

2006 11th Expeditionary Warfare Conference
"Joint Expeditionary Operations in an Uncertain World"
Panama City, FL

23-26 October 2006

Onsite Agenda

Tuesday, 24 October 2006

Joint Expeditionary Operations in an Uncertain World by MG Thomas Benes
Relevant Research and Results…. Yesterday, Today, and Tomorrow by Rear Admiral William Landay III
Aviation Update by MG Virgil L. Packett II
Combating Terrorism Technology Support Office by Mr. Edward McCallum

Technology Challenges in an Uncertain World by BG Randolph Alles
Counter-IED RESPONSE IN THE GWOT "Technology Transition for the Current War" by RDML Archer M. Macy
Air Force Engagement in Expeditionary Warfare by BG Kevin Henabray

Wednesday, 25 October 2006

AEGIS – Ballistic Missile Defense by Rear Admiral Buzz Buzby
NDIA Brief 2006 by CAPT Eugene Gray
Navy Expeditionary Combat Command Navy Expeditionary Combat Command by CAPT John Sturges

Recapitalizing the Navy's Battle-Line by CDR Greg Gombert

Force Structure UnCertainty by VADM Terry Etnyre

We are Ships from Cradle to Grave by RADM Charles Hamilton

Force Structure Uncertainty by Mr. James E. Thomsen

Sea Control and Expeditionary Power Projection by BG Thomas L. Conant

Monday, October 23, 2006

8:00 a.m.	Annual Golf Tournament-Shotgun Start Sponsored by **Northrop Grumman Ship Systems**	Nicklaus Golf Course
3:00 p.m. - 7:00 p.m.	Early Registration	St. Andrew's Foyer
3:00 p.m.	Cyber Café Opens	Spanish Moss "A"
3:00 p.m. - 4:30 p.m.	Spouse Welcoming Tea **Spouses are invited to get acquainted and plan their activities during the conference (Please register your spouse for this complimentary event)**	Palms Court Terrace
6:00 p.m. - 7:00 p.m	Reception Sponsored by **AVW Technologies**	Display Area
7:00 p.m. - 9:00 p.m.	Dinner **Guest Speaker:** Lieutenant General James F. Amos, USMC Commanding General, Marine Corps Combat Development Command	Grand Lagoon Ballroom

Tuesday, October 24, 2006

Opening Session

6:30 a.m.	Registration	
6:30 a.m.	Continental Breakfast Sponsored by **ARINC**	Display Area
7:30 a.m. - 8:00 a.m.	**Welcome and Opening Remarks** Mr. Duane Covert, Northrop Grumman MS, NDIA EWC Chairman Rear Admiral Steven G. Smith, USN (Ret), ViaGlobal Group, LLC, Chairman, EW Division Lieutenant General Lawrence P. Farrell, Jr., USAF (Ret), President and CEO, NDIA Captain Andrew Buduo, USN, Commanding Officer, Naval Surface Warfare Center, Panama City	St. Andrews
8:00 a.m. -8:45 a.m.	Major General Thomas Benes, USMC, Director, Expeditionary Warfare Division, OPNAV N85	
8:45 a.m. - 9:30 a.m.	Brigadier General Robin Swan, USA, Army Capabilities Integration Center, TRADOC	
9:30 a.m. - 10:00 a.m.	Break Sponsored by **Lockheed Martin**	
10:00 a.m. - 10:45 a.m.	USAF Speaker TBD	
10:45 a.m. - 11:30 a.m.	General Robert Magnus, USMC Assistant Commandant of the Marine Corps	
11:30 a.m. - 12:45 p.m.	Networking Luncheon	Grand Lagoon Ballroom
12:45 p.m. - 1:30 p.m.	Lieutenant General Jan Huly, USMC, Deputy Commandant, Plans, Policy and Operations, Headquarters, USMC	

Technology Challenges in an Uncertain World

Session Chairman: Mr. Michael Janay, AFM-USA, Inc.

Session Focus: The challenges and issues facing Joint and Coalition Forces in Iraq and Afghanistan, where insurgents operate outside established warfare parameters, require an immediate and concerted effort to find technological solutions. This session will focus on DoD strategies and industry opportunities to mitigate and eliminate the threats in the current Global War on Terror and the uncertain future world.

1:30 p.m. - 2:00 p.m.	**Keynote Speaker:** Rear Admiral William Landay, USN, Chief of Naval Research
2:00 p.m. - 3:15 p.m.	**Panel Members:** Major General Virgil L. Packett, II, USA, Commanding General, US Army Aviation Warfightimg Center Mr. Edward McCallum, Technical Support Working Group Brigadier General Randolph G. Alles, USMC, Commanding General Marine Corps Warfighting Lab Rear Admiral Arch Macy, USN, Commander, Naval Surface Warfare Center **Moderated by:** General Al Gray, USMC (Ret)
3:15 p.m. - 3:45 p.m.	Break Sponsored by **Austal USA**
3:45 p.m. - 4:30 p.m.	**Panel Question and Answer period**
	Evening Free

Wednesday, October 25, 2006

6:45 a.m. - 7:30 a.m.	Continental Breakfast Sponsored by **BAE Systems**	Display Area
7:30 a.m. - 8:15 a.m.	Vice Admiral John G. Morgan, USN, Deputy CNO for Information, Plans and Stategy (N3/N5)	
8:15 a.m. - 8:30 a.m.	Short Break	

Warfighting Challenges in the Littorals

Session Chairman: Rear Admiral Dennis Conley, USN (Ret), Strategic Insight

Session Focus: Joint Warfighting in the littoral requires the application of multi-dimensional offensive and defensive capability on and above the sea, on and over land, and below the sea surface. This session will focus on the challenges and issues facing Joint Forces in the development and deployment of integrated capability to conduct combat operations in the littoral including operations in river deltas, near coastal areas, and the introduction of expeditionary ground and air forces into areas of uncertainty. We will include discussion of harbor and coastal defense, mine warfare, Marine Corps operations, Integrated Air and Missile Defense and the connection of these operations to overall global maritime and littoral dominance in the protection of the U.S.

8:30 a.m. - 9:15 a.m.	**Keynote Speaker:** Rear Admiral Jack Hines, USN, Deputy Commander, THIRD Fleet
9:15 a.m. - 10:15 a.m.	**Panel Presentations:** Brigadier General Joseph F. Dunford, Jr., USMC, Director, Operations Division, Plans, Policy and Operations, HQ USMC Rear Admiral Buzz Buzby, USN, Deputy Director, Surface Warfare Division, OPNAV N86B Captain Eugene Gray, USCG, Chief of Security and Defense Operations, Coast Guard Headquarters Captain John Sturges, USN, Commander Navy Coastal Warfare Group ONE/Navy Expeditionary Combat Command (NECC) Representative **Moderated by:** Major General Harry Jenkins, USMC (Ret)
10:15 a.m. - 10:45 a.m.	Break Sponsored by **Sonar Systems a DRS/Thaless Company**
10:45 a.m. - 11:30 a.m.	**Panel Question and Answer period**
11:40 a.m. - 1:15 p.m.	**Lunch Speaker:** The Honorable Donald C. Winter Secretary of the Navy

Force Structure Uncertainty

Session Chairman: Rear Admiral Bill Fogarty, USN (Ret), BAE Systems

Session Focus: To address the Issues and Challenges associated with Force Structure that are/will be facing decision-makers as we face uncertainties, both as regards threats to our country and fiscal restraints. "What is the right Force mix, and can we afford it?" That is the question we will explore in this session.

