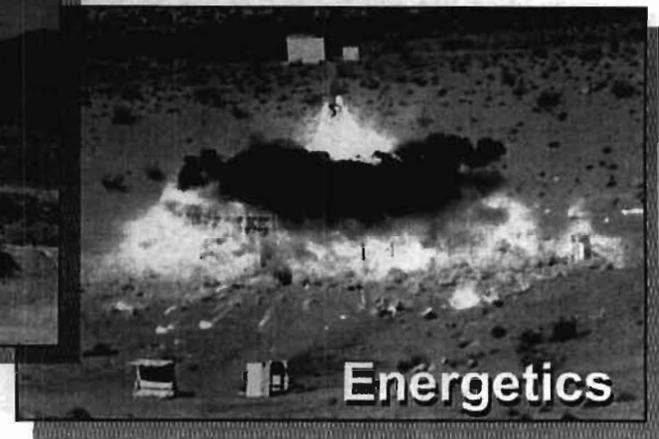
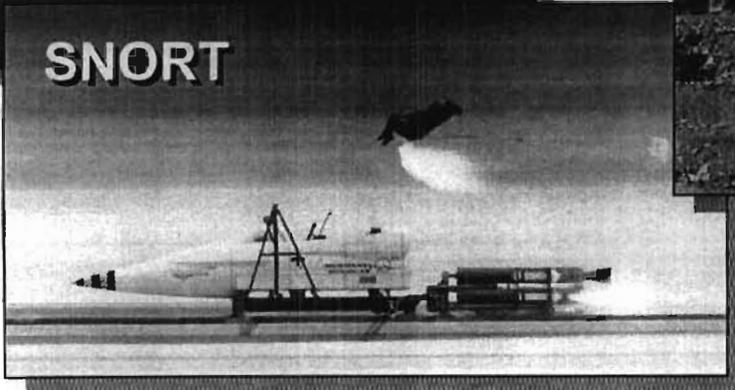
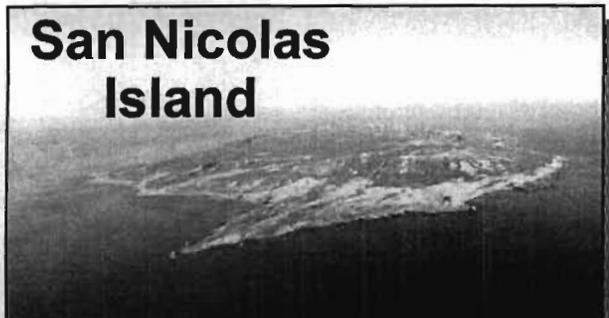
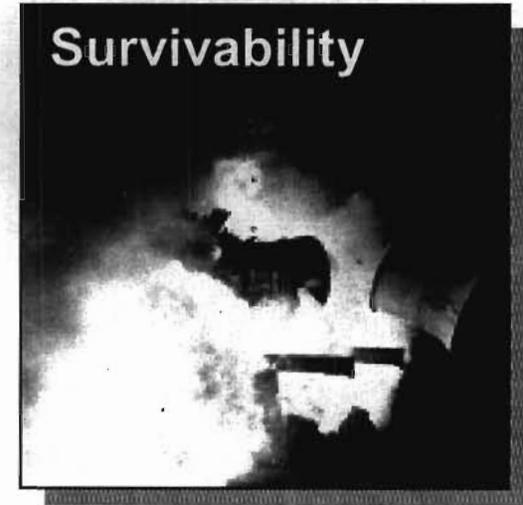
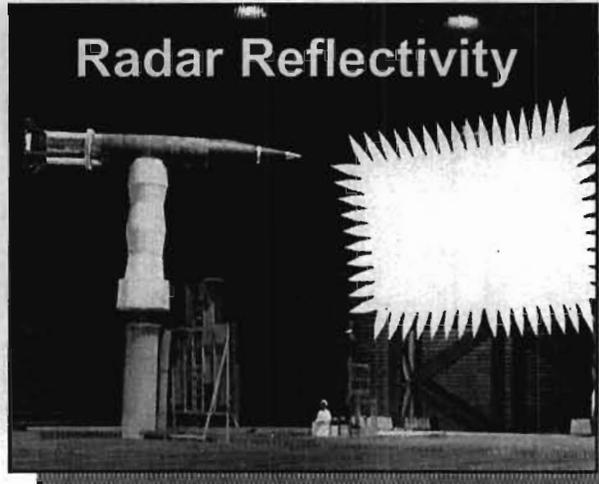
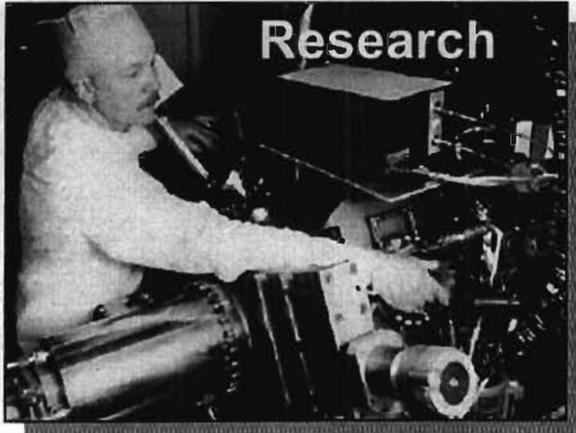
R-2508 Complex \_\_\_\_\_ 19,625

**9% Increase Over FY03**



# Laboratories and Facilities

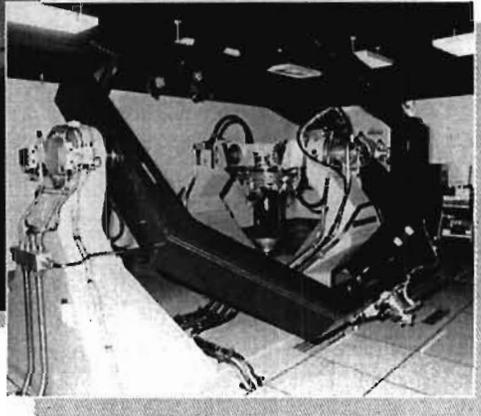
## 40 Major Facilities



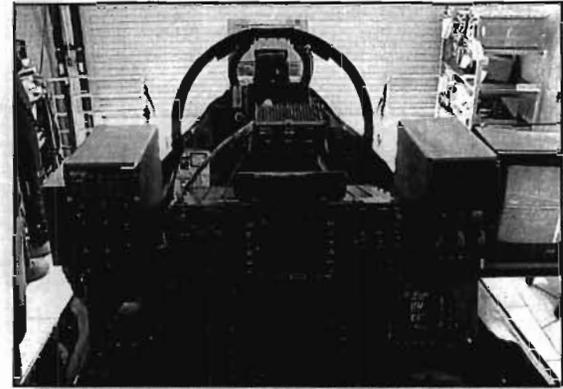
# Integrated Modeling and Simulation



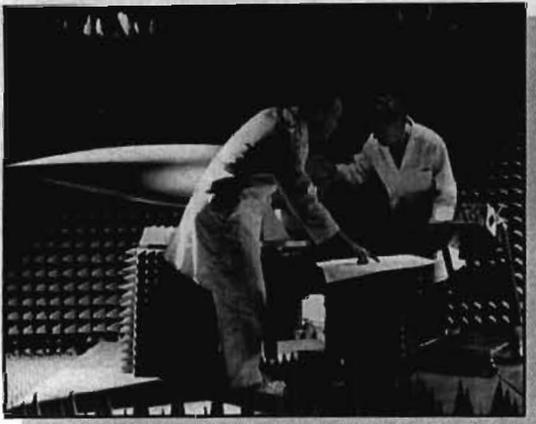
**Virtual Prototyping Facility**



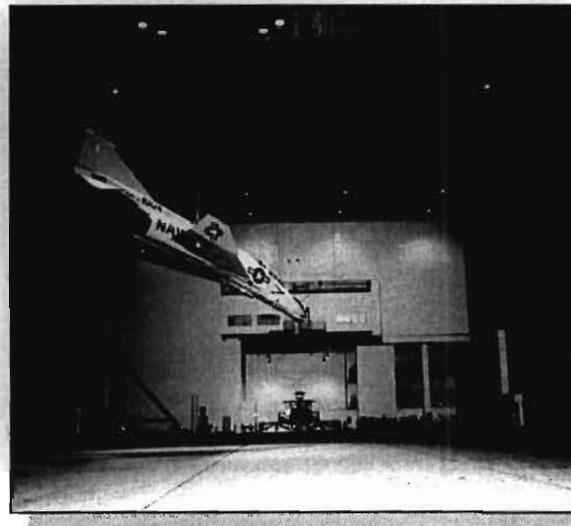
**Carco Five-Axis Table**



**F-14 Weapon Integration**



**Electronic Combat Simulation and Evaluation Laboratory**

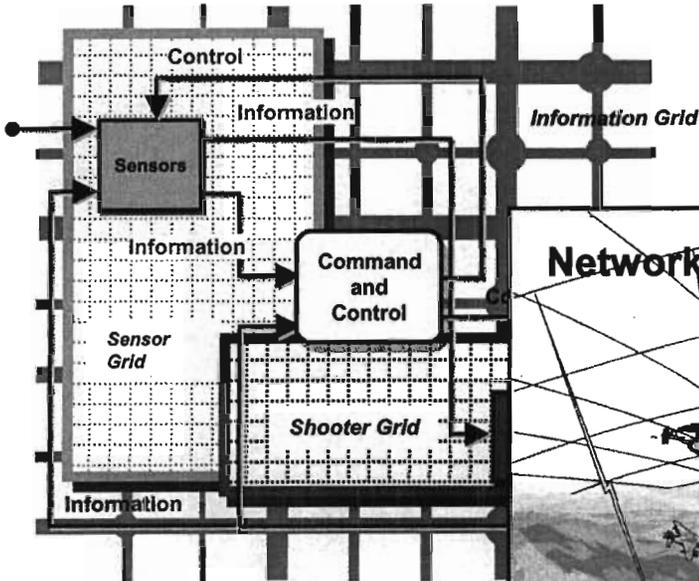


**MESA**

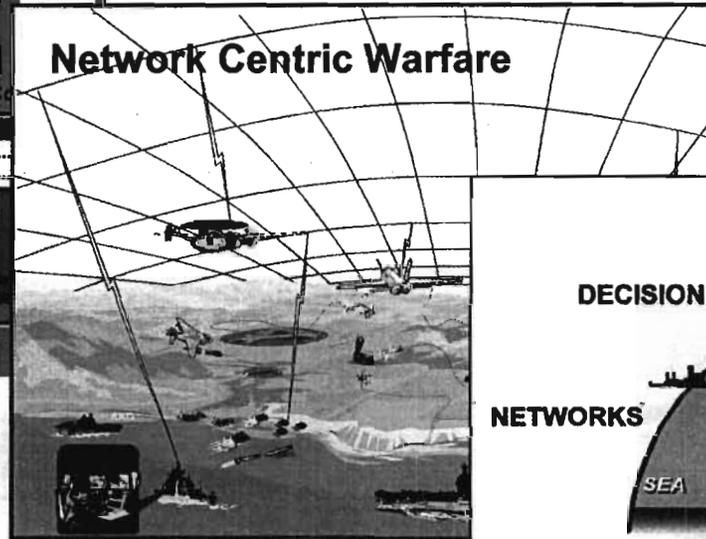


**F/A-18 AWL**

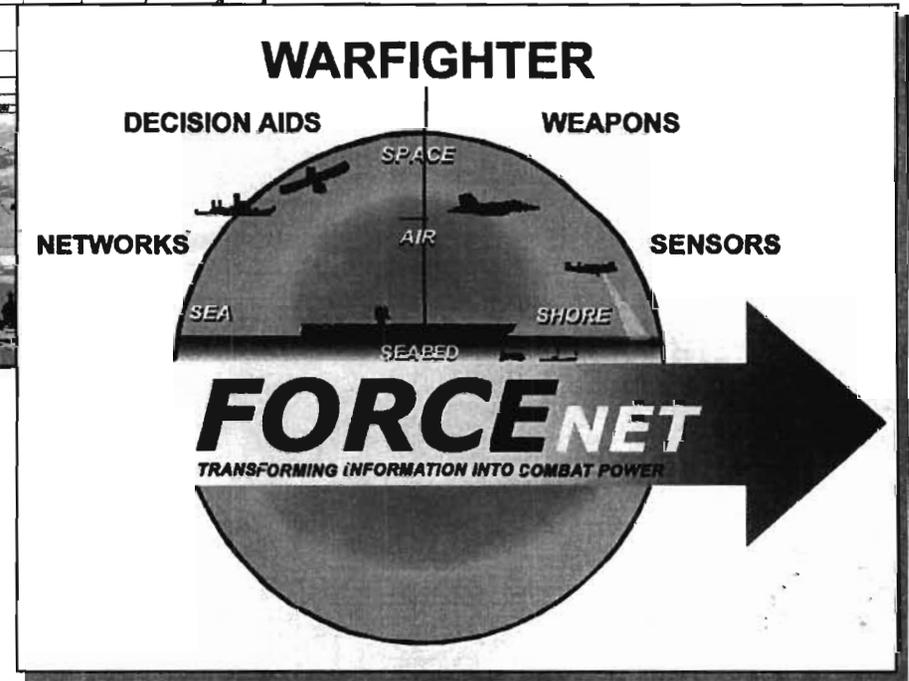
# Force Net Evolution in NAVAIR



1997- Battlespace Engineering  
WD Strategic Thrust



2000 NAVAIR Strategic Initiative

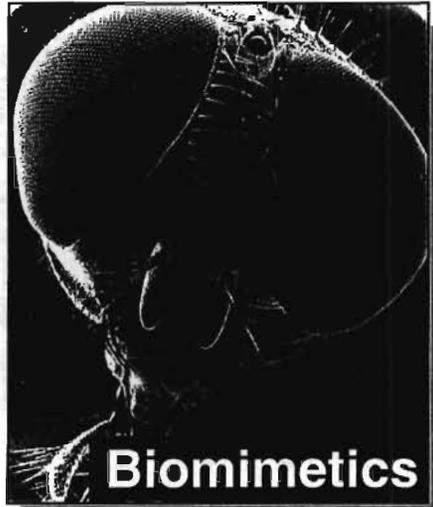


Today

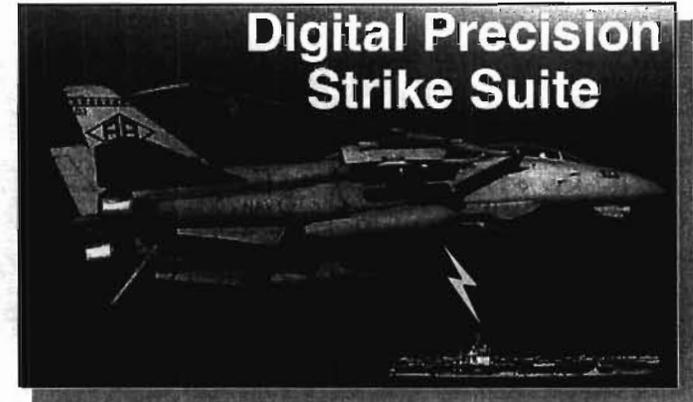
# New Technologies



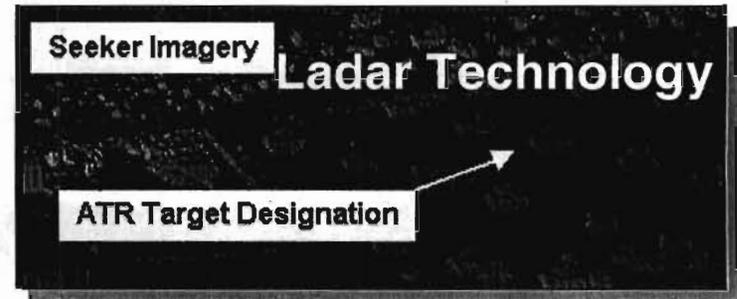
**Homeland Defense**



**Biomimetics**



**Digital Precision Strike Suite**



**Seeker Imagery**

**Ladar Technology**

**ATR Target Designation**



**Directed Energy Weapons**

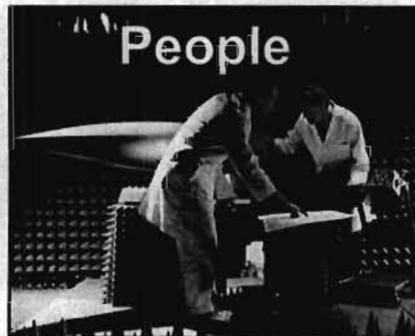


**Spike**



**DAMASK**

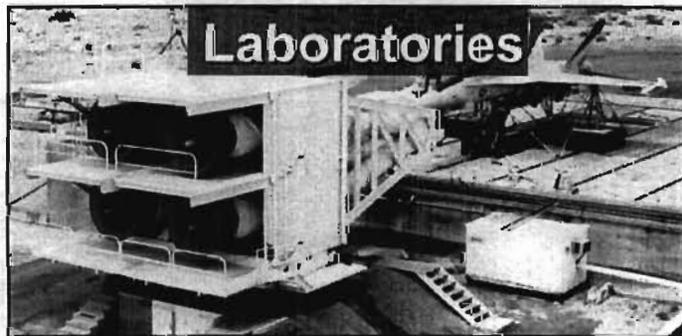
# Warfighter Support Then, Now, and Into the 21<sup>st</sup> Century



- Personnel: 7,001**
- **Civilians: 4,587**
  - **Military: 996**
  - **Contractors: 1,418**



- **Land Ranges: 1.1 million acres**
- **Sea range: 36,000 square miles**
- **Number of annual test events: 3,112**



- **Annual revenue: \$1.1 billion**
- **Plant replacement value: \$2.8 billion**
- **Over 40 major laboratories**



 AVERY



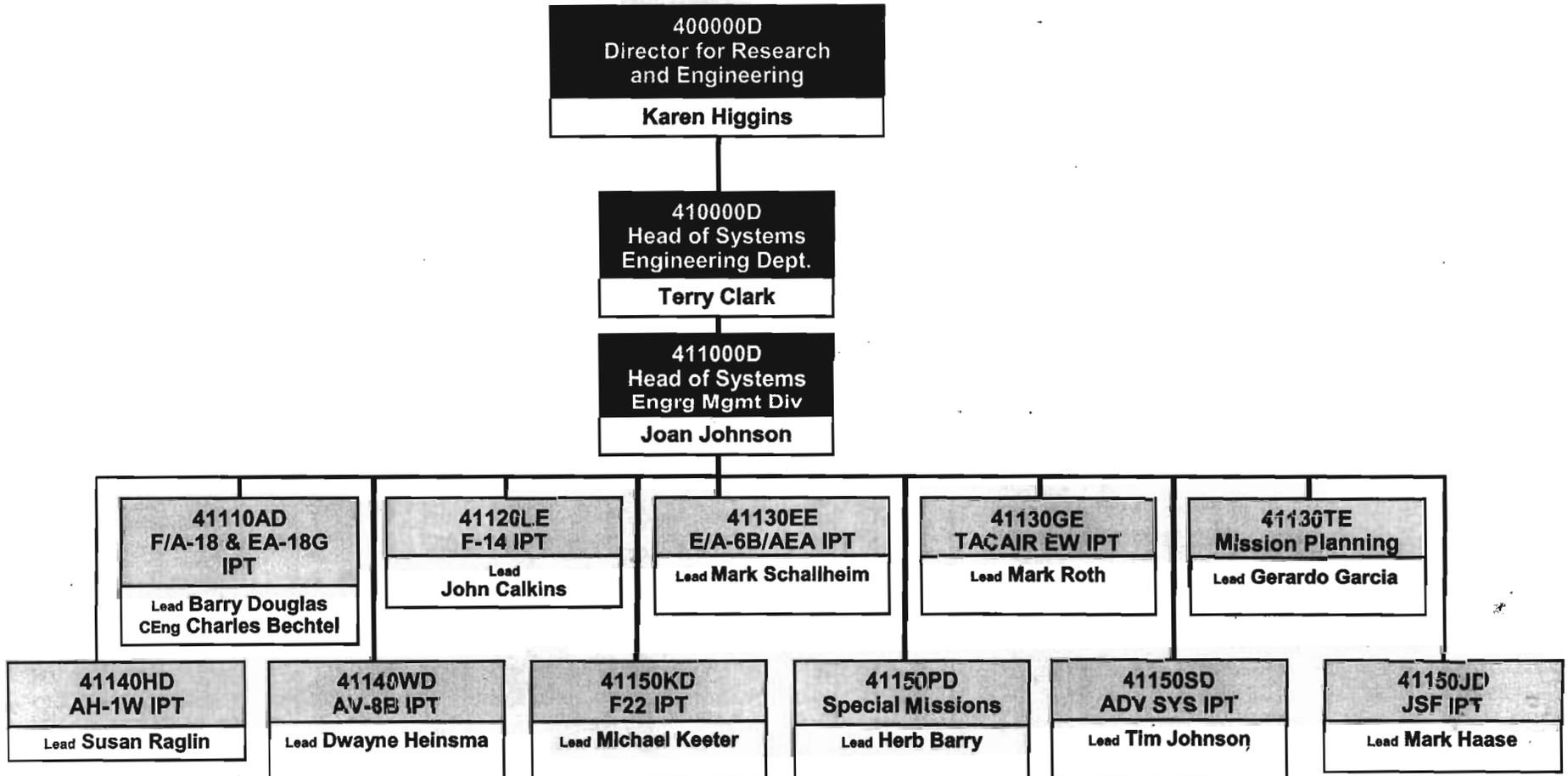


# System Support Activities

The F/A-18 & EA-18G Advanced Weapons Lab  
China Lake



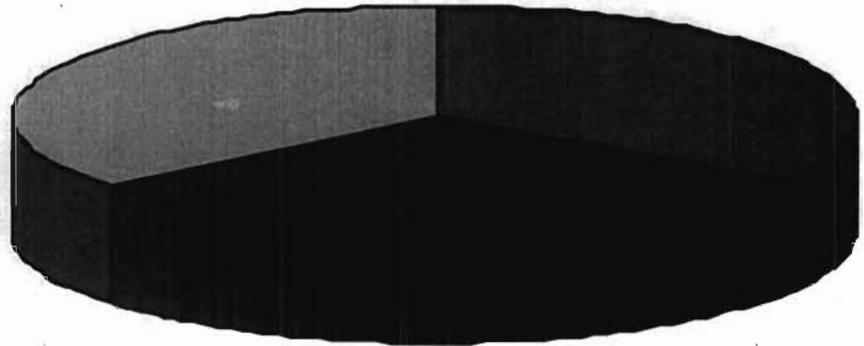
# 4.0 / 4.1 / 4.1.1 ORGANIZATION





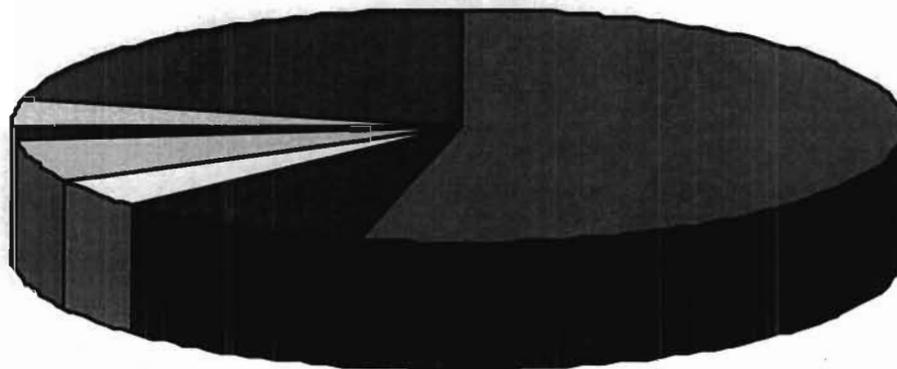
# F/A-18 & EA-18G IPT MANPOWER & SPACE

690 Work Years



- Government
- Industry - local
- Industry - onsite prime
- Industry - offsite prime

100,000 Sq Feet

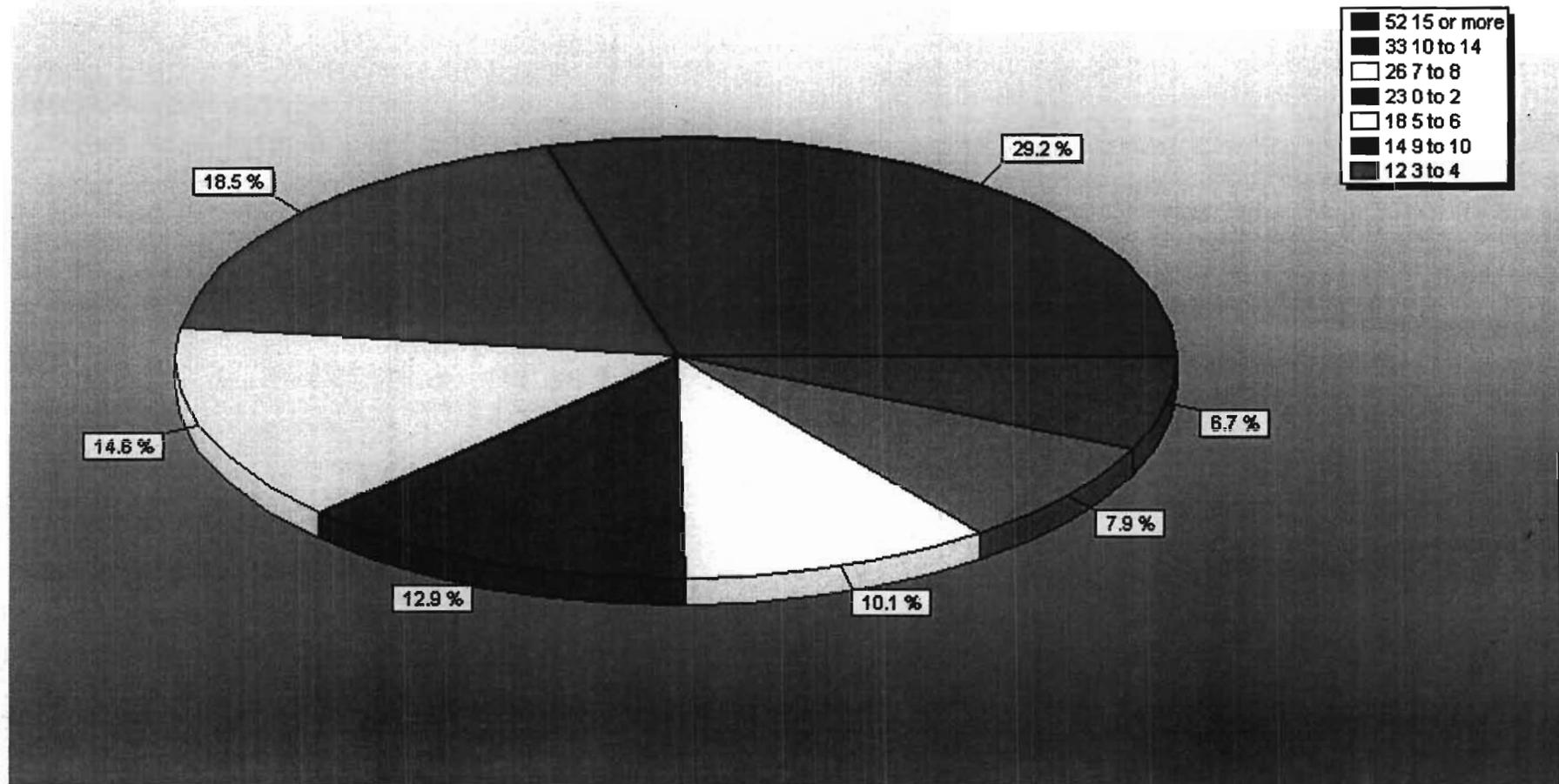


- Hangar 5 Office Spaces
- Software Bldg
- FMS
- FMS Trailers
- Test Support
- Boeing
- Laboratories



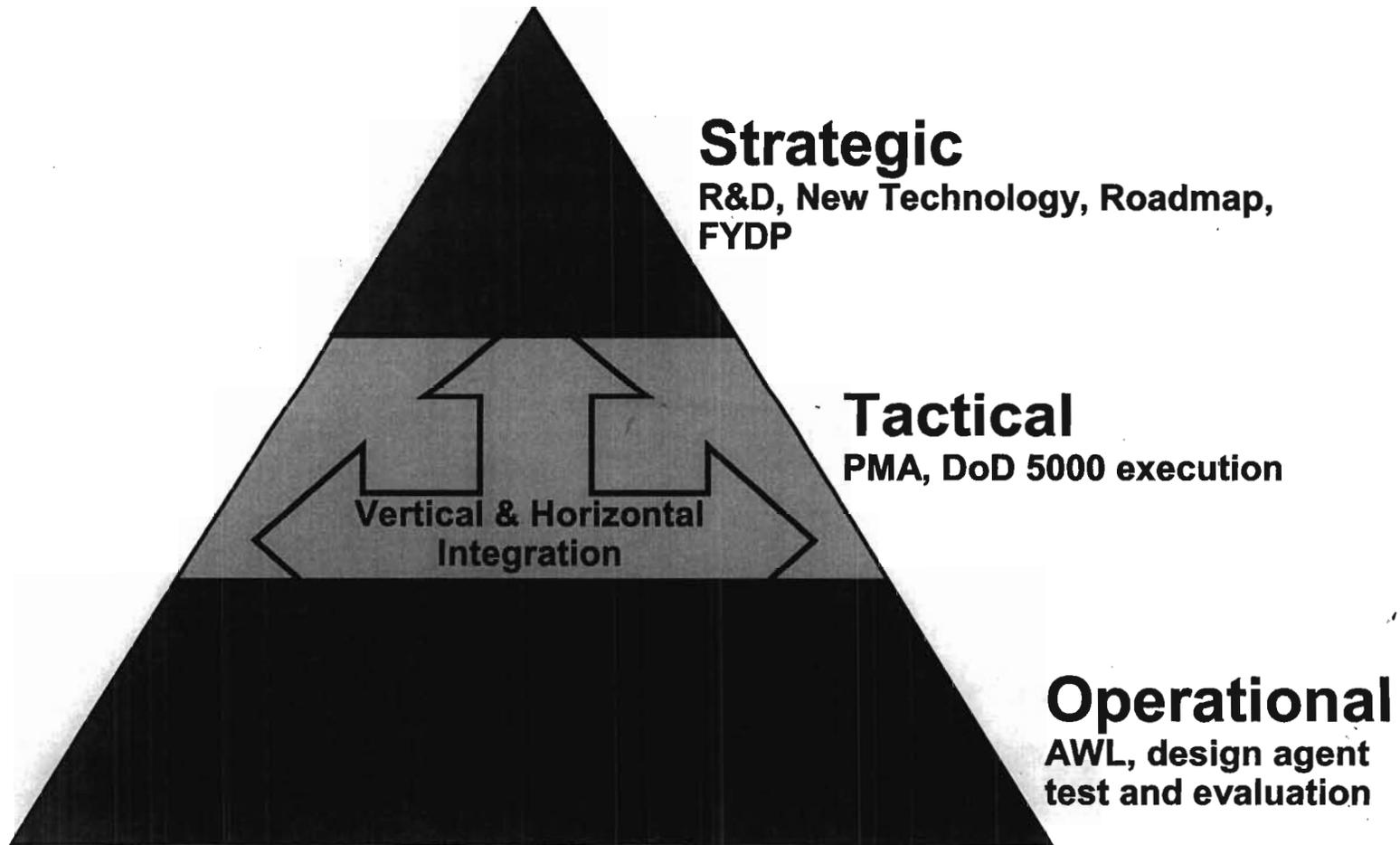
# F/A-18 & EA-18G AWL RELEVANT WORK EXPERIENCE

How many years of F/A-18 relevant work experience do you have?





# SYSTEM ENGINEERING FLOW DOWN





# CVW TACTICAL AVIATION EVOLUTION

1985

1995

2005

2015

2020

## Mission Centric Operations



F-14A

- Outer Air Battle
- Fighter Sweep



A-6 / KA-6

- Strike
- Tanking



A-7

- Light Attack



F/A-18A

- Light Attack



S-3B

- ASUW



EA-6B

- SEAD



E-2C

- Blue Water AEW

## Multi-Mission Operations



F-14D



F/A-18A/C

- Precision Strike
- Air Superiority
- RECCE
- FAC(A)



S-3B

- ASUW
- Tanking



EA-6B

- AEA/SEAD



E-

- Littoral Ops (Limited)

Technologies :  
Multi-role, GPS,  
Night Attack.....

## Network Centric Operations



F/A-18E/F



F/A-18C

- Time Critical Strike
- Precision Strike (Fixed and Moving)
- Air Superiority
- CSAR
- RECCE
- FAC(A)
- Battlefield Persistence
- Tanking



EA-6B

- AEA/SEAD



E-2C

- Littoral Ops
- Digital Collaborative Targeting

Technologies :  
AESA, Link-16, DCS,  
Geo-Registration

## Future Operations



F/A-18E/F



EA-18G



F-35B/C



E-2C



- JUCAS

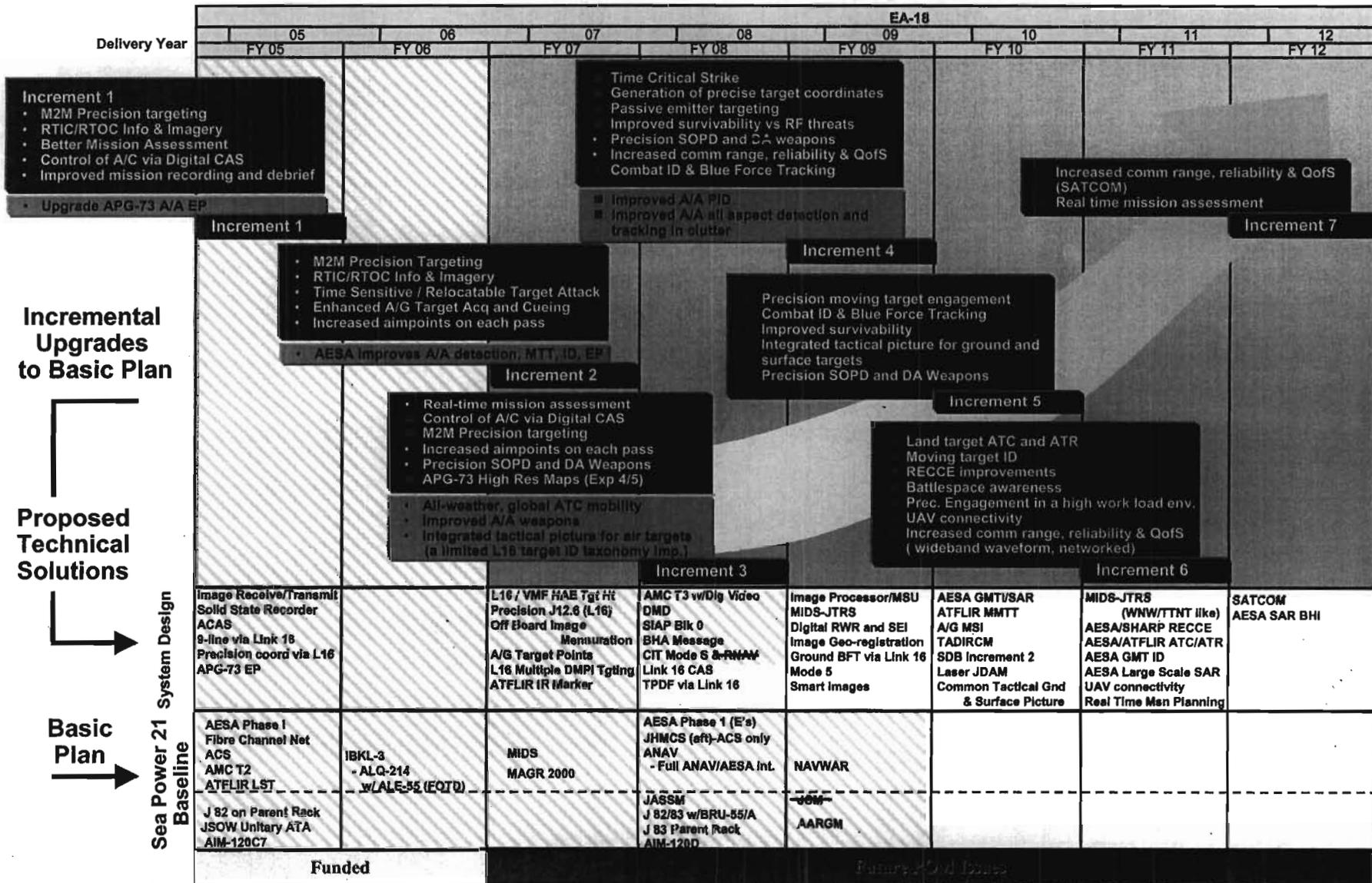
Technologies :  
JAN-TE, JTRS, WPNS  
DATA LINKS,  
SATCOM, Blue Force  
Tracker, Combat ID