1:30 p.m. - 2:15 p.m.	**Keynote Speaker:** Vice Admiral Terrance T. Etnyre, USN, Commander, Naval Surface Forces
2:15 p.m. - 3:15 p.m.`	**Panel Members:** Rear Admiral Charles Hamilton, USN, Program Executive Officer SHIPS Mr. James E. Thomsen, Program Executive Officer Littoral and Mine Warfare Ms. Jo Decker, Assistant Deputy CNO for Integration of Capabilities and Resources, OPNAV N8B Brigadier General Thomas Conant, USMC, Assistant Deputy Commandant for Combat Development **Moderated by:** Rear Admiral Bill Fogarty, USN (Ret), BAE Systems
3:15 p.m. - 3:45 p.m.	Break Sponsored by **Triton Services**
3:45 p.m. - 4:30 p.m.	**Panel Question and Answer Period**
4:45 p.m.	First bus departs for NSWC PC
5:00 p.m. - 7:00 p.m.	NSWC PC Open House Networking Reception Sponsored by **EDO Corporation & Raytheon Corporation**
7:00 p.m. - 10:00 p.m.	Pig Roast
10:00 p.m.	Last bus departs NSWC PC for Bay Point Marriott

Thursday, October 26, 2006

6:45 a.m. - 7:45 a.m.	Continental Breakfast Sponsored by **The Boeing Company**	Display Area
7:45 a.m. - 8:30 a.m.	Rear Admiral Mike Lefever, USN, Former Commander Expeditionary Strike Group One and CJTF Disaster Assistance Pakistan	

Joint Interoperability of Unmanned Systems in Expeditionary Warfare

Session Chairman: Mr. Skip Gaskill, AAI Corporation

Session Focus: With the rapid growth of both Joint and Service unique requirements for Unmanned Systems and with the uncertainties of an ever-changing world, it is imperative that DoD and Industry focus on the challenges of meeting those requirements while keeping in mind the requirements for interoperability. This session will focus on both Joint and Service unique requirements, current developmental efforts, and interoperability challenges of Unmanned Air, Ground, Surface, and Subsurface Systems.

8:30 a.m. - 9:15 a.m.	**Keynote Speaker:** Mr. Barry Dillon, Executive Director, Marine Corps Systems Command
9:15 a.m. - 9:55 a.m.	**Presentations:** Lieutenant Colonel Jennifer Jensen, USA, Program Manager One System Ground Control Station (OSGCS) Colonel Frank Kelly, USMC, Program Manager Unmanned Systems, Marine Corps Systems Command
9:55 a.m. - 10:25 a.m.	Break Sponsored by **Maersk Line, Limited**
10:25 a.m. - 11:05 a.m.	**Presentations:** Colonel Terry Griffin, USMC, Joint Program Office, Unmanned Ground Systems Lieutenant Colonel Steven Tanner, USAF, Doctrine/Training Division Chief, Joint Unmanned Aerial Systems Center of Excellence **Moderated by:** Mr. Helmut Portmann, Deputy Product Area Director, Littoral and Mine Warfare
11:05 a.m. - 11:50 a.m.	**Panel Question and Answer period**
11:50 a.m. - 12:00 p.m.	Closing Remarks
12:00 p.m.	Lunch

CONFERENCE ADJOURNS UPON COMPLETION OF LUNCH

12th Annual Expeditionary Warfare Conference

October 22 - 25, 2007



Technology Challenges in an Uncertain World

Commanding General, Marine Corps Warfighting Lab

Vice Chief of Naval Research

BGen Randolph Alles

www.mcwl.quantico.usmc.mil

24 October 2006

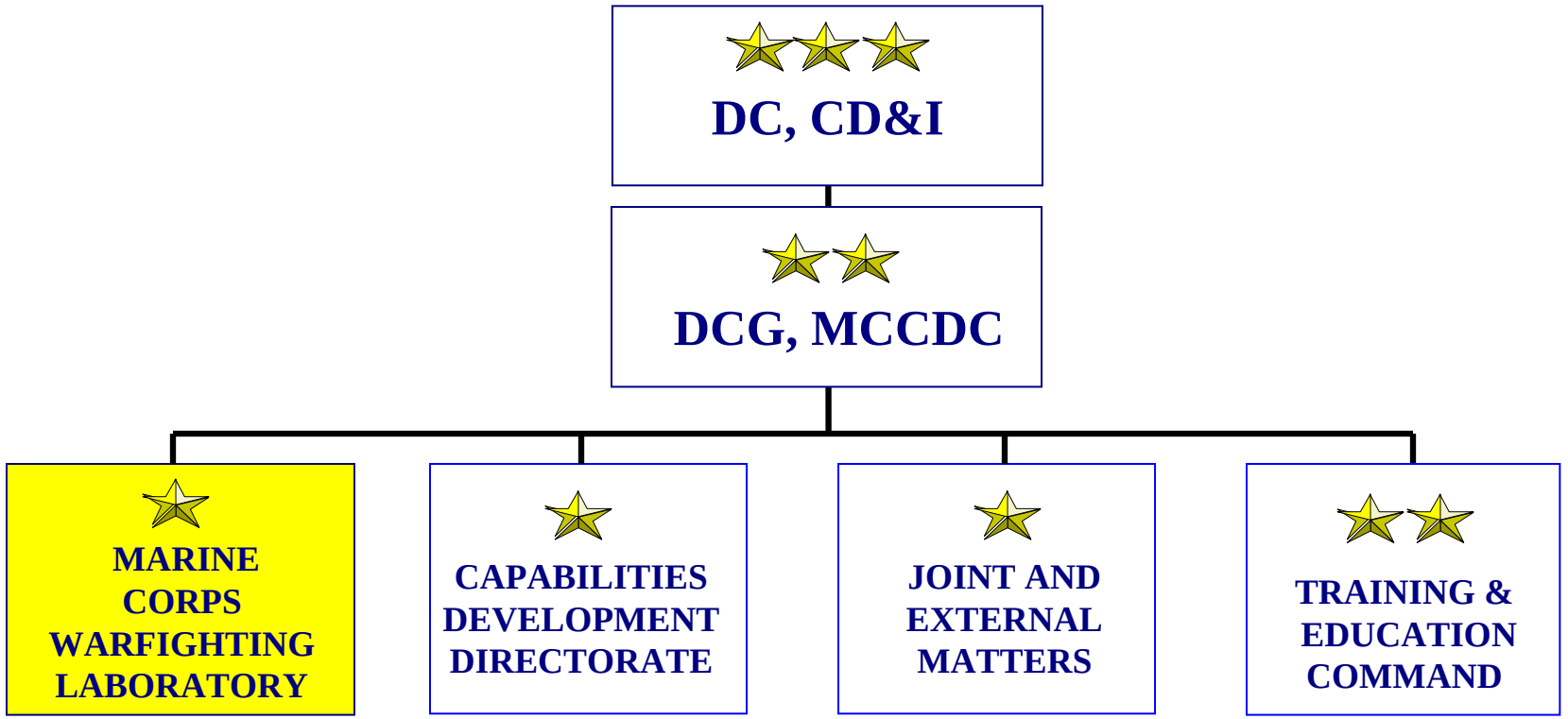
Mission

The Lab develops **concepts**, conducts ***concept-based experimentation*** to develop and evaluate ***tactics, techniques, procedures and technologies*** in order to enhance Marine Corps warfighting capabilities.