# F/A-18E/F STRATEGIC CAPABILITY ROADMAP

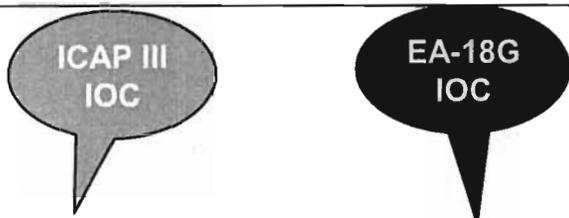
## FY 2005-2012 Plan 05-1.2

Jan 2005





# EA-18G Growler Schedule



FY	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
USN (CVW)	ICAP II		ICAP III							EA-18G				
USN (EXP)			ICAP II											
USMC	ICAP II								ICAP III				USMC Follow-on	
USAF														B-52 Plus Family of Systems

USAF Assumes Expeditionary Mission



UNCLASSIFIED

NAV  AIR

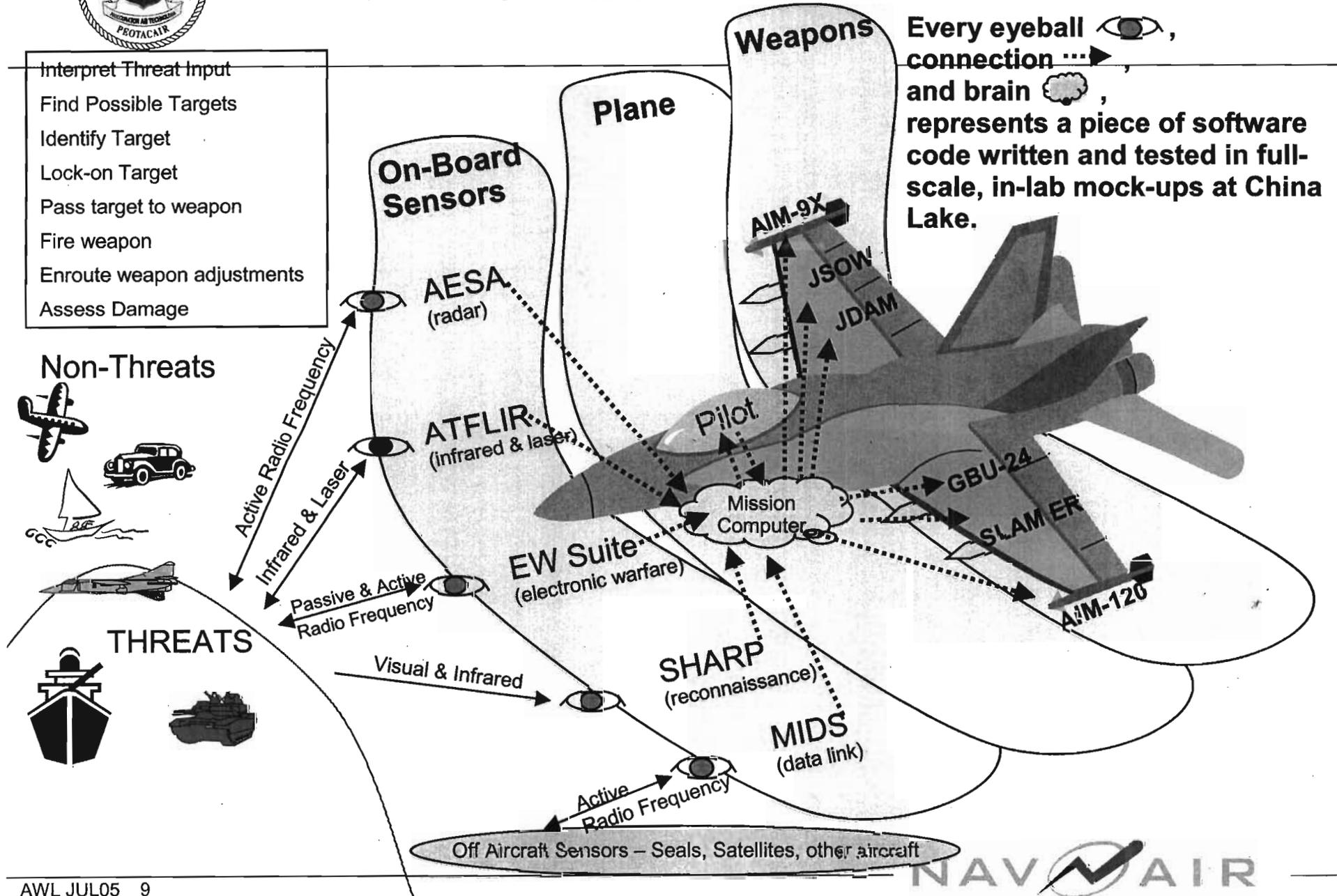


# WIRED TOGETHER

i.e., an example of *Weapons and Systems Integration*

- Interpret Threat Input
- Find Possible Targets
- Identify Target
- Lock-on Target
- Pass target to weapon
- Fire weapon
- Enroute weapon adjustments
- Assess Damage

Every eyeball , connection , and brain , represents a piece of software code written and tested in full-scale, in-lab mock-ups at China Lake.





# SENSORS IN THE ELECTROMAGNETIC SPECTRUM

Sensors = U.S.'s latest technological edge.

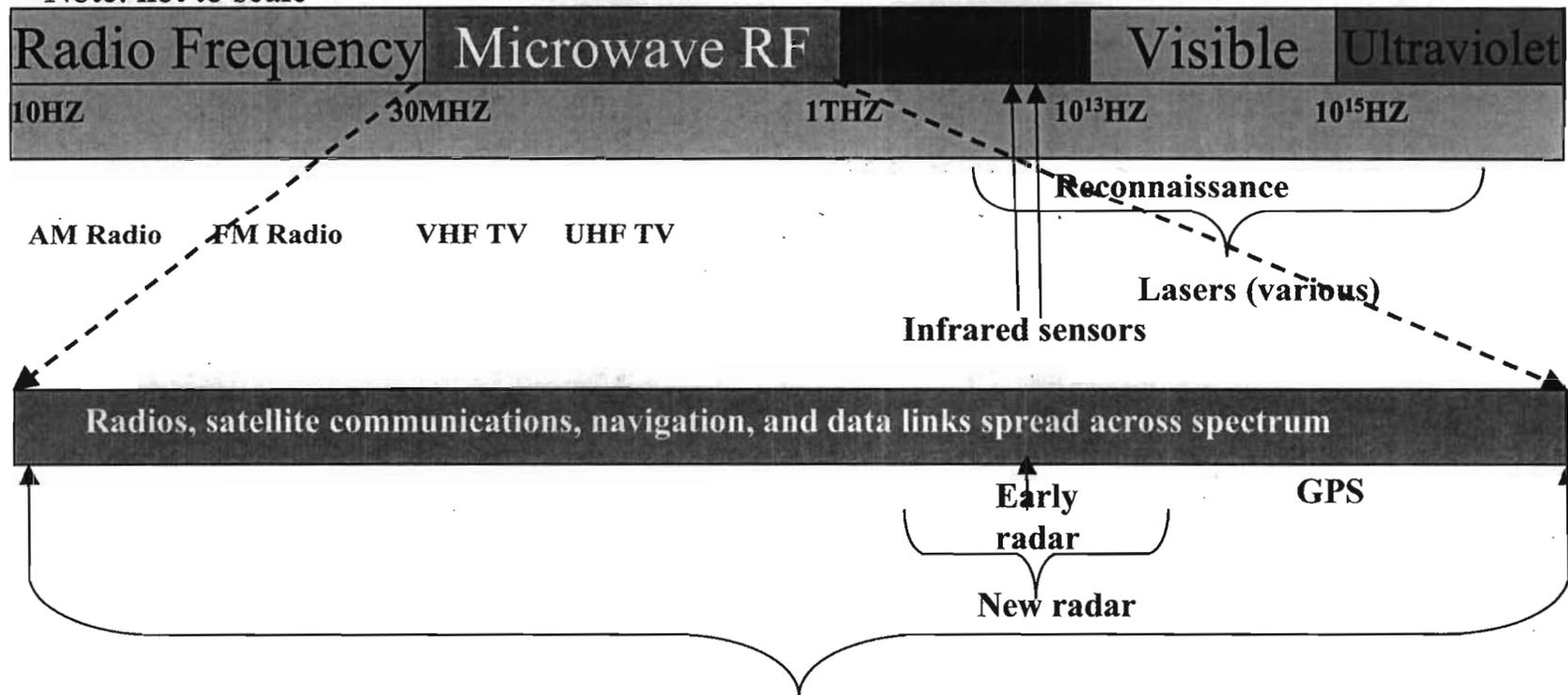
Air War = Public's preferred type of war.

Sensors on Aircraft = U.S.'s point of maximum opportunity.

The "eyes and ears" of a smart plane and a smart bomb.

Different kinds of Sensors for different areas of the Electromagnetic Spectrum.

Note: not to scale



Passive EW - identify and locate threat transmissions

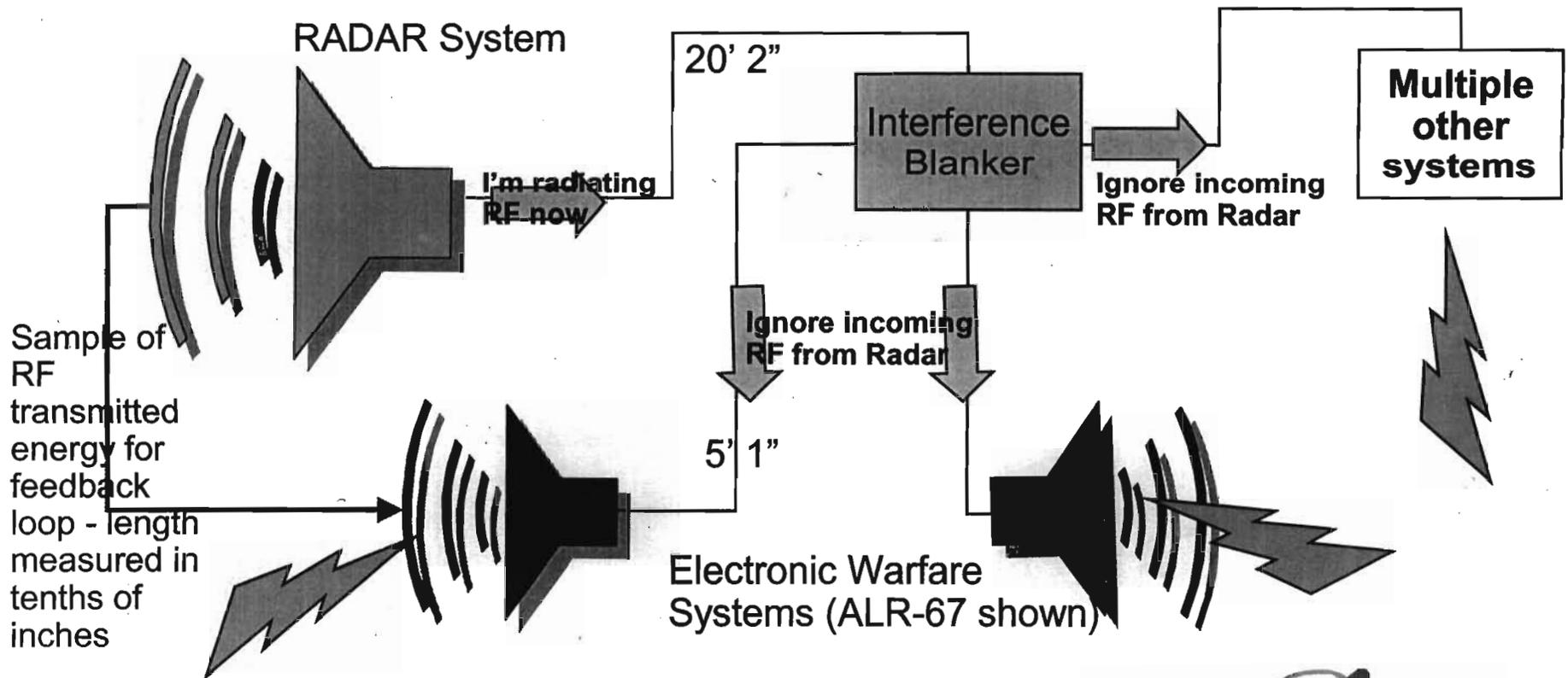
Active EW - jam or deceive threat systems



# NANOSECOND PRECISION

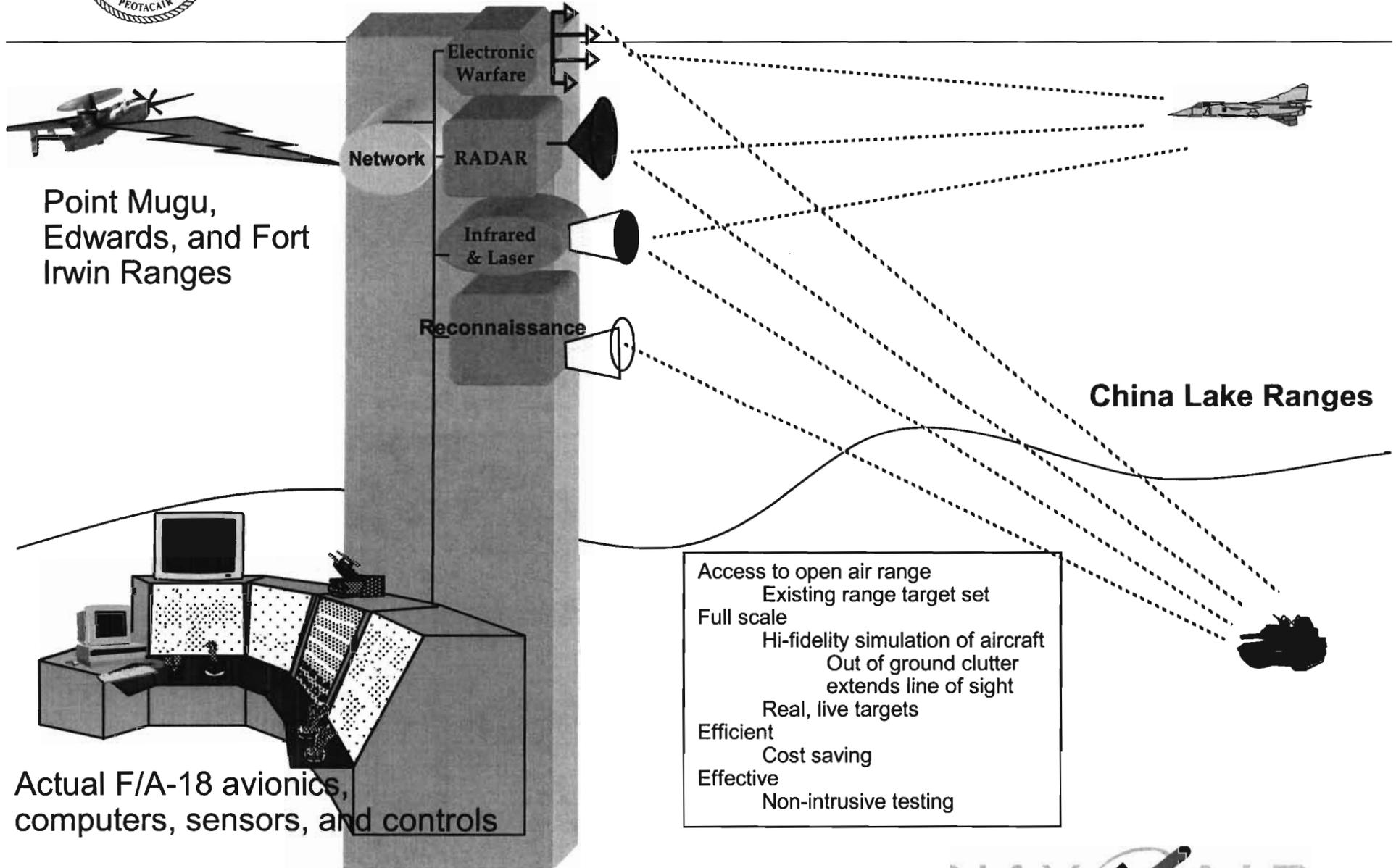
Signals travel about 1 foot per nanosecond in wiring. Nanosecond accuracy is required. Therefore length of wiring must accurately replicate aircraft wire lengths, and all systems must be collocated.