Integral Part of the Combat Development Enterprise



The Lab CG is also Vice Chief of Naval Research,
Executive Agent for S&T, and EA for Tech Support to OIF/OEF

Experimentation Continuum

The Three Worlds of Innovation and Transformation



Solving Immediate Problems



The Next Service

4-5 years



The Service After Next

10-15 years

Marine Corps Experimentation and S&T supports Naval Transformation Roadmap

Tactical Experimentation









Current Emphasis:
Distributed Operations

Distributed Operations
(Challenges)

- Sustainment / Logistics
  - Distance / Threat / Concealment
- CASEVAC
  - Distance / Threat / Golden Hour
- Communications
  - Reliable / Global / Weight / Batteries
- Training
  - Use of Simulation

Technology Priorities Conceptually

- Make our ***small units dominant***, akin to our aviation at 15K feet or our Navy on the high seas
- Consider the ***Marine as a part of a system***, so we don't just concentrate on giving an individual the best gear, but gain synergy (comms, jammers, ISR, etc.) from the system
- Find and avoid minefields by their ***anomalies***.
- Strengthen our ability to sensitize our troops to ***cultural and language*** capabilities – enable the human interface

Technology Priorities
Specific Targets

- ***Achieve persistent, focused ISR over the battlespace.***
- Find and predetonate improvised explosive devices.
- **Halve the weight of the basic fighting load of the infantryman**
- Incorporating common electrical power without the variety of short life batteries
- **Make infantrymen bulletproof and climatically controlled within ten years**
- A helmet with a pilot-like HUD containing optics, protection, data display & comms
- A day/night scope for infantry weapons
- Simulators that approximate the real conditions for squads are needed
- Combat identification of friendly forces and easily position location information read/transmitted in real time and displayed.
- EMP shielding and chem-bio protection
- Adaptive camouflage that conforms to the environment and light conditions.

Wasp Micro UAS

- DARPA funded Micro Air Vehicle
- Platoon Leader's "Binoculars forward"
- 4-5 Km -- 1 Hour Duration
- 35 WASP Systems over 18 months (137 Air Vehicles)
- Validation of requirement anticipated Summer 06
- Controlled insertion of technology into forward deployed units



Improved Personnel Armor



Problem remains the <u>accumulative</u> weight

Lighten the Load

- Basic Combat Load:
  - Armor
  - Ammo, food, water
  - Environmental protection
  - ***Power source!***
- Every infantryman a seat?
- Exoskeleton?
- Squad equipment carrier (UGV)?



Big Dog Robotic Quadruped

- DARPA funded Robot
- Squad Leader's "Pack Mule"
- 4 MPH (10 MPH goal)
- 2 Prototypes over 18 months
- Incorporated into DO experiments
- USMC partnering with **DARPA** to set expectation of capabilities
- **Demo of mobility on Quantico's hill trail in summer 07**



Exploring concept of a Big Dog 81mm Mortar Carrier

Industry Participation

- What can industry do?
  - Respond to our requests – RFIs / BAAs
  - Respond to our needs (capability gaps) – both known and unknown
- Don’t wait for us!
  - Bring your ideas to us!
    - Familiarize yourself with current and future concepts
    - We are open to your ideas, planned products, briefs, presentations.

Vehicle Armor Weight

Distributed Operations

Body Armor

QUESTIONS?

Counter IED

Persistent Surveillance

Non-lethal

Ground Simulation

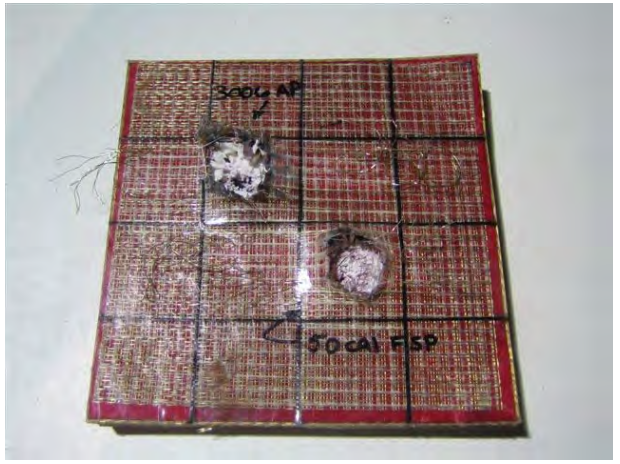
Reduce the number of radios / weight

Vehicle Composite Armor

- Greater Protection
- Lighter
- Affordable
- Adaptable







X-Files--After Action Reports



Marine Corps Warfighting Laboratory

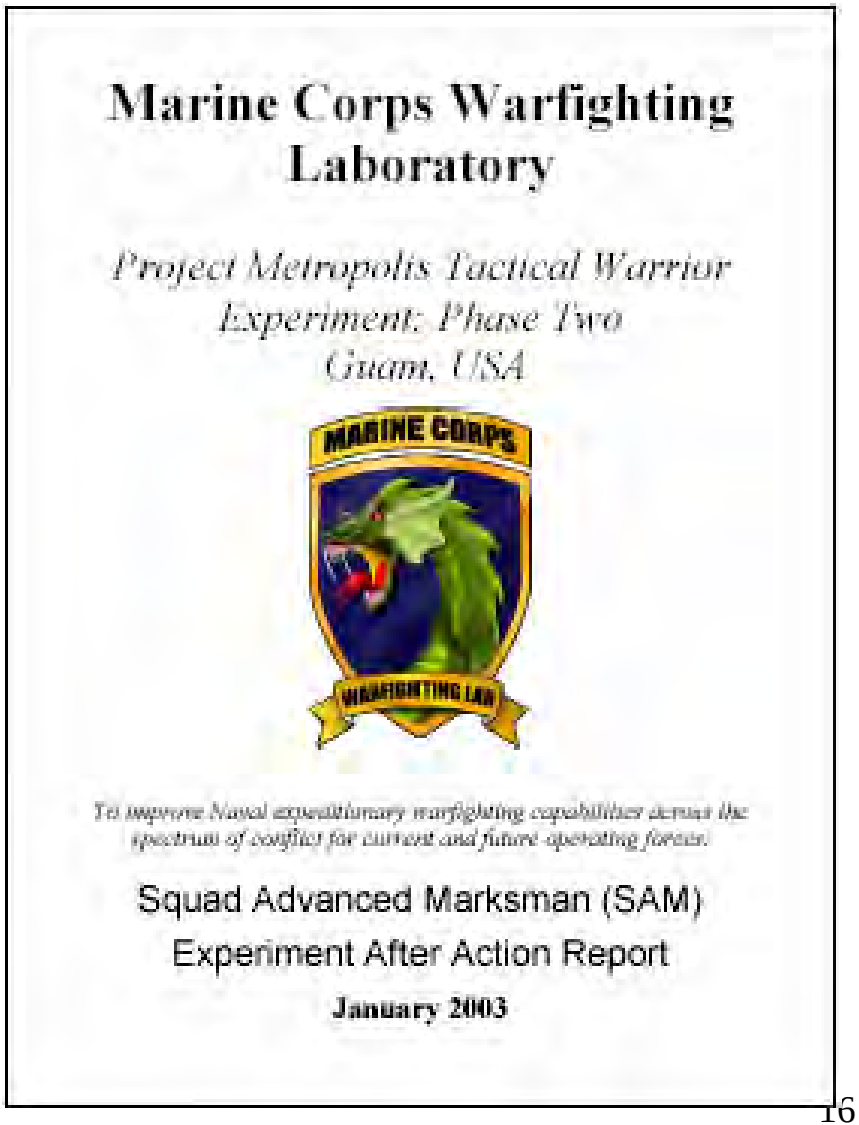
Millennium Dragon 02
(MD 02)

MARINE CORPS
WARFIGHTING LAB

Experiment After Action Report

To improve Naval expeditionary warfighting capabilities across the spectrum of conflict for current and future operating forces.

30 July – 12 August 2002



Marine Corps Warfighting Laboratory

Project Metropolis Tactical Warrior Experiment: Phase Two
Guam, USA

MARINE CORPS
WARFIGHTING LAB

To improve Naval expeditionary warfighting capabilities across the spectrum of conflict for current and future operating forces.

Squad Advanced Marksman (SAM)
Experiment After Action Report

January 2003

XM326 120MM Mortar System

- Tested with C-RAM system at Yuma
- Just completed 192 rounds fired
- Achieved 58 second (end-to-end missions)
- Less than 15m CEP



Counter Rocket and Mortar

- Follow-on to current effort
- Networked Radars
- Mobile platform
- LAV(M) w/XM 326
- AFATDS compatible
- Just completed 192 rounds
- Achieved 58 second (end-to-end missions)
- Less than 15m CEP



Mobile C-RAM

Counter-IED RESPONSE IN THE GWOT

"Technology Transition for the Current War"

RDML Archer M. Macy, USN
Commander, Naval Surface Warfare Center
23 October 2006

This presentation is Unclassified

Historical Context



	% Artillery & Mortar	WIA:KIA
Vietnam	36% KIA, 65% WIA	2.6:1
Korea	44% KIA	3:1
WWII	46% KIA	2:1

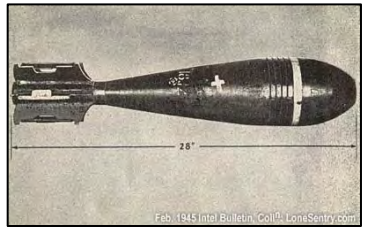


OIF/OEF

52% Casualties from IEDS

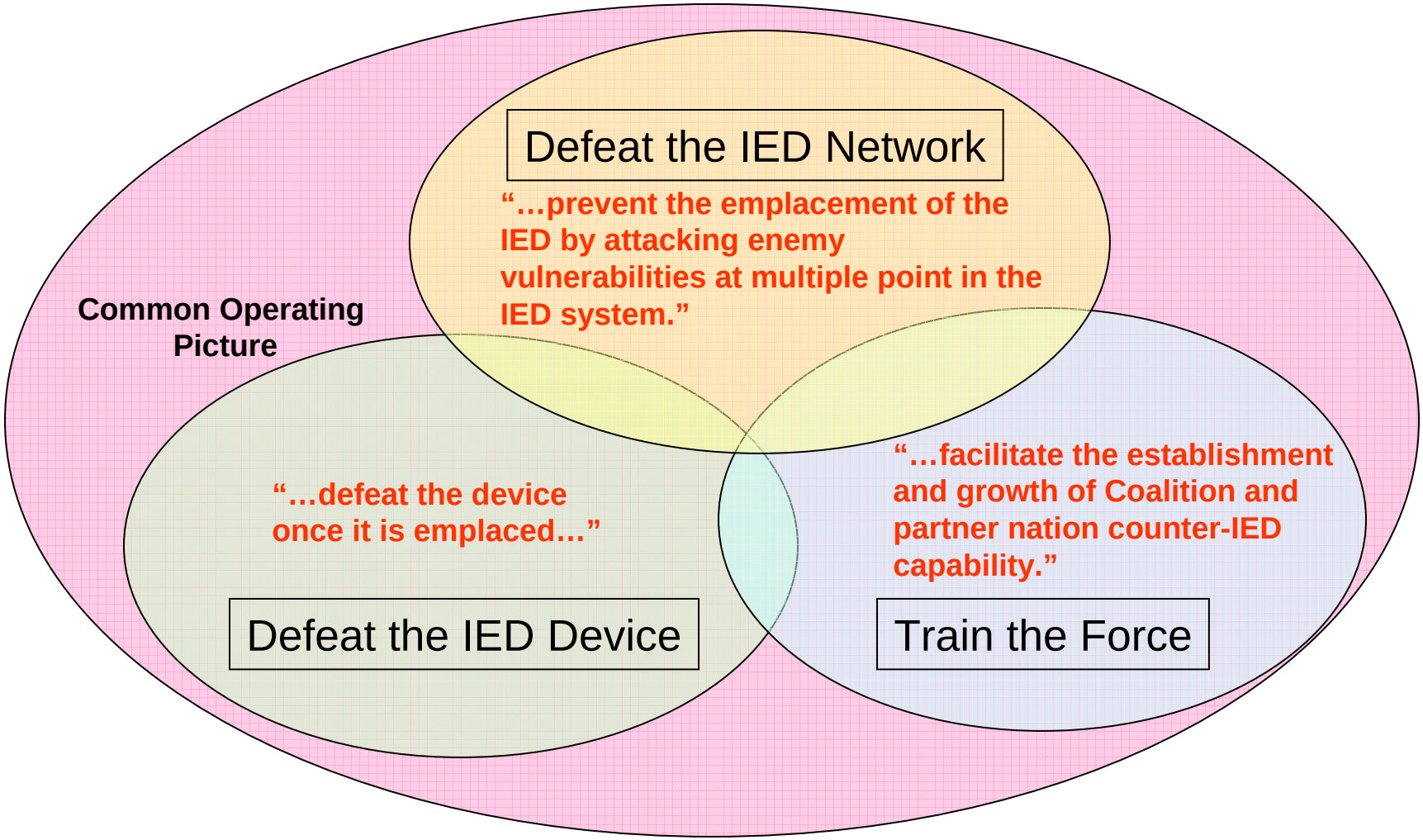
WIA:KIA 9:1





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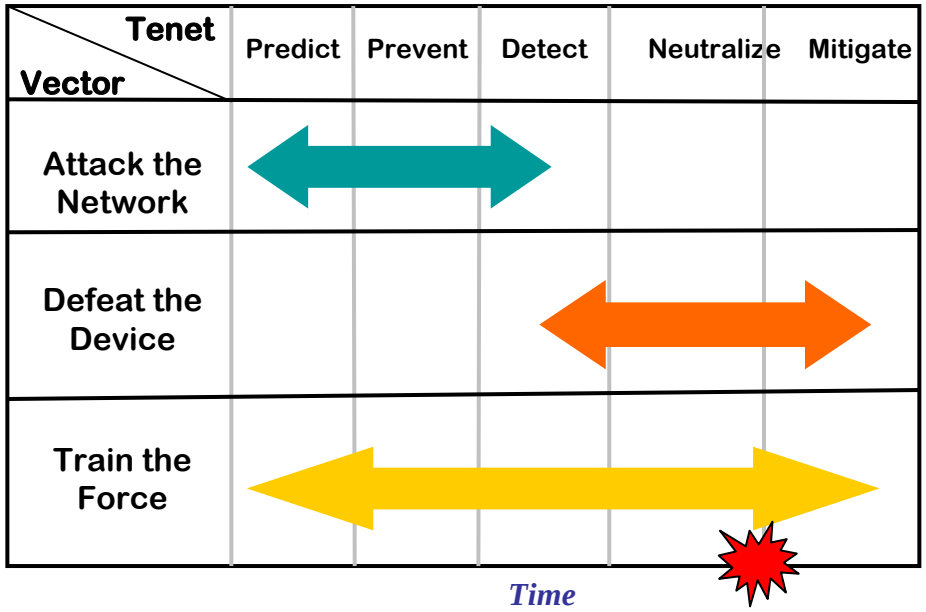
DoD C-IED Overall Approach



This presentation is Unclassified

Tenets of IED Defeat

- Predict
  - Prevent
    - Detect
      - Neutralize
        - Mitigate



This presentation is Unclassified

Categories of Actions in C-IED

- **Predict**: Activities that integrate intelligence to contribute to a clearer understanding of enemy personnel, equipment, infrastructure, Tactics/Techniques/Procedures, support mechanisms or other actions in order to forecast specific enemy IED-focused operations directed against US interests.
- **Prevent**: Actions that offensively target, interdict, and eliminate key enemy personnel, infrastructure, logistics capabilities, and enemy combat operations involving IEDs. Activities that destroy bomb-makers and their supporting networks, disrupt the IED chain of events prior to emplacement, and deter public support for the enemy's use of IEDs.
- **Detect**: Activities to identify and locate enemy personnel, explosives devices and their component parts, equipment, logistics operations and infrastructure in order to provide accurate and timely information to military operations and planners.
- **Neutralize**: Activities to eliminate the hazards of enemy IEDs by destroying them or rendering them incapable of detonating at the time/place of the enemy's choosing.
- **Mitigate**: Protect personnel, equipment, facilities and infrastructure from the effects of IEDs.