Only Radar RF interference shown for simplicity





# IN LAB MOCK-UPS

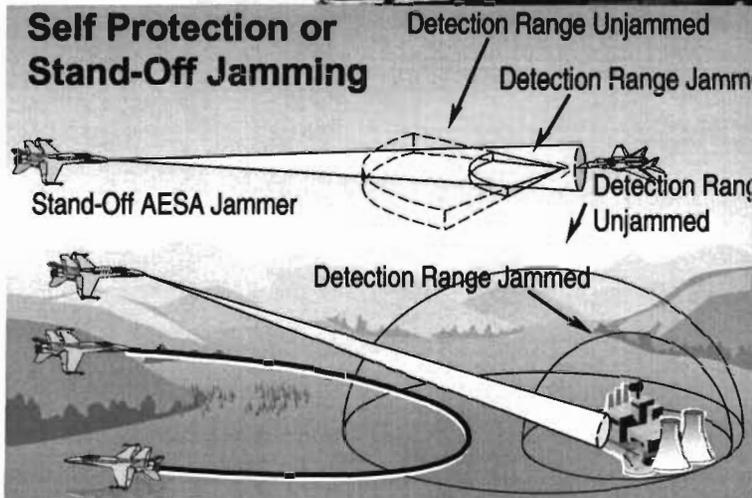
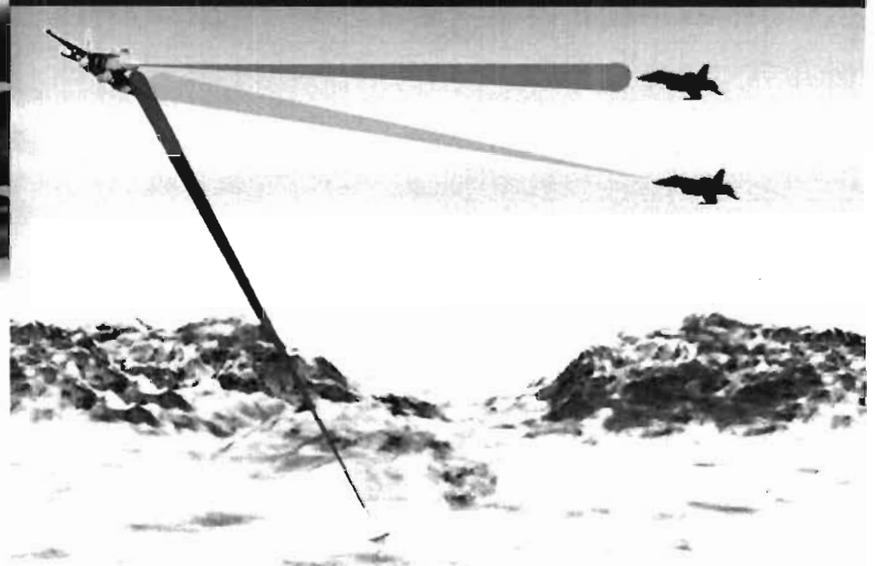




# AESA, THE GROWLER AND SPOT JAMMING



Electronic Protection, Electronic Support and Electronic Attack





# EARLY OPERATIONAL CAPABILITY IN OIF

- The following were pulled out of development before Operational Evaluation, or pulled out of Operational Evaluation, to provide an Early Operational Capability (EOC) for Operation Iraqi Freedom (OIF).
  - An advanced infrared system provided the Fleet with stand-off targeting and attack, and reconnaissance.
    - Delivered 3 refurbished Engineering Manufacturing Development (EMD) pods
    - Also used in Operational Enduring Freedom and Southern Watch
  - A new reconnaissance pod provided the Fleet reconnaissance capability.
    - Delivered 3 pods, one we delivered directly to ship pier-side in San Diego



# EARLY OPERATIONAL CAPABILITY IN OIF, cont'd

---

- A new digital radio provided digital forward air control for close air support.
  - This was a software installation, hardware already extant
- A new data link system provided network centric warfare capabilities.
  - Low Rate Initial Production systems
  - Used for finding & designation targets, finding tankers, passing section/division data, and general situational awareness.



# QUICK FLEET RESPONSE

---

- In Afghanistan, the Fleet needed to simultaneously carry both a weapon to attack caves and a weapon to attack troops in the open
  - We provided a software solution in 20 days
- We supplied testing for the requested deployment of the Rapid Precision Targeting System (RPTS)
- In Kosovo they needed reconnaissance. We pulled a new development system forward and deployed it in less than 4 weeks



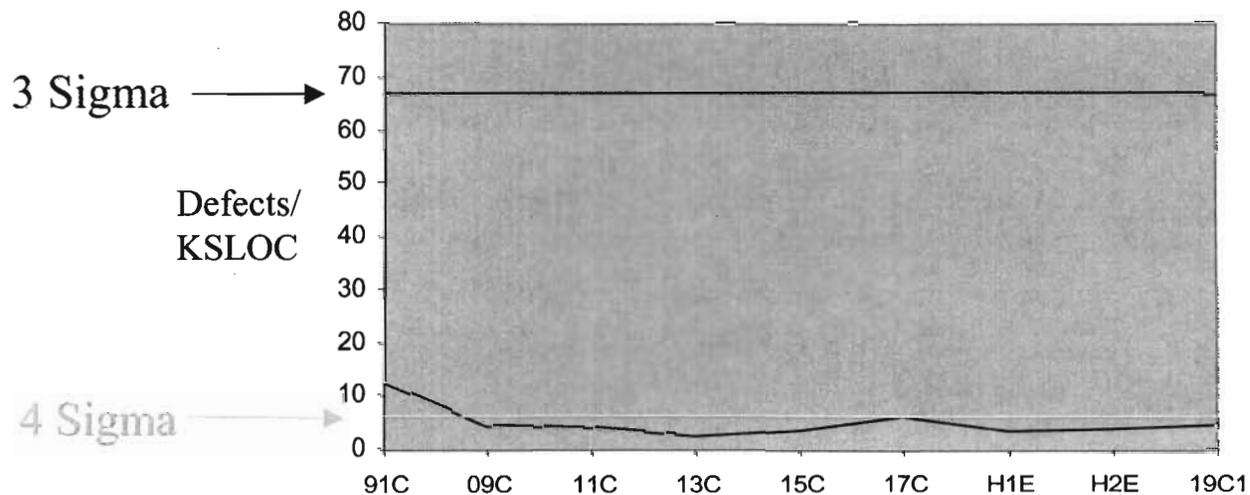
# TYPICAL DATA PROVIDED AT THE "FLEET BRIEF" W/EACH NEW SCS

- **Aircrew questions:**
  - LCDR Allen "Caulk" Blocker
    - DSN 437-4987
    - allen.blocker@navy.mil
    - blockera@chinalake.navy.smil.mil (SIPRNET)
- **Maintenance questions:**
  - SSgt Kevin Schiermeyer
    - DSN 437-0118
    - kevin.schiermeyer@navy.mil
- **Hornet Hotline**
  - (760) 939-FA18 (3218)
  - DSN 437-FA18 (3218)
  - NWFA18AWL@NAVAIR.NAVY.MIL
  - Classified.Hornethelp@chinalake.navy.smil.mil (SIPRNET)

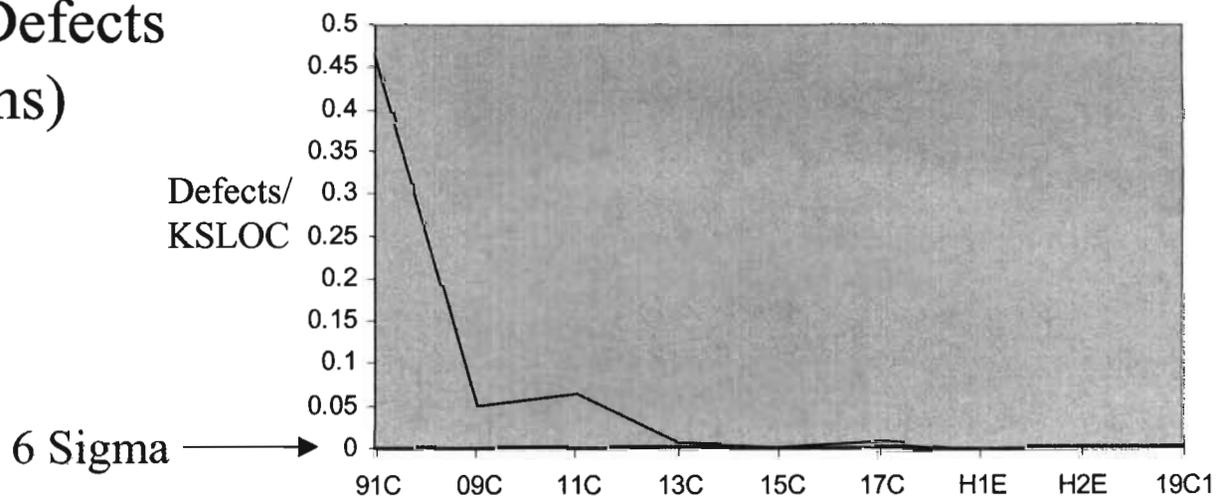


# 6 SIGMA QUALITY

Life Cycle Defects  
(all defects)



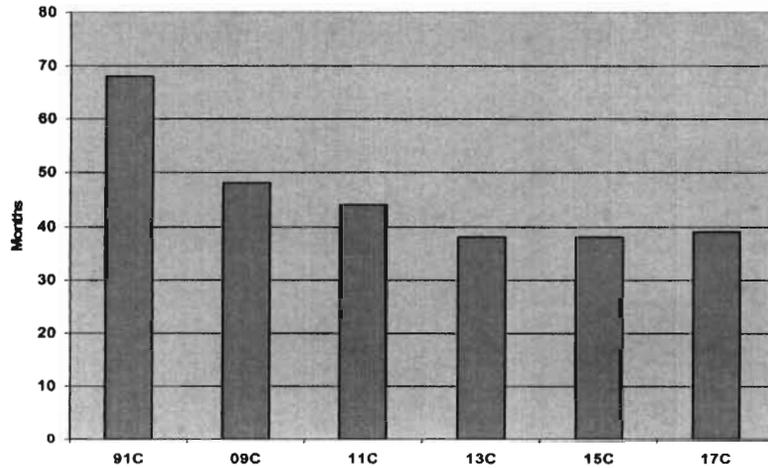
Customer Reported Defects  
(that impact operations)



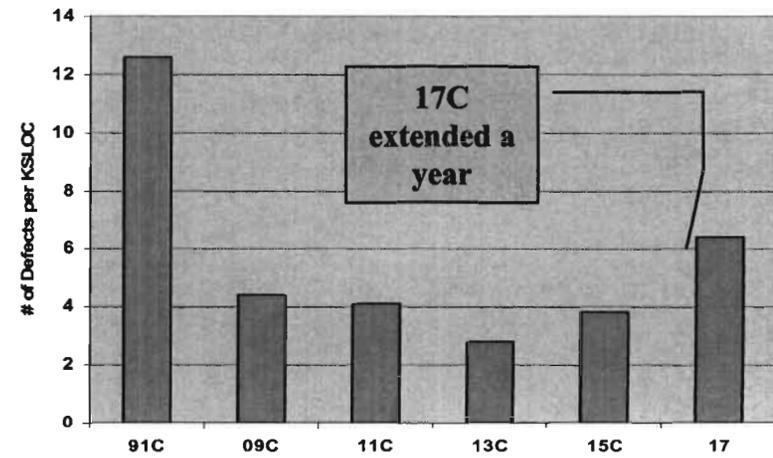


# F/A-18C/D HISTORICAL DATA

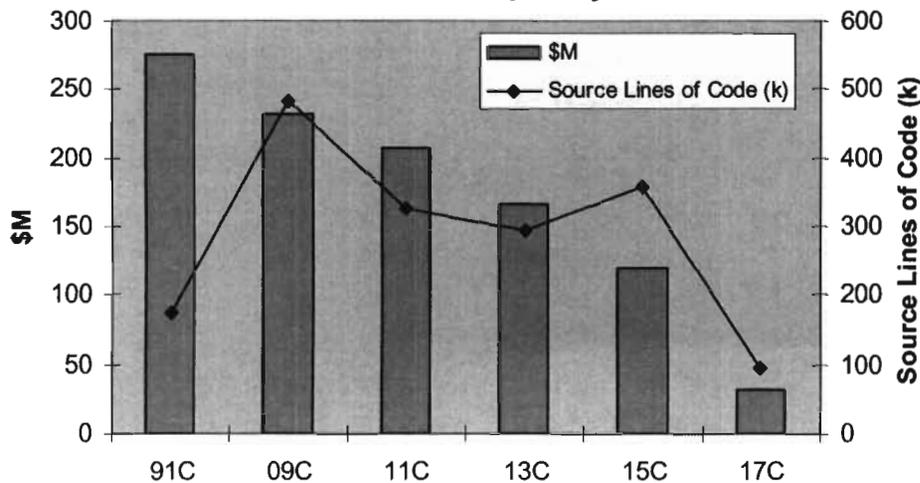
Time From Requirement To Operational Test



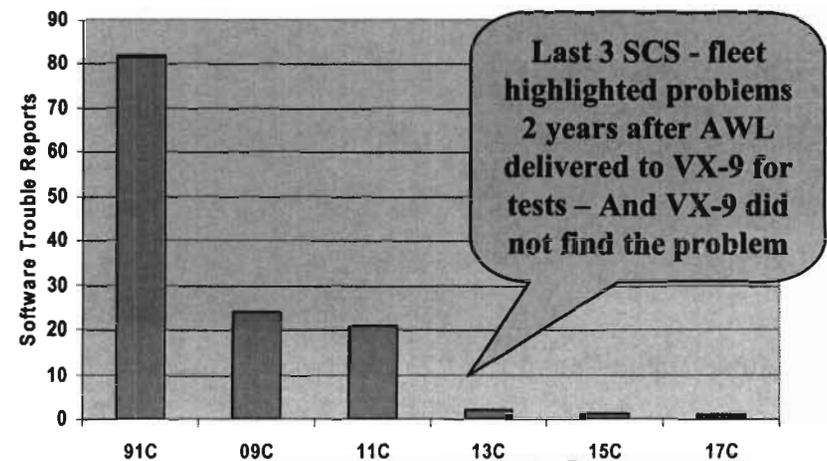
Life Cycle Defects per KSLOC



Cost and Complexity

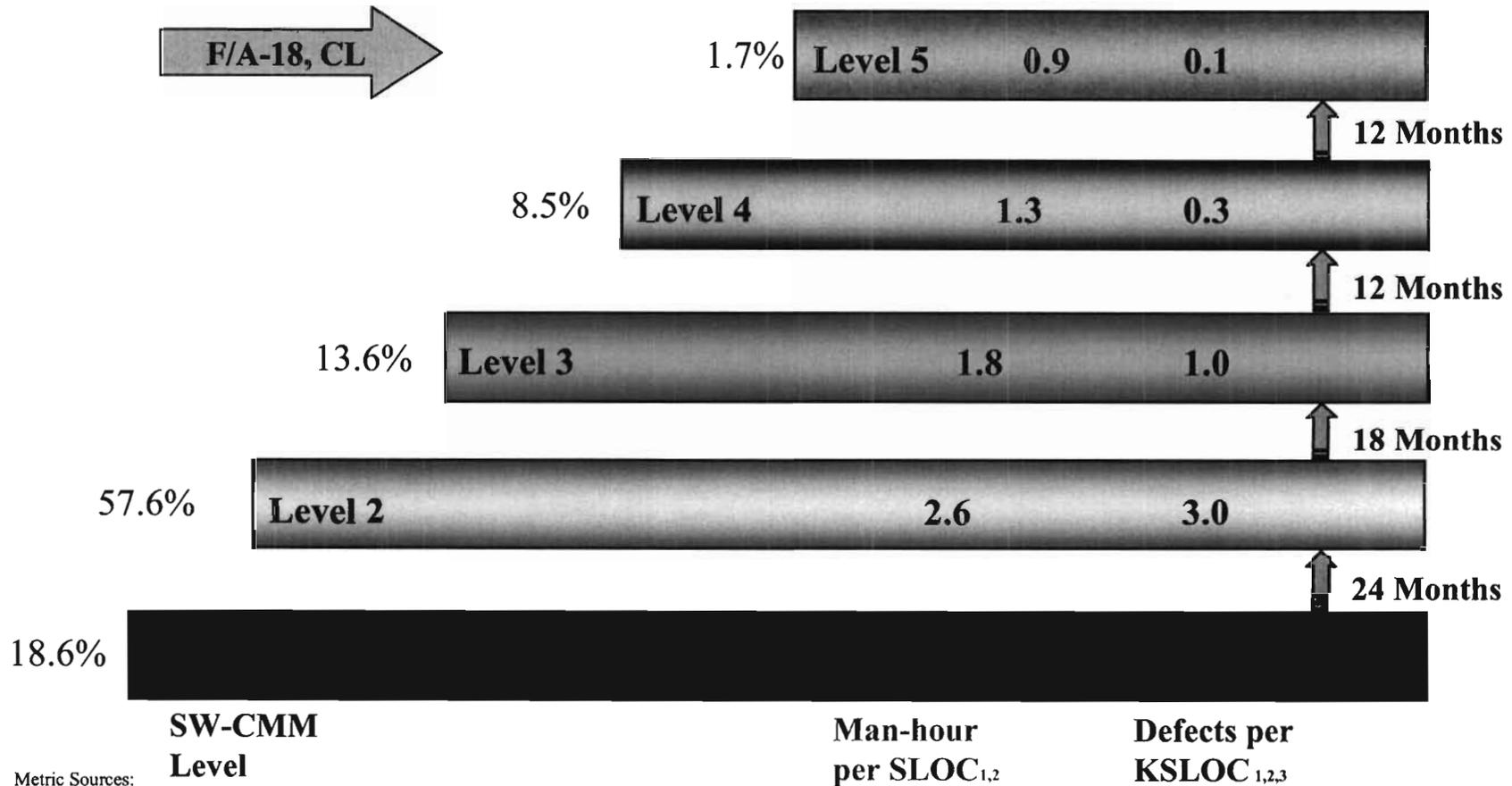


Fleet Reported Software Problems - Pri A or B





# SW-CMM JOURNEY



Metric Sources:

1. 1994 Citibank Analysis
2. Applied Software Measurement, Capers Jones
3. Benchmarking F/A-18 Mission Computer Inspection 2000
4. March 2001 ISD, Inc and Carnegie Mellon University adapted



# TWO TIME WINNERS OF *CrossTalk*

(Journal of Defense Software Engineering)

Winner of the *CrossTalk* 2001 Top 5 U.S. Government Quality Software Projects Awarded for 15C System Configuration Set.