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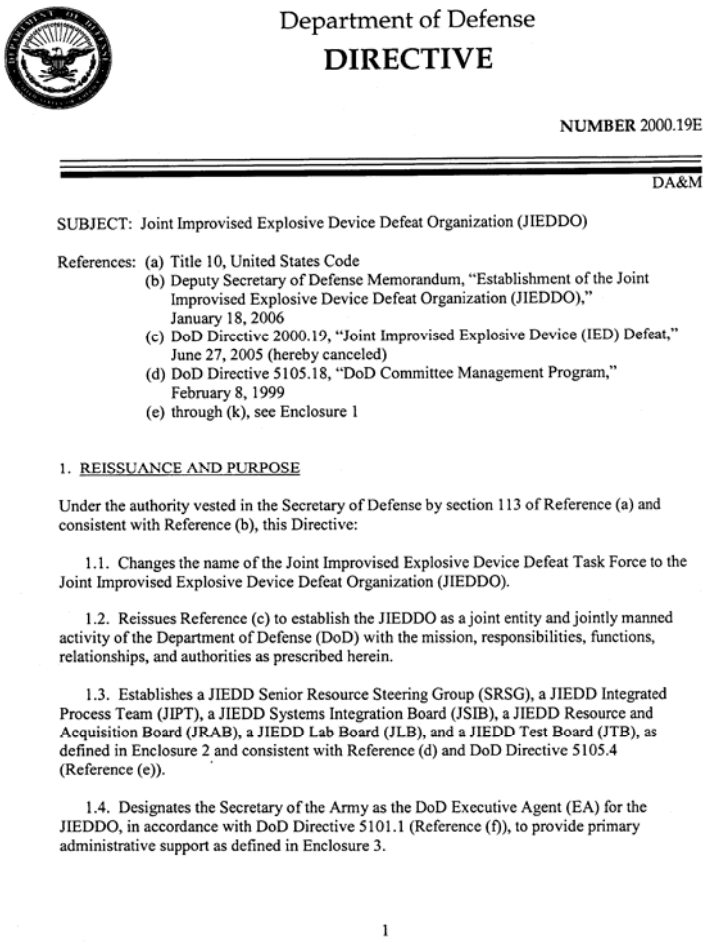
Required Characteristics

- **Agility – adapt at a rate faster than the opponent**
- **Responsiveness – meet the situation that is – not what we wish it to be**
- **Interoperability/Compatibility – provide solutions that don't –**
  - Worsen another situation
  - Create a new opportunity for the enemy
- **Timeliness – get it there for today's fight**

This presentation is Unclassified

JIEDDO

"The JIEDDO shall focus (lead, advocate, coordinate) all Department of Defense actions in support of the Combatant Commanders and their respective Joint task Forces' efforts to defeat Improvised Explosive devices as weapons of strategic influence."



Department of Defense
DIRECTIVE

NUMBER 2000.19E

DA&M

SUBJECT: Joint Improvised Explosive Device Defeat Organization (JIEDDO)

References: (a) Title 10, United States Code
(b) Deputy Secretary of Defense Memorandum, "Establishment of the Joint Improvised Explosive Device Defeat Organization (JIEDDO)," January 18, 2006
(c) DoD Directive 2000.19, "Joint Improvised Explosive Device (IED) Defeat," June 27, 2005 (hereby canceled)
(d) DoD Directive 5105.18, "DoD Committee Management Program," February 8, 1999
(e) through (k), see Enclosure 1

1. REISSUANCE AND PURPOSE

Under the authority vested in the Secretary of Defense by section 113 of Reference (a) and consistent with Reference (b), this Directive:

1.1. Changes the name of the Joint Improvised Explosive Device Defeat Task Force to the Joint Improvised Explosive Device Defeat Organization (JIEDDO).

1.2. Reissues Reference (c) to establish the JIEDDO as a joint entity and jointly manned activity of the Department of Defense (DoD) with the mission, responsibilities, functions, relationships, and authorities as prescribed herein.

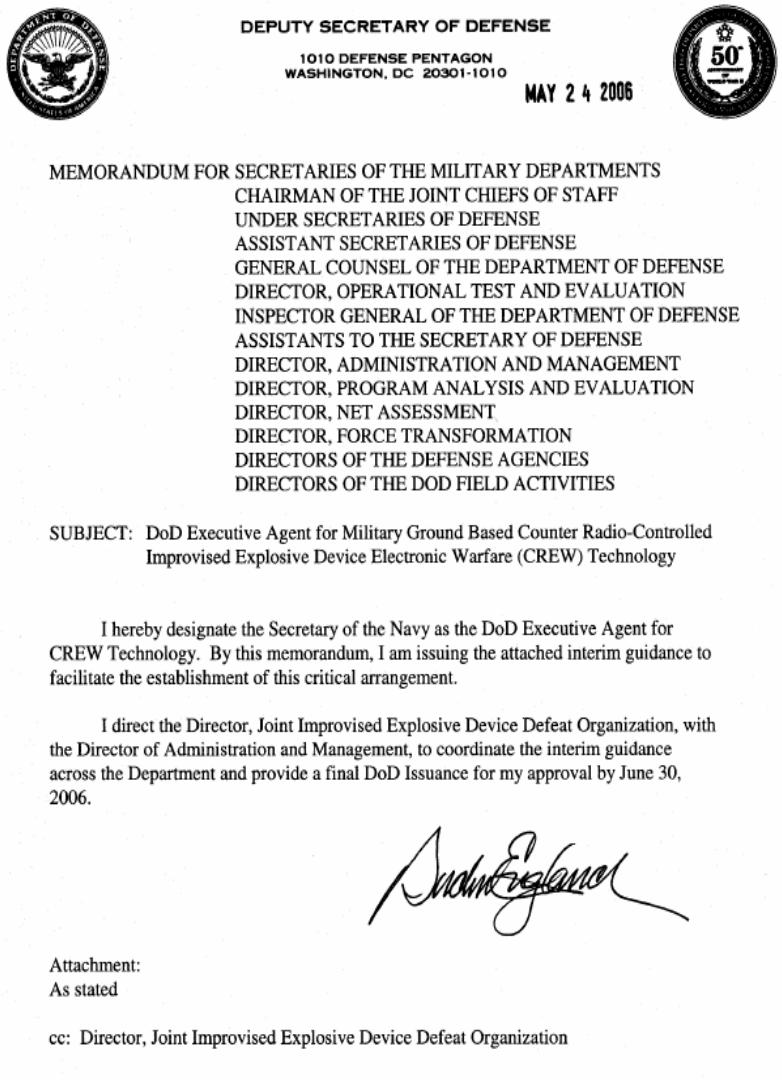
1.3. Establishes a JIEDD Senior Resource Steering Group (SRSG), a JIEDD Integrated Process Team (JIPT), a JIEDD Systems Integration Board (JSIB), a JIEDD Resource and Acquisition Board (JRAB), a JIEDD Lab Board (JLB), and a JIEDD Test Board (JTB), as defined in Enclosure 2 and consistent with Reference (d) and DoD Directive 5105.4 (Reference (e)).

1.4. Designates the Secretary of the Army as the DoD Executive Agent (EA) for the JIEDDO, in accordance with DoD Directive 5101.1 (Reference (f)), to provide primary administrative support as defined in Enclosure 3.

1

Navy Exec Agent for CREW

"It is DoD policy that the DoD CREW technology program provide the most effective countermeasures against radio-controlled improvised explosive devices and improve the efficiency and economy of CREW capability development throughout the Department of Defense by eliminating duplication and overlap of effort."