From *CrossTalk* January 2002 "These top five projects were selected from 87-nominations in this first event. They demonstrate how competent software project teams go about building successful products"

"This is a very large, real-time operational system that has made significant improvement in cost, schedule, and quality."

Dr. Jack Ferguson a Top 5 Judge

Winner of the *CrossTalk* 2004 Top 5 U.S. Government Quality Software Projects

Awarded for H1E System Configuration Set.



Pamela Palmer, *CrossTalk* stated, "Recoding 1.3 million lines of F/A-18 assembly language code to a more cost effective High Order Language (HOL) has made every piece of aviator functionality fast, modular, and inexpensive enough to ensure that aircraft capabilities can be expanded for years to come. The HOL is a significant leap forward in flexibility of computer code and test efficiency."



# GAO REPORT ON DOD SOFTWARE MANAGEMENT

Defense Acquisitions, March 2004, GAO-04-393:

**"Stronger Management Practices Are Needed to Improve DOD's Software-Intensive Weapons Acquisitions".**

A GAO study to:

"...identify the practices used by leading companies...analyze the causes of poor outcomes of selected DOD programs...evaluate DOD's efforts to develop programs for improving software acquisition processes and to assess how these efforts compare with leading companies practices."

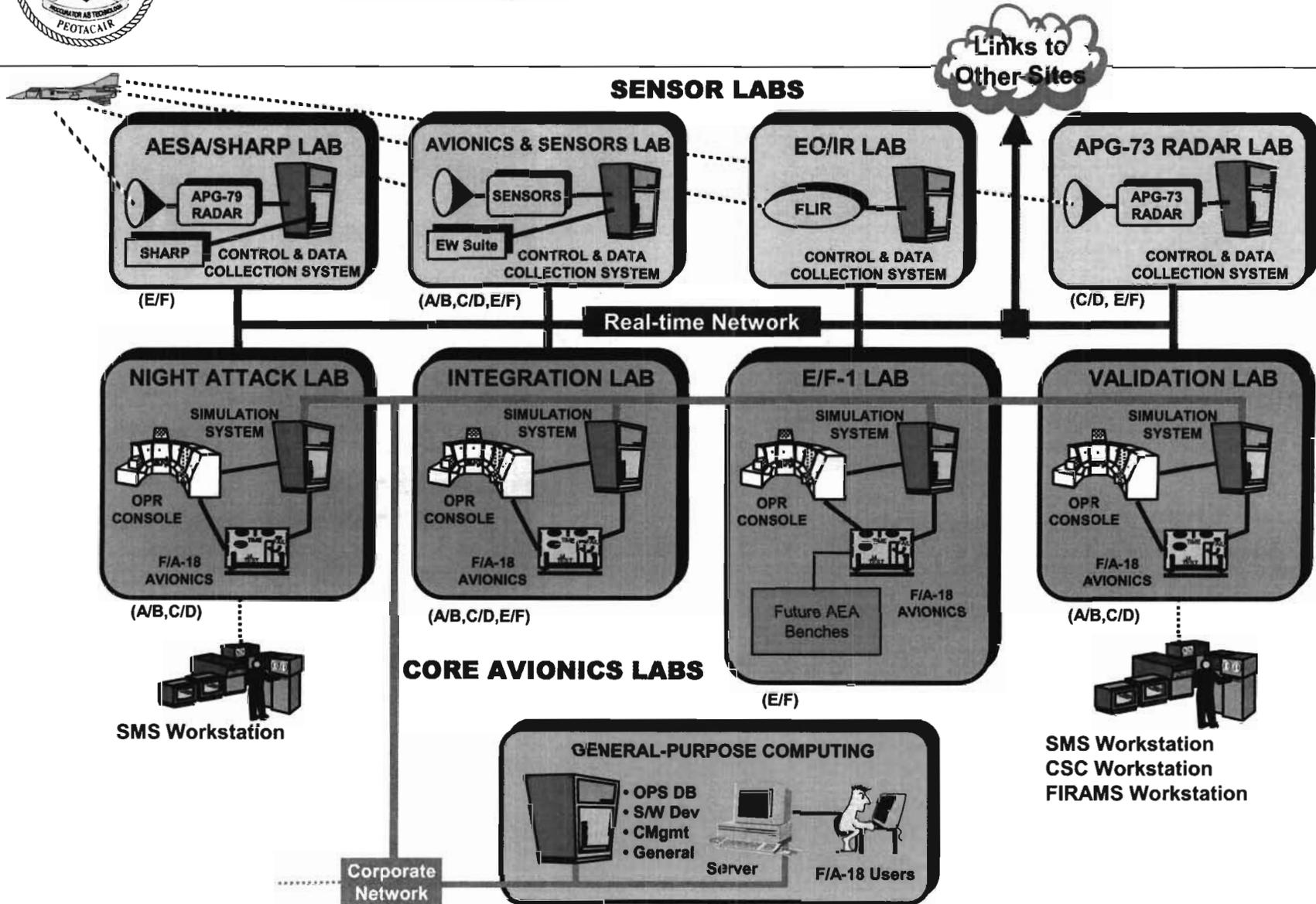
The study was very favorable to the F/A-18C/D in comparisons with 5 other DOD programs and 5 leading commercial companies:

"...and F/A-18C/D programs were developed in an evolutionary environment, engaged in extensive work on requirements, controlled requirements' changes, collected and used detailed metrics to track development progress...."

"...software for the F/A-18C/D...were very successful in meeting initial cost and schedule estimates. These programs emulated leading software development companies practices..."

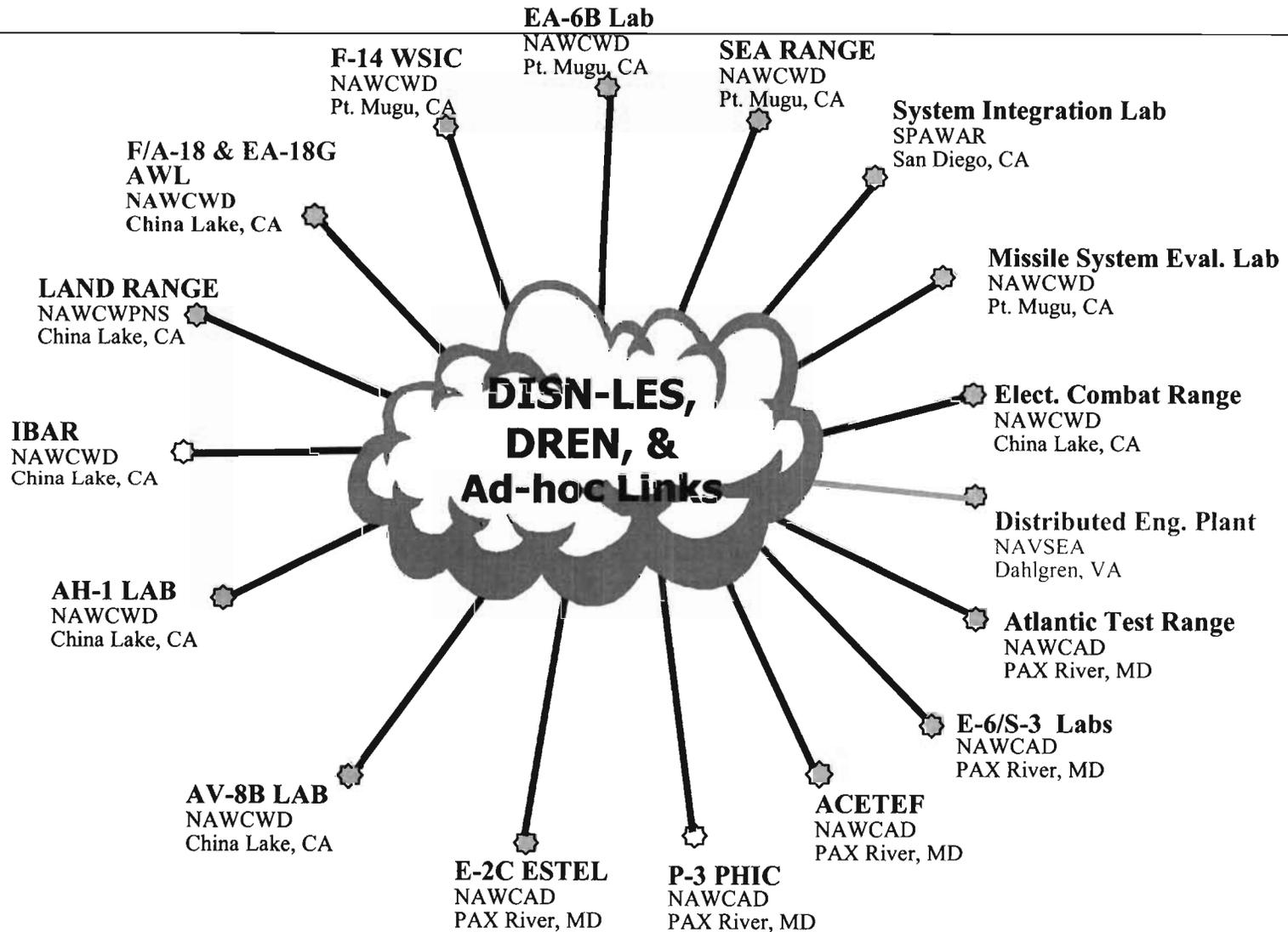


# The F/A-18 AWL Labs



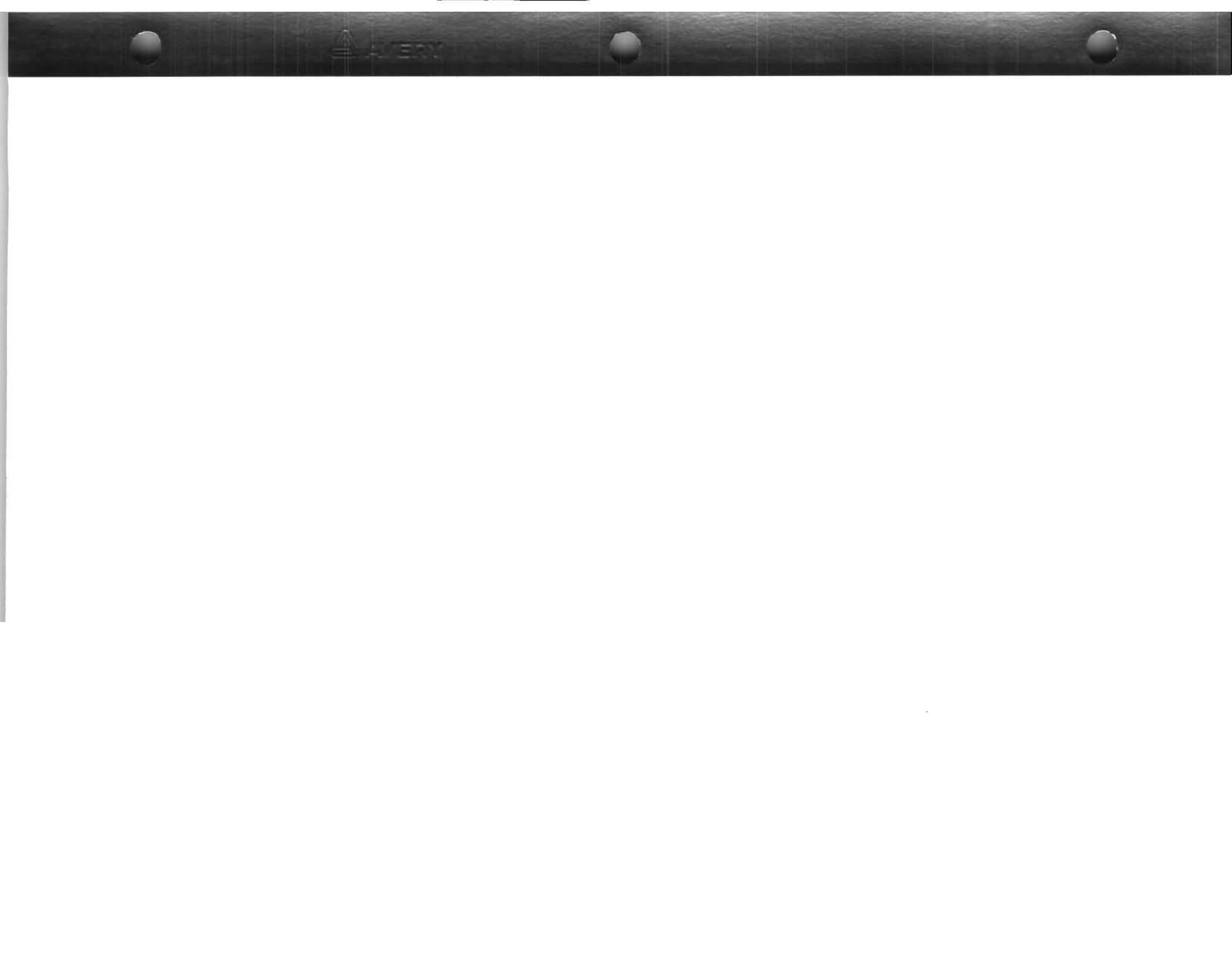


# Missionized Test Via Existing Network Centric Dynamic Lab Links



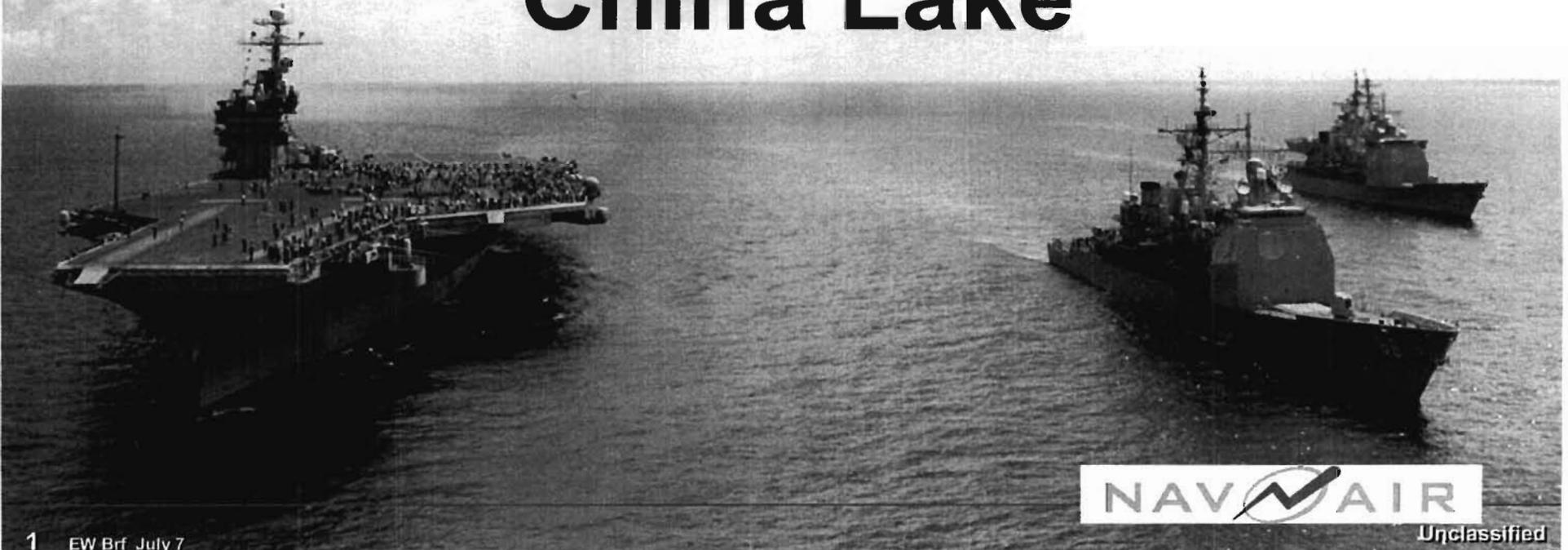


**Questions?**





# EW Capability At NAVAIR Weapons Division China Lake



# OUTLINE

- **Purpose of Today's Briefing**
- **EW Terms of Reference**
- **Comparison of NAVAIR WD Point Mugu and China Lake EW Capabilities**
- **China Lake Programs / Activities Examples**
- **Summary**

# Expected Takeaways

- **NAWC Weapons Division understands and strongly supports the BRAC process goals:**
  - **Recommendations that facilitate transformation**
  - **Recommendations that deliver efficiencies**
- **The recommendations you are reviewing are the result of NAWC input and DoN / DoD analysis**
- **Your analysis will validate whether**
  - **The risks are reasonable**
  - **Transformation is achieved**
  - **Return on investment and efficiencies is substantiated**

# What is Electronic Warfare (EW)?

## *BRAC 05 definition*

- **Electronic Warfare (EW) encompasses the capability to disrupt or degrade an enemy's defenses throughout the areas and times – and across the entire electronic, infrared(IR), and visual spectrums – required to permit the deployment and employment of U.S. and allied combat systems. Electronic Warfare includes capabilities for deceiving, disrupting, or destroying enemy surveillance, command and controls (C<sup>2</sup>), and weapons systems/sensors (e.g., early warning, acquisition and targeting functions) associated with the enemy's integrated air/area defense network. EW also includes the critical capabilities of recognizing attempts by hostile systems to attack or engage U.S. or friendly forces, automatically initiating the appropriate counter-measures or defensive response, and protecting friendly systems through redundancy and hardening.**