DEPUTY SECRETARY OF DEFENSE

1010 DEFENSE PENTAGON
WASHINGTON, DC 20301-1010

MAY 2 4 2006

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS
CHAIRMAN OF THE JOINT CHIEFS OF STAFF
UNDER SECRETARIES OF DEFENSE
ASSISTANT SECRETARIES OF DEFENSE
GENERAL COUNSEL OF THE DEPARTMENT OF DEFENSE
DIRECTOR, OPERATIONAL TEST AND EVALUATION
INSPECTOR GENERAL OF THE DEPARTMENT OF DEFENSE
ASSISTANTS TO THE SECRETARY OF DEFENSE
DIRECTOR, ADMINISTRATION AND MANAGEMENT
DIRECTOR, PROGRAM ANALYSIS AND EVALUATION
DIRECTOR, NET ASSESSMENT
DIRECTOR, FORCE TRANSFORMATION
DIRECTORS OF THE DEFENSE AGENCIES
DIRECTORS OF THE DOD FIELD ACTIVITIES

SUBJECT: DoD Executive Agent for Military Ground Based Counter Radio-Controlled Improvised Explosive Device Electronic Warfare (CREW) Technology

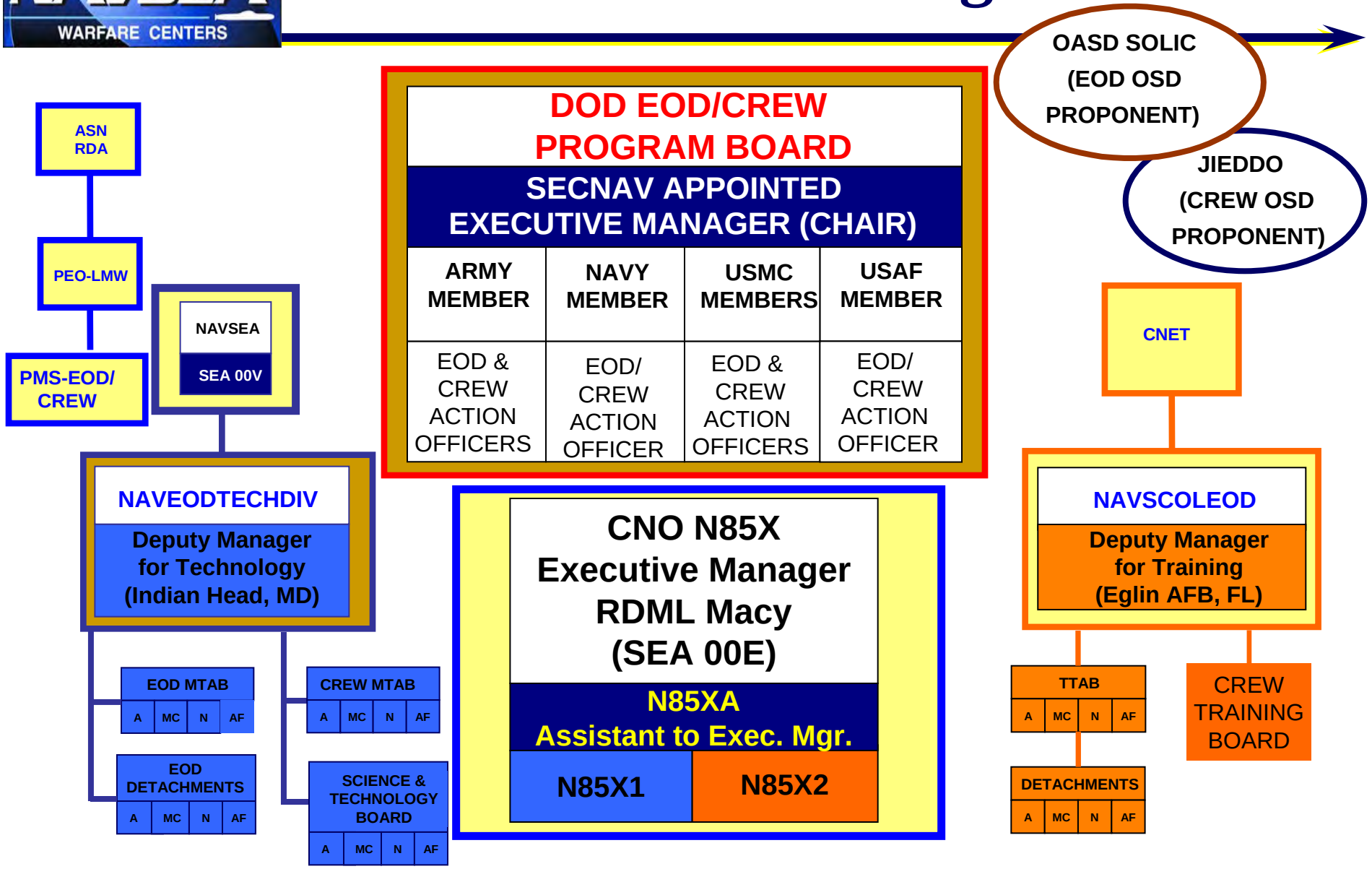
I hereby designate the Secretary of the Navy as the DoD Executive Agent for CREW Technology. By this memorandum, I am issuing the attached interim guidance to facilitate the establishment of this critical arrangement.

I direct the Director, Joint Improvised Explosive Device Defeat Organization, with the Director of Administration and Management, to coordinate the interim guidance across the Department and provide a final DoD Issuance for my approval by June 30, 2006.

Attachment:
As stated

cc: Director, Joint Improvised Explosive Device Defeat Organization

DOD EOD/CREW Organization



Contact Information

- **Info package on how to prepare submissions to JIEDDO provided to NDIA EXW Conference staff.**
  - **For submissions & questions, eMail (<10 Mb) to:**

    IEDTaskForce@jieddo.dod.mil
  - **Submissions and questions can also be mailed to:**

    Joint IED Defeat Organization
    Technical Review Group
    5000 Army Pentagon
    Washington DC 20310-5000

- **For CREW: Contact CAPT Mark Kavanaugh, PMS-408, 202-781-2066; mark.kavanaugh@navy.mil**

- **When all else fails: CDR Roger Hardy, 202-781-4064 roger.d.hardy@navy.mil**

11th Expeditionary Warfare Conference

Joint Expeditionary Operations in an Uncertain World

23-26 October 2006

MajGen Thomas Benes
Director, Expeditionary Warfare Division (N85)



Naval Challenge

The challenge for the Navy and Marine Corps today is to remain capable of traditional naval missions while simultaneously enhancing our ability to conduct non-traditional missions in order to ensure that naval power and influence can be applied at and from the sea, across the littorals, and ashore, as required.

- *Naval Operations Concept, 2006*



Service Challenges



Strategic Landscape
- **The Long War**
- **Emboldened Adversaries**
- **Potential of Major Conflict**

Naval Expeditionary Capabilities Required
- **Guiding principles…Speed, Access, and Persistence**
- **Flexible, Scalable, Sustainable, Affordable**



Program Challenges
- **Resource limits**
- **Valid requirements underfunded**
- **Development Process…integrated but cumbersome**

Expeditionary Program Snapshot

Amphibious Force

- 2 Marine Expeditionary Brigade Assault Echelons
- 2 Marine Expeditionary Brigade MPF(F) + MPS
- LPD-17
- LSD Modernization Plan
- JMAC/LCAC-X
- ERGM – reliability testing FY08






MPF(F) Squadron

Amphibious Assault Ship (T-LHA)



- **Lightship Displacement: 30,862 MT**
- **Landing Spots: 9/ship No well-deck**
- **Personnel: 3000/ship**
- **Ship Speed: 22kts**

Multi-Purpose Amphibious Assault Ship (T- LHD)



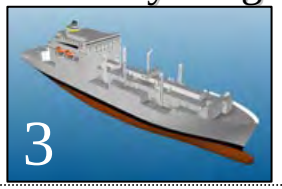
- **Lightship Displacement: 28,540 MT**
- **Landing Spots: 9/ship 3 LCAC**
- **Personnel: 3000/ship**
- **Ship Speed: 22kts**

Large Medium-Speed Roll-On/Roll-Off (LMSR)



- **Lightship Displacement: 36,289 MT**
- **Landing Spots: 2/ship**
- **Personnel: 345/ship (+500surge)**
- **Ship Speed 24 kts**