# EW Terms of Reference

- **ESM – Electronic Support Measures – search for, intercept, identify, and locate sources of radiated EMR (ELINT, COMINT et cetera) for EW threat recognition. ESM provides data ultimately used to develop ECM, ECCM, avoidance, targeting, mission planning, and other tactical deployment options**
- **ECM – Electronic Countermeasures – involving actions taken to prevent or reduce an enemy's effective use of the electromagnetic spectrum**
- **ECCM – Electronic Counter-countermeasures – involving actions taken to ensure friendly, effective use of EMR despite the enemy's use of electronic warfare**
- **EA – Electronic Attack – involving the use of electromagnetic or directed energy to attack personnel, facilities, or equipment with the intent of degrading, neutralizing, or destroying enemy combat capability**

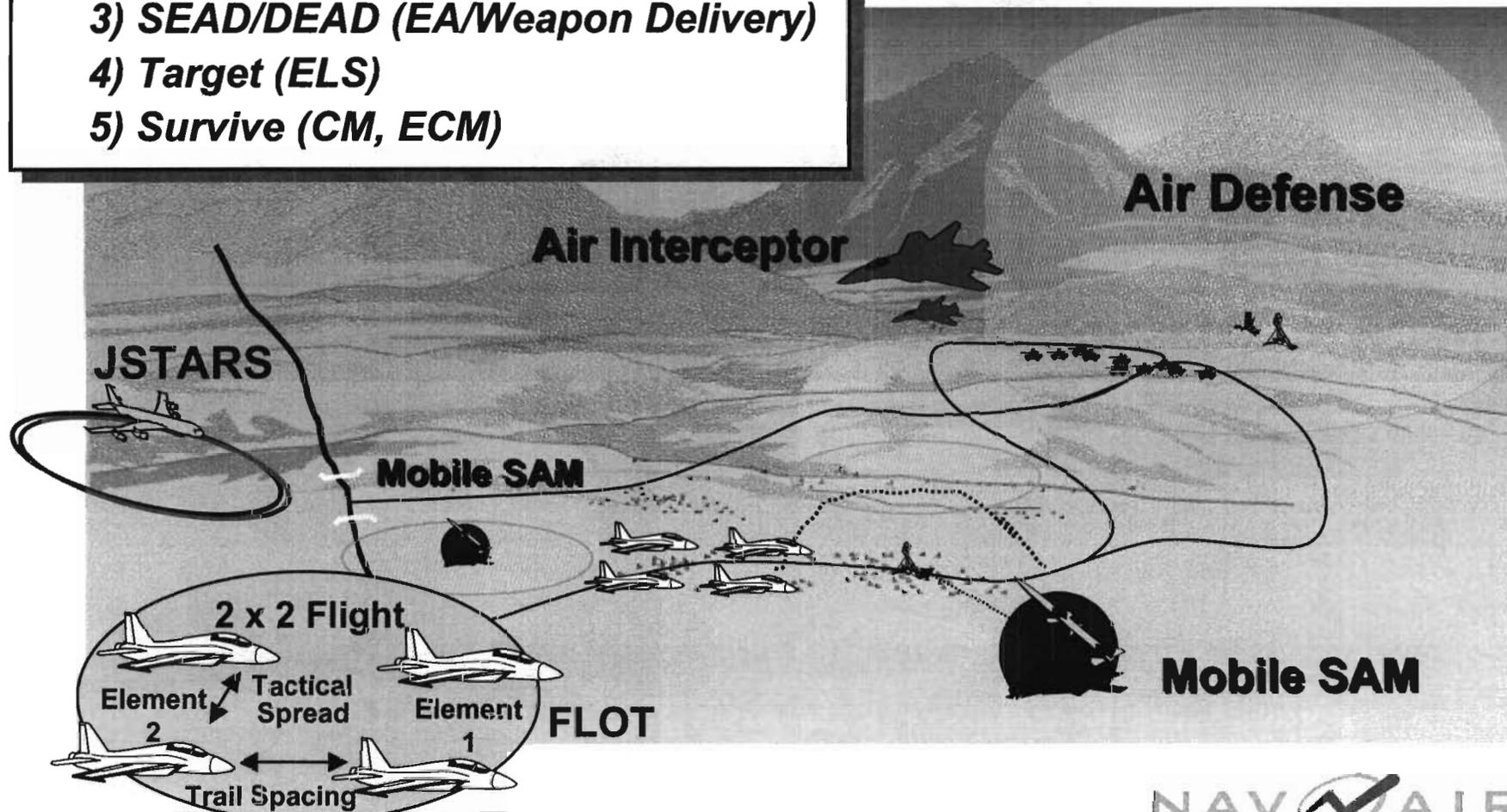
Extracted from The History of US Electronic Warfare, Alfred Price



# Specific Mission Example

## EW Tactical Events:

- 1) *ESM (detect)*
- 2) *Avoid (reroute)*
- 3) *SEAD/DEAD (EA/Weapon Delivery)*
- 4) *Target (ELS)*
- 5) *Survive (CM, ECM)*



# EW Mission Support at NAVAIR Point Mugu, CA

- **EW for Tactical Aircraft (Rotary & Fixed Wing)**
  - Radar Warning Receivers
  - Missile Warning Systems
  - Jammers
  - Dispensers / Expendables
  - Turn-Key Reprogramming Labs / FMS support
- **EW Suite / Systems Integration**
- **EW Data Base Management (EWDB / FIRMS)**
- **USMC Tactical Electronic Reconnaissance Processing & Evaluation System**
- **Airborne Electronic Attack - ICAP 2, ICAP3**
- **Jammer Techniques Optimization (JATO)**
- **EW Mission Planning**
  - JMPS (Joint Mission Planning System)
  - TEAMS (Tactical EA-6B Mission Support)
- **High Fidelity EW Simulation Development & Support**
  - Open / Closed-loop Systems and Capabilities
- **EW Support Equipment (SE)**
  - EW Test Program Set (TPS) Software Development and Fleet Support
  - EW SE Development and Fleet Support
  - Systems Supportability Analysis Services

**OFFPs, UDFs,  
Fleet, &  
Joint Service  
Support**

*Not duplicated at China Lake*

## Naval Air Warfare Center, Weapons Division Sensors, Electronics and Electronic Warfare

		Sensors, Electronics	Electronic Warfare		
<b>China Lake</b>	<p><b>Development</b>  <b>Systems Integration</b>  <b>Test and Evaluation</b>  <b>In-Service Engineering</b>  <b>Life Cycle Support</b></p> <p><b>(333)</b></p>	<p><b>EW Systems Integration (inc FMS)</b>  <b>EW Test and Evaluation</b>  <b>(ECR, JR, AJ GPS, Mongoose etc)</b>  <b>FME, Electronic Attack, ...</b></p> <p><b>(318)</b></p>	12	<b>China Lake</b>	
<b>Point Mugu</b>	-	<p><b>EW Development</b>  <b>EW In-Service Engineering</b>  <b>EW Life Cycle Support</b></p> <p><b>(369)</b></p>		<b>Point Mugu</b>	

# EW Mission Support at NAVAIR China Lake, CA

- China Lake complements Point Mugu EW expertise in the following areas
  - EW Intel analysis and database management
    - HARM, RWR, and non-EA-6B Jammers
  - Next Generation EW Platform Integration
    - EA-18, JSF, UAV/UCAV...
  - Foreign Materials Evaluation – IADS, Weapons
  - ELINT/COMINT Sensor Systems Development
  - TACAIR Radar Warning Systems Expertise
  - Electronic Attack
    - Directed Energy
      - *Destruction* – HPM and Tactical Laser Research and Advanced Development
      - *Disruption* – Multi-mode RADAR
  - Core EW Facilities
  - EW Systems Development and Operational Test and Evaluation

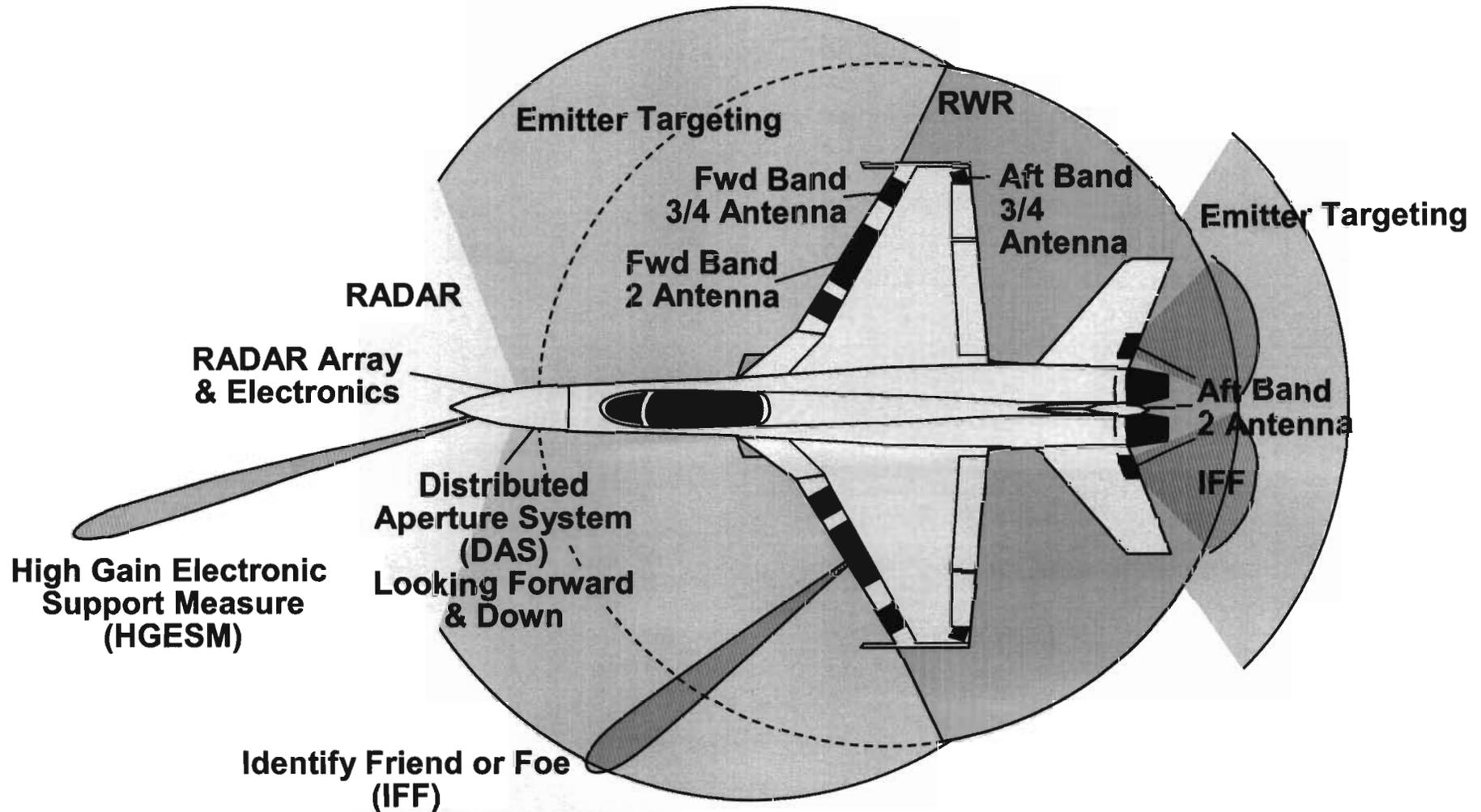
## **EW Intelligence Analysis Process To Support TACAIR EW & HARM Reprogramming**

- **Inputs – Fleet requests, OAG, TACAIR EW Technical Review Board, ARM Steering Committee, Order of Battle data, new emerging threats**
- **Threats list – EW Suite FRD lists, HARM Geo-tailored Emitter lists**
- **Multiple data sources – EWIR DB, FME, other intelligence sources**
- **Emitter Data for Naval Analysis (EDNA) Database-**  
*a relational Database where data is a parametric assessment of the threat emitter, provided to each system for sensor engineering*

# EW Mission Support at NAVAIR China Lake, CA

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# Typical Next Generation EW Platform



**Sensor Suite Coverage Supports SA and Targeting**

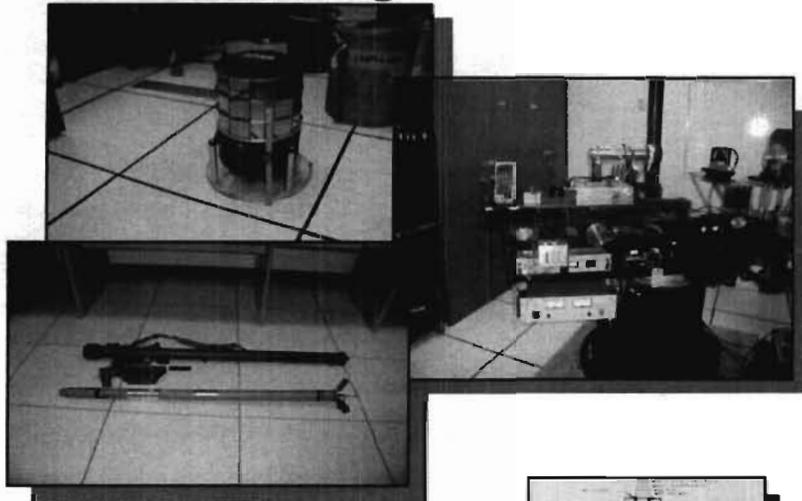


# EW Mission Support at NAVAIR China Lake, CA

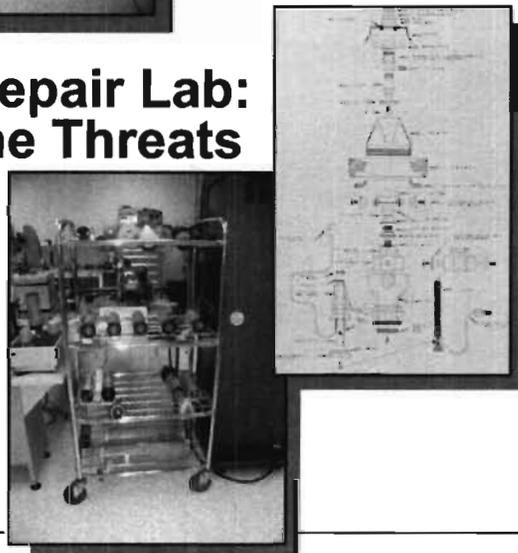
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  - **Foreign Materials Evaluation – IADS, Weapons**
  - ELINT/COMINT Sensor Systems Development
  - TACAIR Radar Warning Systems / Jammer Expertise
  - Electronic Attack
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# Foreign Materials Evaluation

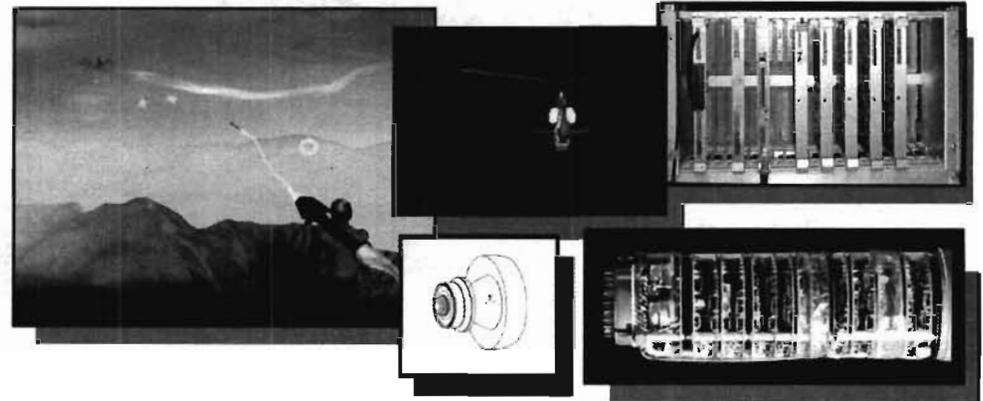
## Electro-optics / Infrared Evaluation Office: Characterizing the Threats



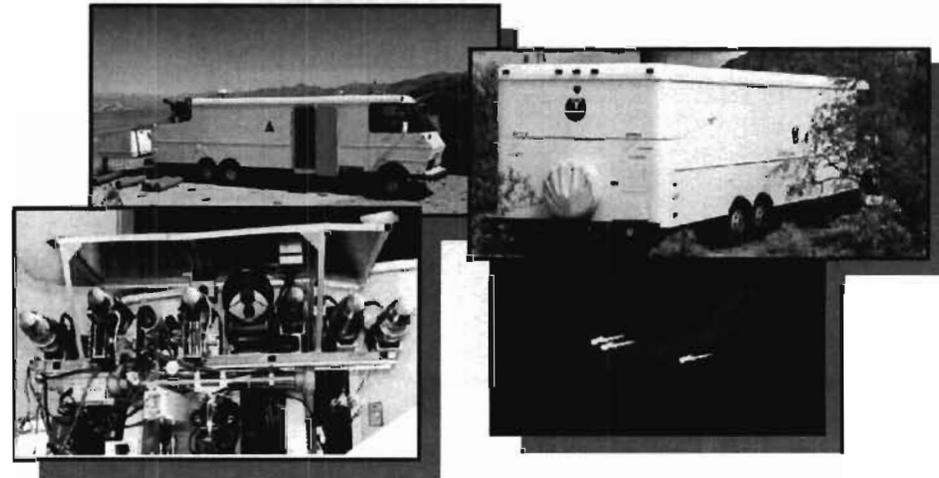
## Seeker Repair Lab: Repair the Threats



## Threat Missile Simulation: Threat Missile in Flight



## Seeker Test Van/Infrared Signature Measurements: Threats in the Field



# EW Mission Support at NAVAIR China Lake, CA

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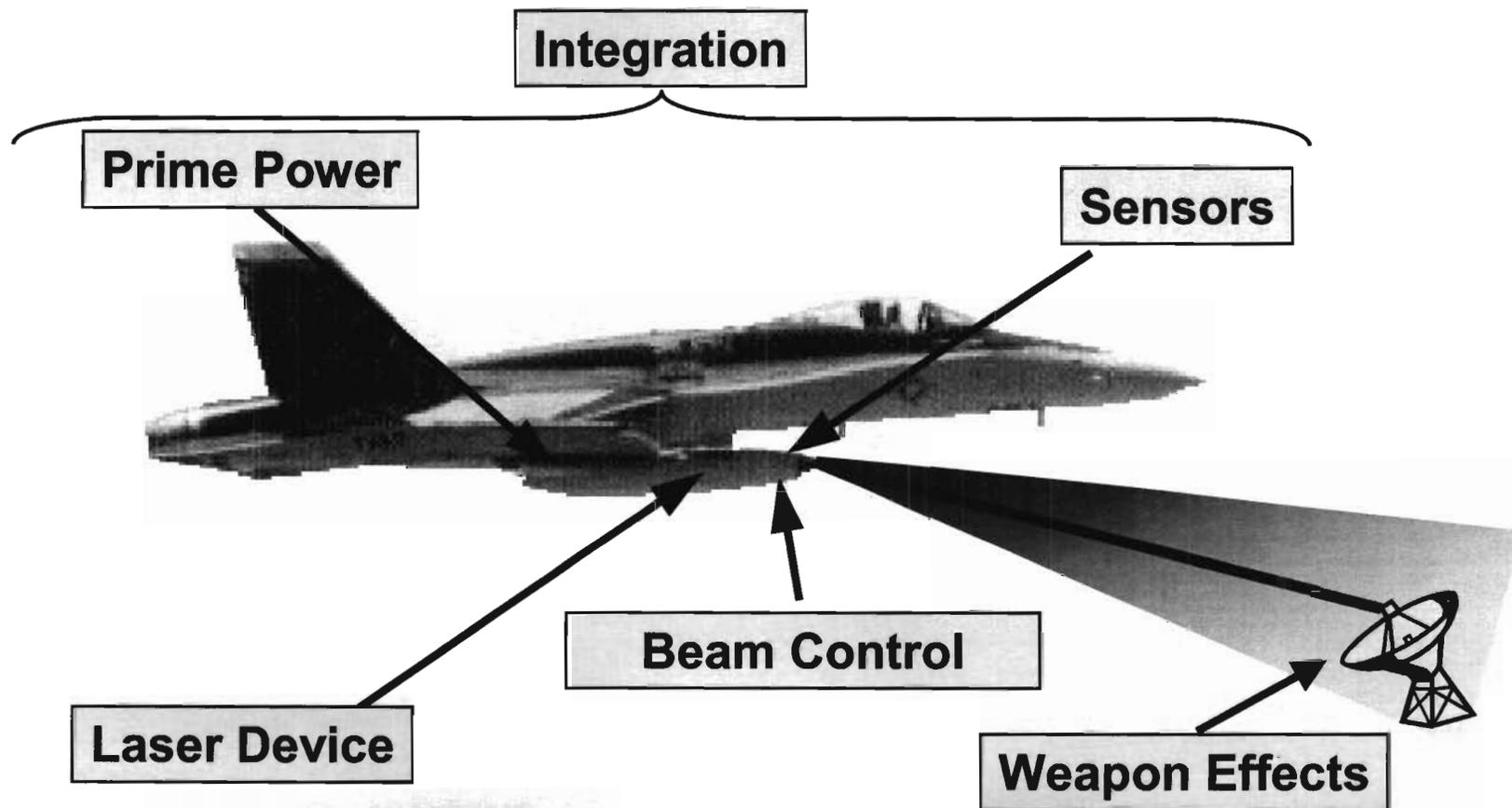
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  - Next Generation EW Platform Integration
    - EA-18, JSF, UAV/UCAV...
  - Foreign Materials Evaluation – IADS, Weapons
  - ELINT/COMINT Sensor Systems Development
  - **TACAIR Radar Warning Systems Expertise** *(this is likely where the 12 people @ Mugu were identified)*
  - Electronic Attack
    - Directed Energy
      - *Destruction* – HPM and Tactical Laser Research and Advanced Development
      - *Disruption* – Multi-mode RADAR
  - Core EW Facilities
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# NAVAL AVIATION DE HEL\* S&T INVESTMENT AREAS

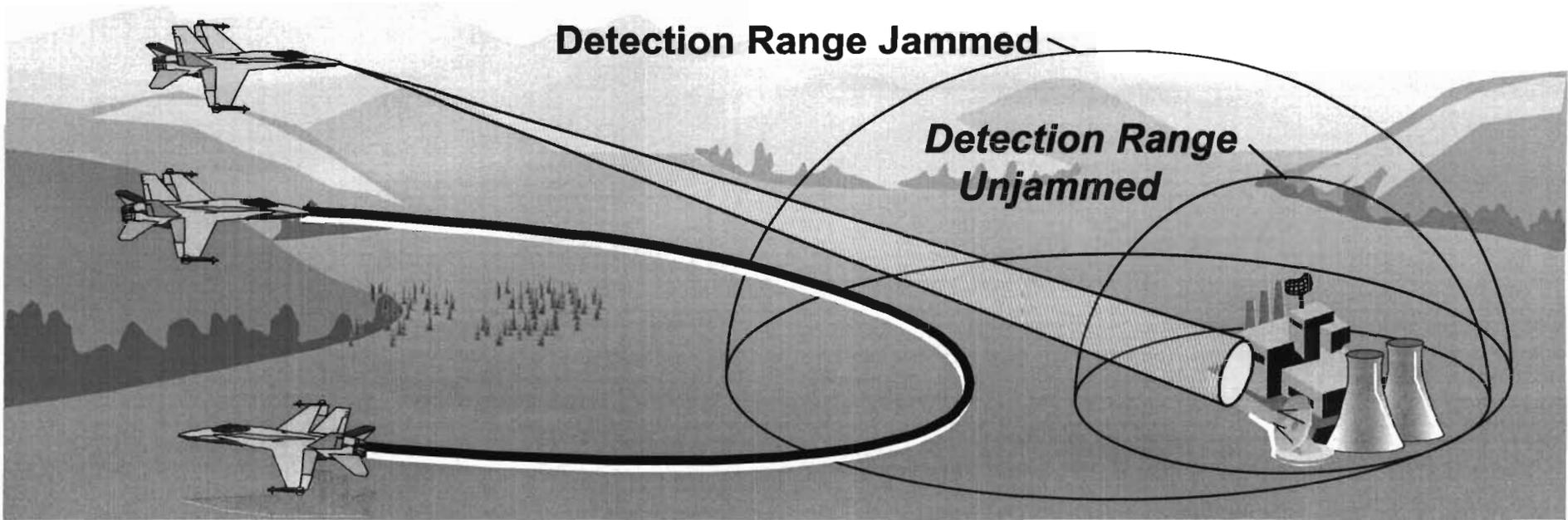
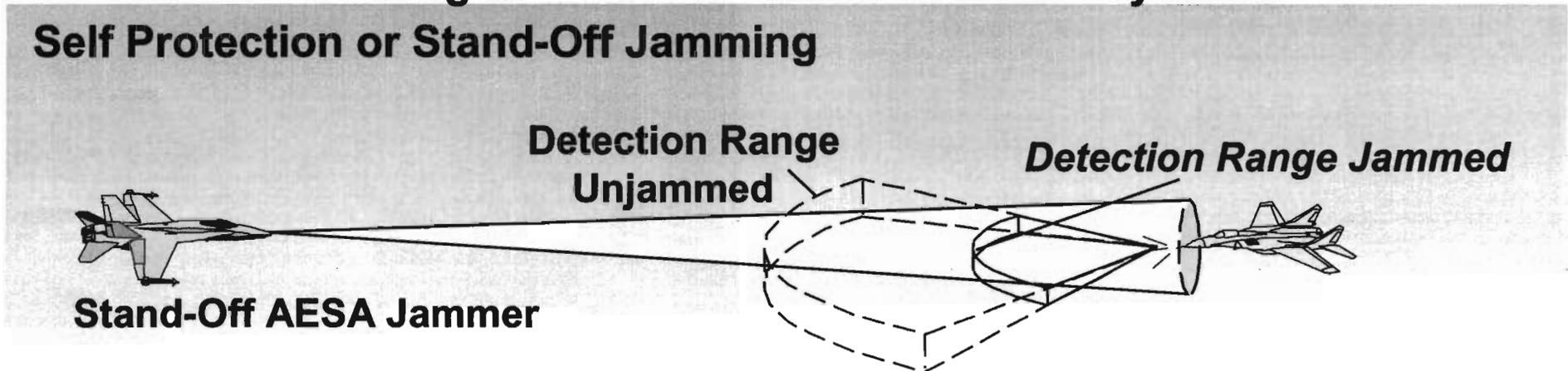


**100 KW+ laser weapon that can be integrated into a flyable platform  
in less than 10 years**

# Electronic Attack –

## utilizing advanced multi-mode sensor systems

### Self Protection or Stand-Off Jamming



# EW Mission Support at NAVAIR China Lake, CA

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## NAWCWD EW FACILITIES COMPLEMENTARITY

- **PT MUGU** (*Bldg 3008*)
  - Electronic Combat Simulation & Evaluation Laboratory (ECSEL): System UDF/OFD Development
  - Iron Crow: Support Equipment Development & TPS
  - EA-6B ICAP II BLK 89: Development and Integration
  - EA-6B ICAP III: Development and Integration
  - EA-18G AEA: Development and Integration
  - Tactical Electronic Reconnaissance Evaluation System (TERPES): Mission Planning & Processing
  - Electronic Warfare Database Support (EWDS): Threat Intelligence Support
  - Jamming Technique Optimization (JATO): Technique Development
- **CHINA LAKE**
  - Electronic Warfare Integration Laboratory (EWIL): Flight Test Support & Data Analysis
  - Electronic Combat Range (ECR): Open Air Range

# EW Mission Support at NAVAIR China Lake, CA

- **China Lake complements Point Mugu EW expertise in the following areas**
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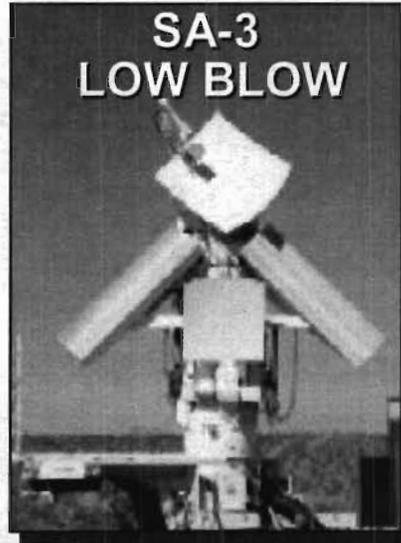
# **EW Systems Developmental / Operational Test And Evaluation Facility**

- **Provide decision-quality test data for development and/or modernization of aircraft EW suite systems**
- **Provide additional support services:**
  - **Combat tactics development and training (TOPGUN)**
  - **Hardware-in-the-loop testing**
  - **Missile flight testing**
  - **Special operations training**
  - **Satellite-based systems and UAV test and training**
  - **NASA JPL and Foreign Military tests**
- **Key functions:**
  - **Acquire / develop air defense threats, range instrumentation, and support facilities**
  - **Operate and maintain the range**

# EW Systems Developmental / Operational Test And Evaluation Facility



SA-2E FAN SONG



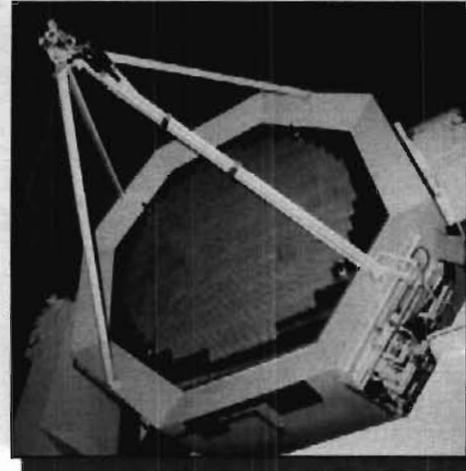
SA-3  
LOW BLOW



SA-8 LAND ROLL



EURO ROLAND II



SA-N-6/SA-10  
TOP DOME / FLAP LID



SPOON REST B

# Summary of NAVAIR WD China Lake 'non-core' EW Functionality

- F/A-18 ASL – EW sub-system integration
- Echleron Valley –
  - Anti-JAM GPS Evaluation/Development
  - High level (optical and RF) directed energy RDT&E
- Foreign Materials Evaluation
- ELINT / COMINT systems DT&E
- Counter-measure dispense systems DT&E
- EW Threat Analysis and Characterization
- Advanced Systems Development

# Summary

- **NAVAIR WD Point Mugu and China Lake possess unique, complementary, and interdependent EW domain knowledge**
  - *This is ‘by design;’ our organization is highly integrated*