Auxiliary Cargo and Ammunition Ship (T-AKE)



- **Lightship Displacement: 25,700 MT**
- **Landing Spots: 1/ship**
- **Personnel: 194/ship**
- **Ship Speed 20 kts**

Legacy MPS

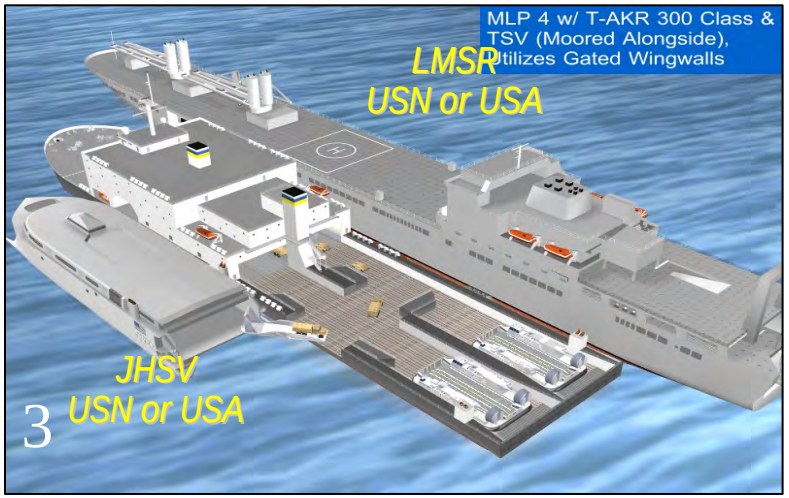


- **Lightship Displacement: 19,900 MT**
- **Landing Spots: 1/ship**
- **Personnel: 127 berths/ship**
- **Ship Speed 17 kts**

Joint…
Potential universal interfaces for Navy and Army ships and small craft

Mobile Landing Platform (MLP)

- **Light Ship Displacement: 28,423 MT**
- **Landing Spots: 1/ship 6 LCAC**
- **Personnel:850 /ship**
- **Ship Speed 20kts**

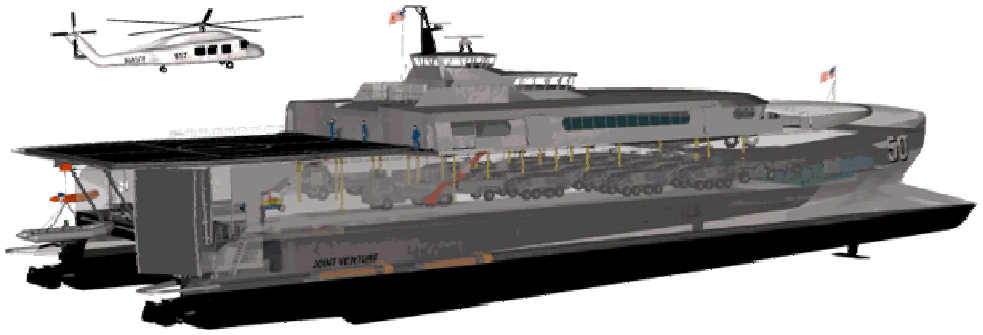


Supports rapid closure, assembly, employment, sustainment and reconstitution

Joint High Speed Vessel (JHSV)

Guiding Principles

- Joint program
  - One vessel design
  - One crewing strategy
  - One maintenance strategy
  - One supportability strategy
- Not a combatant
  - commercial non-developmental



Program Highlights

- Army-Navy program
- Capitalize on experiments
- Non-developmental approach
- Lead ship - FY08 (FY10 delivery) – ~20 year life
- Missions:
  - War on Terrorism
  - Theater Security Cooperation Program
  - Marine Expeditionary Brigade or Brigade Combat Team lift & Sustainment
  - Force Closure
  - Sea Basing Support

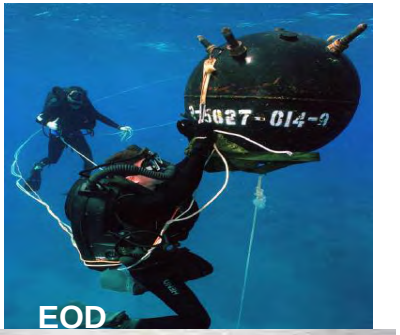
Key Characteristics

• High Speed	35 – 45 kts	"Iron Triangle" *
• Intra-theater (loaded range)	1,200 nm	
• Medium-lift (payload)	600 – 700 st	
• Self-deploying (unloaded range)	4,700 – 5,200 nm	

- Net-ready (common C4I suite)*
- Aviation Capability*
  - Threshold: one H-60 flight deck spot, space for 1 hangar
  - Objective: one CH-53K flight deck spot, space for 2 hangars
- Able to operate from austere ports

* Cost drivers

Mine Warfare – Legacy to Organic

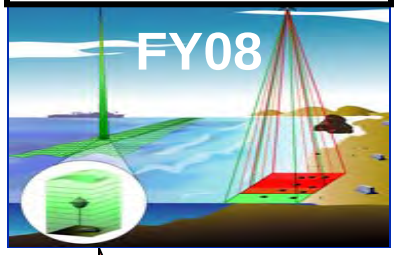




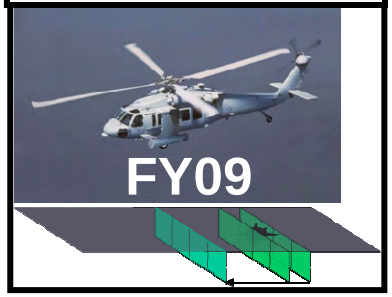


Transition To Organic

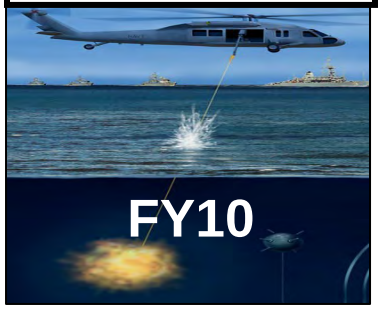
Coastal Battlefield Reconnaissance & Analysis System



Airborne Laser Mine Detection System



Rapid Airborne Mine Clearance System

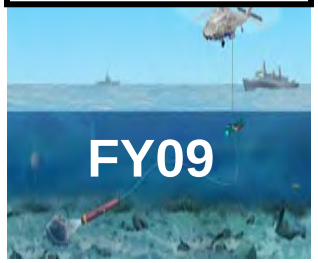




Remote Mine Hunting System & AN/AQS-20A



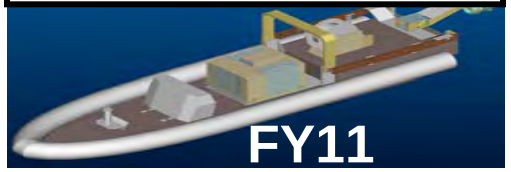
Airborne Mine Neutralization System



SCULPIN Unmanned Underwater Vehicle



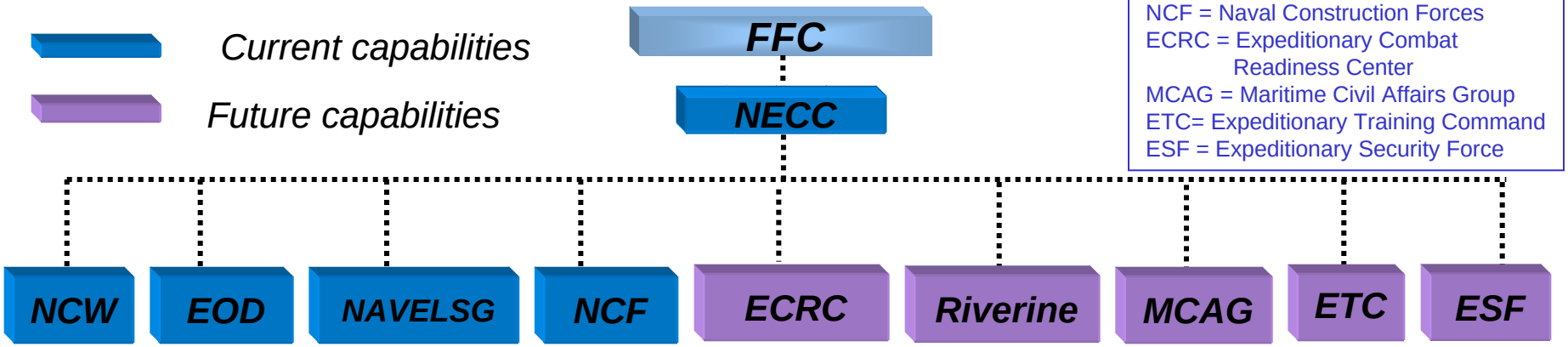
Unmanned Surface Vehicle & Organic Airborne and Surface Influence Sweep