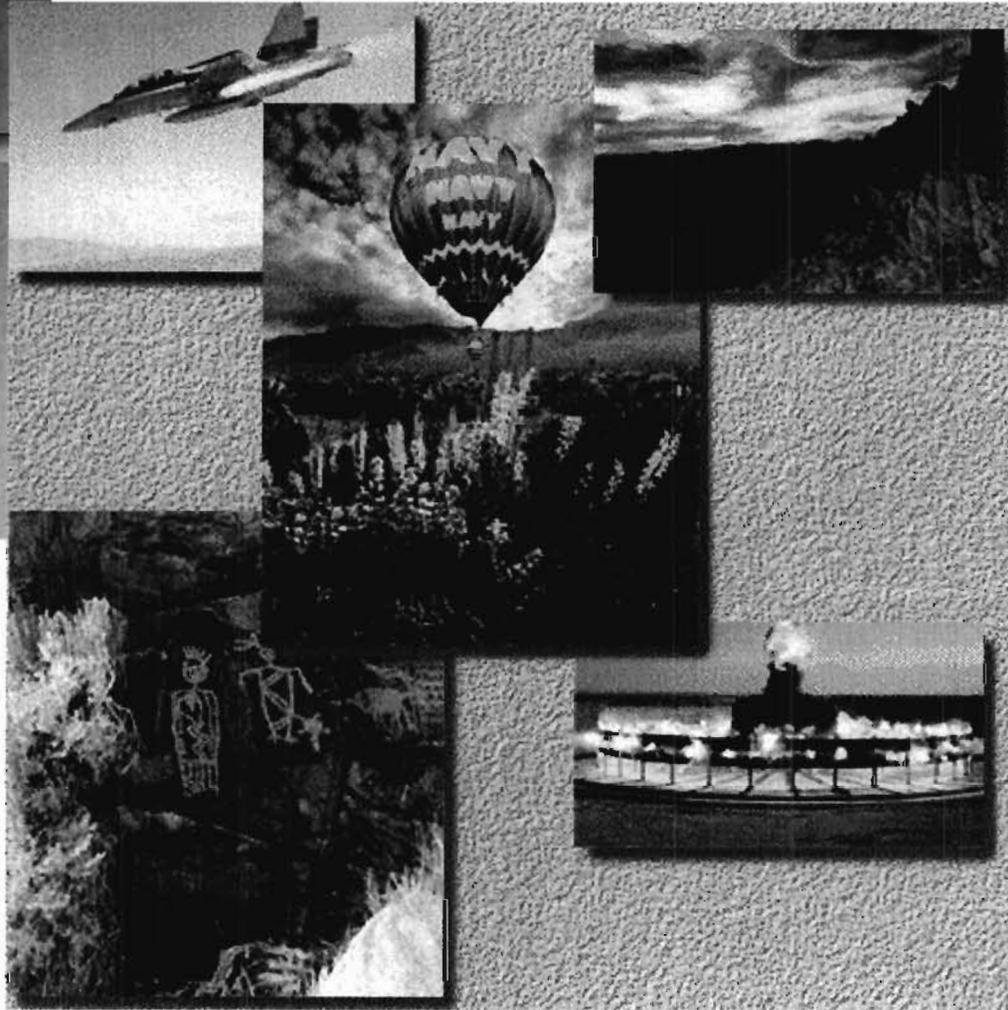
 AVERY

July 2005



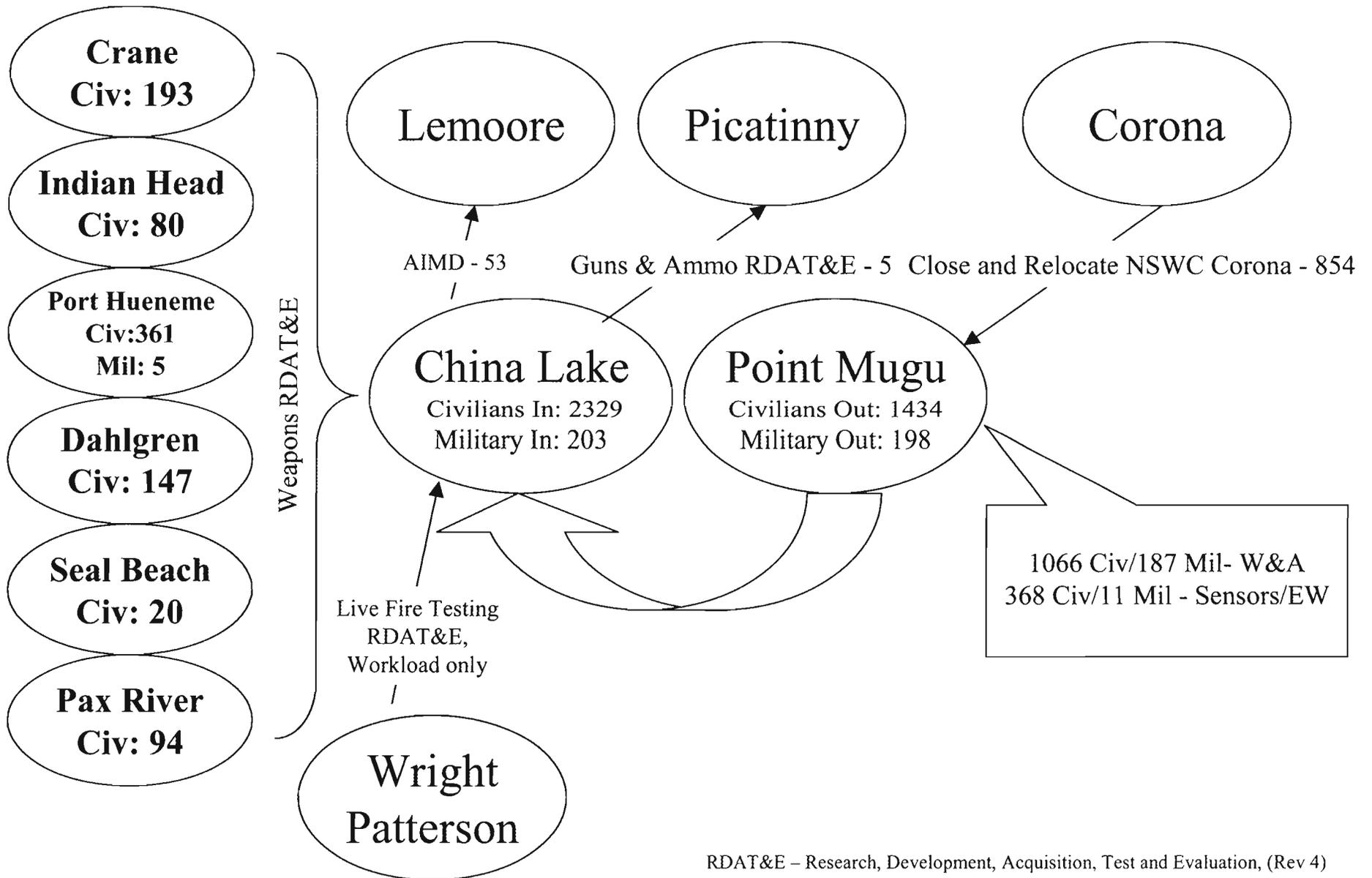
# **NAWS China Lake Realignment**

## **Facilities Planning**



**Captain Mark Storch  
Commanding Officer**

# BRAC 2005 China Lake Site Impacts



# BRAC Realignment at CL

---

- Transfer in. Consolidate seven different sites at China Lake for “Weapons and Armament” RDAT&E
- Transfer in. Sensors, EW and Electronics RDAT&E
- Transfer in. USAF Fixed Wing Live Fire testing
- Transfer out “Guns and Ammunition” RDAT&E to Picatinny Arsenal
- Transfer out Aircraft Intermediate Maintenance Activity to Lemoore (consolidation)

# Realignment Strategy

---

- Integrating three of seventeen scenarios
- Proposals must be
  - ✓ Consistent with the BRAC scenarios
  - ✓ Executable
  - ✓ Reduced to Form-1391 detail by end of July

# Data requested

---

- 1. Identify each building on the base, the building number, the current tenant, the type of building (classroom, laboratory, office, housing, etc.), and the square footage.
- 2. The same information as #1 above except instead of the current tenant, it should show the tenant if ALL incoming BRAC recommendations are approved, but none of the transfers out are approved.
- 3. The same information as #1 above except that instead of the current tenant, it should show the tenant if all incoming and outgoing BRAC recommendations are approved.

# Data Requested (cont.)

---

- Question: How does this Realignment complement your existing mission?
- Question: Can the town of Ridgecrest assimilate the population growth?
- Question: Is the water supply capable of supporting the population growth?

# Questions?



 AVERY

# NAWS China Lake

## Indian Wells Valley Groundwater Resources



Michael Stoner, Water Program Manager

July 11, 2005



- Navy and Community have long history of proactive groundwater management.
  
- IWV Cooperative Groundwater Management Plan signed Sept. 1995. Signatories include:
  - NAWS China Lake
  - IWV Water District
  - City of Ridgecrest
  - Searles Valley Minerals Corporation
  - Inyokern Community Services District
  - IWV Airport District
  - Bureau of Land Management
  - Kern County Water Agency
  - Kern County
  - Eastern Kern County RCD
  - Quist Farms



# IWV Cooperative Groundwater Management Plan

## Purpose

- Set guidelines/management principles for production, distribution and use of groundwater.
- Continue to develop technical and analytical capabilities to better understand the nature/characteristics of the watershed and aquifer system.
- Apply guidelines towards sound management practices to extend the useful life of the resource.
- Coordination between local agencies and water producers to share info and implement management practices to maintain the life of the reservoir.



# IWV Cooperative Groundwater Management Plan

## Objectives and Guidelines

- Limit large scale pumping in specific areas
- Distribute new groundwater extractions to minimize effects on existing conditions and maximize long-term water supply.
- Development and implementation of water conservation and education programs.
- Encourage use of treated, reclaimed, recycled, gray and lower quality water where appropriate and economically feasible.
- Explore potential for additional types of water management programs
- Continue cooperative efforts to develop info and data to further define and understand groundwater resources in the valley
- Develop interagency management framework to implement and enforce objectives of cooperative plan.



# Water Supply Issues

## Historic Groundwater Extractions

Decade High	Extraction Total
1979	27,034 AF ( <i>acre feet</i> )
1985	27,214 AF
1996	30,220 AF
2004	25,000 AF



# Water Supply Issues

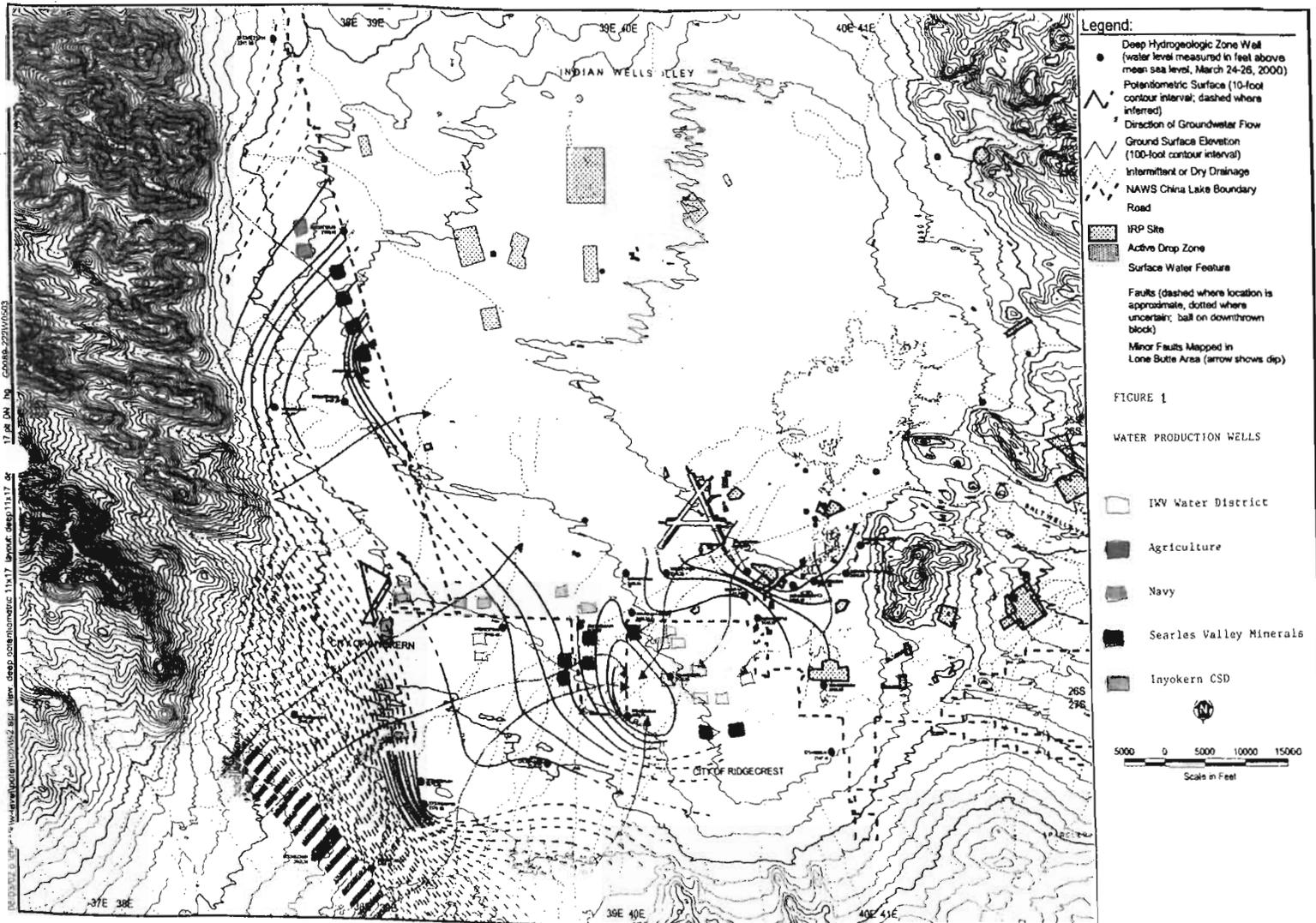
## Current Groundwater Extractions

- May 2005 – R/C Population: 26,493
- 2004 Groundwater Extraction: 25,000 AF/YR
- 2004 Groundwater Extraction Distribution:
  - IWVWD 9,000 AF
  - Agriculture 7,000 AF
  - NAWS CL 2,700 AF
  - SVMC 2,500 AF
  - Domestics 3,000 – 4,000 AF
  - Inyokern CSD 100 AF

Total 24,300 – 25,300 AF



# Groundwater Extraction Locations





# Water Supply Issues

## Water Levels

### Extraction Areas:

- Harvey Wellfield  
    < 1.0 ft/YR decline
- Intermediate Wellfield  
    < 1.0 ft/yr decline
- Ridgecrest Wellfield  
    < 1.0 ft/yr decline
- Southwest Wellfield  
    < 1.0 ft/yr decline
- Domestic Well Areas  
    < 0.20 – 0.50 ft/yr decline
- East-Central/Northern Valley Areas  
    0.00 – 0.20 ft/yr decline



# Aquifer Conditions

## Groundwater in Storage

- IWV Groundwater Basin Size: 385 sq mi
- Useable Groundwater-Basin Size: 110 sq mi
- 2,200,000 AF in storage within upper 200 feet of aquifer
- Recent deep wells indicate saturated sediments approx. 1500 feet thick (more than 5 times original estimate)
- Good aquifer characteristics throughout section



# Aquifer Conditions

## Water Quality in Extraction Areas

- Harvey Wellfield  
TDS decreases since 1970 (500+ppm – 400 ppm)
- Intermediate Wellfield  
TDS increases since 1970's (270 ppm – 290 ppm)
- Ridgecrest Wellfield  
TDS remains static since 1970's (350 ppm – 400 ppm)
- Southwest Wellfield  
TDS increases since 1970's (330 ppm – 340 ppm)



# Aquifer Conditions

## Water Recharge

- Recharge estimates range from 8,000 – 40,000 AF/YR
- Pleistocene water in basin (15,000 – 40,000 years old)
- High quality water in basin (TDS < 500 ppm)
- Recharge from:
  - Adjacent watersheds
  - Perennial streams in adjacent canyons
  - West to east groundwater movement



# Groundwater Recharge

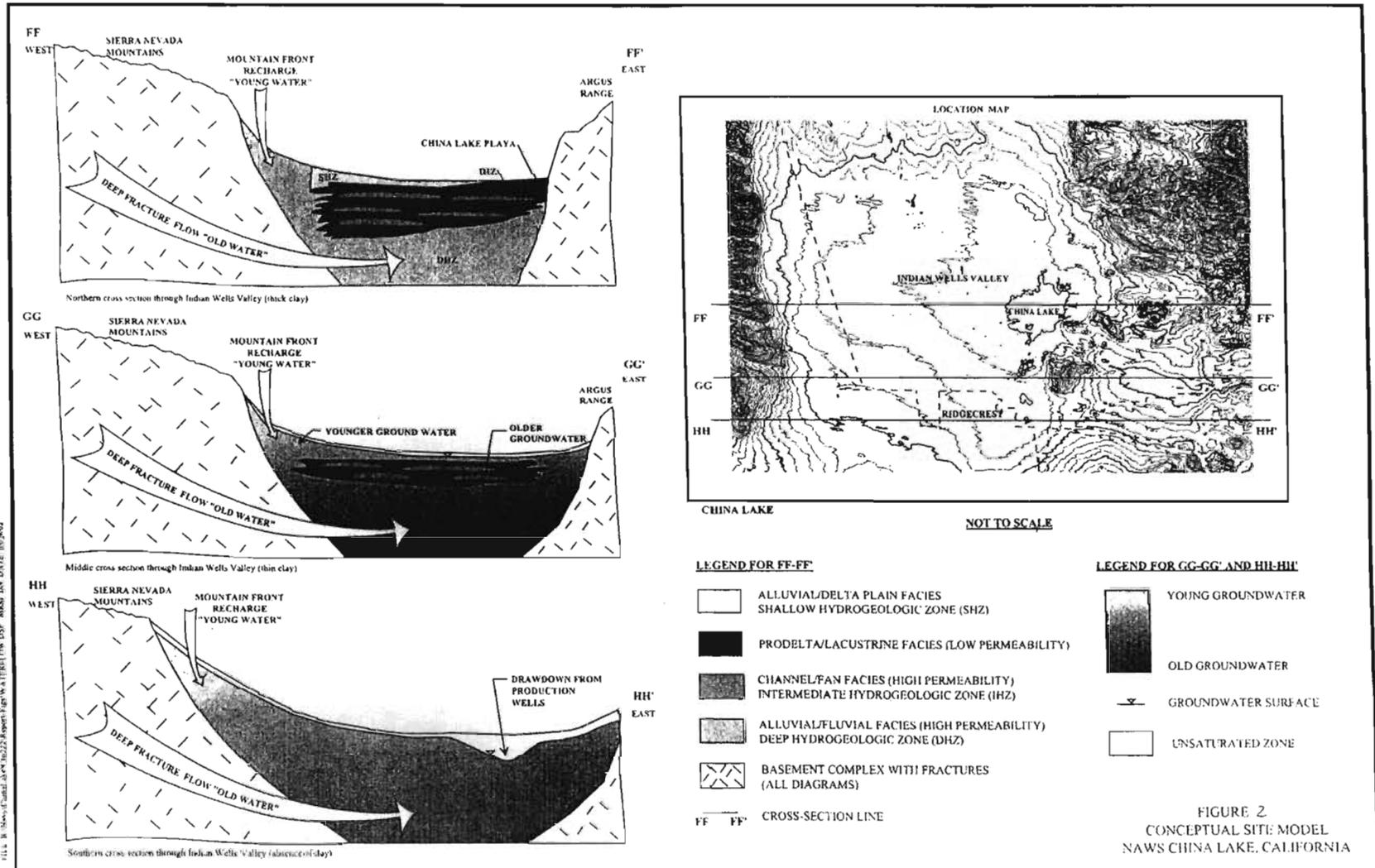


FIGURE 2  
CONCEPTUAL SITE MODEL  
NAWS CHINA LAKE, CALIFORNIA



# Conclusions

1. Based on recent drilling – more groundwater in storage than estimated by USGS. Current estimate: 4M-8M AF.
2. Useable life of basin water resources is 100's of years at current extraction rate (USBR).
3. Water levels in major extraction areas declining up to 1.0 foot/yr. Slight increase in extraction to support population increase is not expected to result in dramatic water level declines.
4. Groundwater quality has improved in one wellfield, slightly degraded in two wellfields and remains constant in another. All wellfields show excellent water quality parameters and no technical reason to expect change with an increase in extraction.



# NAVAIR China Lake Hiring and Retention

BRAC Commission Staff Visit  
7/11/2005

# China Lake Profile

- Civilian Population
  - 1983-1992 = **5160**
  - 1989 Peak # = **5468**
- Current civilian population
  - 2683 plus 384 Shore Station = **3067**
- College recruiting
  - ~**100/yr** 1983–1991
  - **171** Peak intake 1985
  - *Goals met* since inception of “Demo” 1980
- Peak total hires 393 in 2002

- Education    Total    S&E only
  - PHD            118        110
  - Master        410        332
  - Bachelor    1055      839
- Average Length-of-Service
  - 18 years
- Average retention rate per year – 94%

# Region and History

- Kern County is the Most Affordable Home Market in California (2004) according to a March 2004 survey conducted by the California Association of Realtors.

- Bakersfield Population – Metropolitan area ~ 400K

- Antelope Valley (Lancaster/Palmdale)

~430K Population

*'Antelope Valley is one of the fastest growing communities in California'*

- BRAC moves to remote sites
- Warminster move to Patuxent River 1992-6
  - ~25% moved
    - Of those who moved
      - 75% Professional
      - & 10% Technician
- Corona move to China Lake 1969-71
  - ~25% moved
  - Retained many for rest of career

# Realignment Strategy

1. Acknowledge technical excellence of realigned personnel & extend a rich welcome that includes the community along with the technical co-workforce
2. Use the 3-5 years of facility construction & coordination of workload transition period to phase hiring
3. Expand college recruitment program and journey level hiring
4. Survey to understand critical skills required and expand development program for technical areas required
5. Team with bases closing to offer employment
6. Partner with private industry
7. Work with sponsors to phase transition alignment with employee needs
8. Use Demo / NSPS flexible salary setting to offer competitive salaries and broad bands to move people to the funded work
9. Add 1 Temp HR Staffing team of 4 specialists