Navy Expeditionary Combat Command

CNO Guidance 2006: establish a more effective maritime protection strategy – green and brown water

NCW = Naval Coastal Warfare
EOD = Explosive Ordnance Disposal
NAVELSG = Naval Expeditionary Logistics Support Group
NCF = Naval Construction Forces
ECRC = Expeditionary Combat Readiness Center
MCAG = Maritime Civil Affairs Group
ETC= Expeditionary Training Command
ESF = Expeditionary Security Force



New capabilities required

- Level III visit, board, search, and seizure (VBSS)
- Expanded maritime interdiction operation (MIO)
- Expeditionary training – to host nations by Expeditionary Training Command (ETC) & to sailors by Expeditionary Combat Readiness Command (ECRC)
- Maritime expeditionary security force (MESF)
- Civil affairs - Military Civil Affairs Group (MCAG)
- Riverine (3 Riverine Squadrons)







Way Ahead

- **Partnership—OPNAV, Fleet Forces, ONR, Industry, Congress and American Public**
- **Complex Problems—require unique approaches-modularity, portfolio of systems, spiral development, risk**

Back Up Slides

Seabasing Future Naval Capabilities (FNC)

EMPLOY/RECONSTITUTE/
SUSTAIN (deployed forces)



75 – 175 nm

CONUS

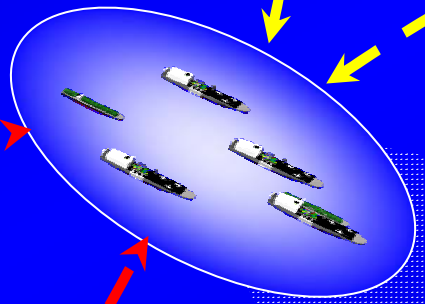
25 - 200 nm



Sea Base

Objective

CLOSE/SUSTAIN
(Sea Base)



8,000 – 12,000 nm



ASSEMBLE



Ready
for the
fight

Strategic
Airlift

1,000 – 4,000 nm

ISB

AEGIS – Ballistic Missile Defense



- 2 Cruisers and 1 Destroyer are Capable of Firing SM-3 Interceptors and Conducting Long Range Surveillance and Tracking Operations (LRS&T)
- 10 Destroyers are Capable of Conducting LRS&T
- Gap-Filler Sea Based Terminal is in Progress
  - Aegis BMD modifying baseline computer program
  - PEO IWS modifying SM-2 Blk IV missiles
  - Demonstrated success with Linebacker

A Success Story

Surface Warfare N86

Aegis BMD - Delivered to Date

Engagement (BMD 3.6, BMD 3.0, SM-3 Blk I) and LRS&T



USS STETHEM (DDG 63)

BMD 3.6



USS SHILOH (CG 67)

BMD 3.6



USS LAKE ERIE (CG 70)
(BMD 3.6 Sep 06)

BMD 3.0



USS PORT ROYAL (CG 73)
(BMD 3.6 Dec 06)

BMD 3.0



USS CURTIS WILBUR (DDG 54)



First SM-3 Blk I's – Nov 2004 –
11 Rounds Delivered as of Aug 06



First SM-3 Blk IA Encanned
2 Rounds Delivered as of 31 Aug 06

LRS&T (BMD 3.0E)



USS JOHN S. McCAIN (DDG 56)



USS FITZGERALD (DDG 62)



USS RUSSELL (DDG 59)



USS MILIUS (DDG 69)



USS PAUL HAMILTON (DDG 60)



USS JOHN PAUL JONES (DDG 53)



USS BENFOLD (DDG 65)



USS HOPPER (DDG 70)



USS O'KANE (DDG 77)



USS HIGGINS (DDG 77)

Upgrade Installation in Progress

Littoral Combat Ship

Lockheed Martin Team

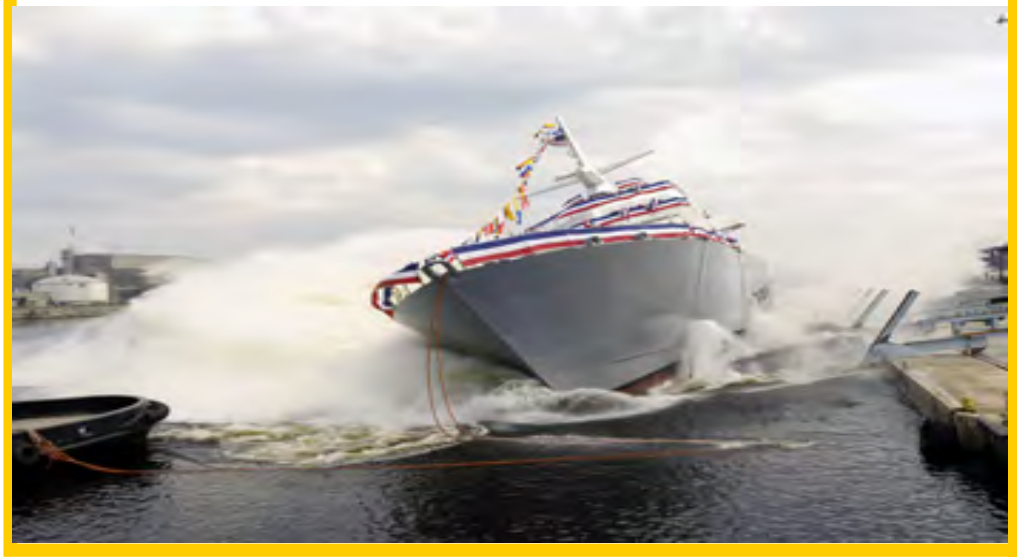
Lockheed Martin
Gibbs & Cox
Marinette Marine
Bollinger Shipyards



General Dynamics

Bath Iron Works
General Dynamics AIS
Austal USA
BAE Systems
MAPC
L3







LCS Mission Package Capability

Surface Warfare N86

Mine Warfare

VTUAV



USV



RMS



UUV



MH-60S



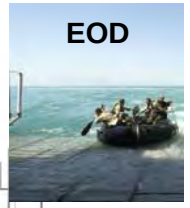
UUV



COBRA



EOD



Beach/Surf Zone Detection

Antisubmarine Warfare

MH-60R



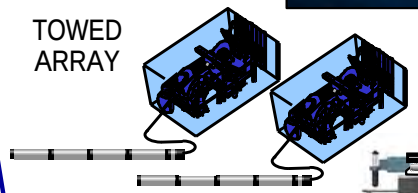
RMS



VTUAV

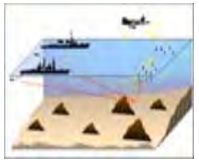


TOWED ARRAY



USV





MULTISTATIC

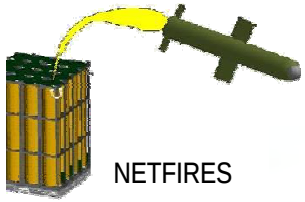
Surface Warfare



MH-60R/S

VTUAV





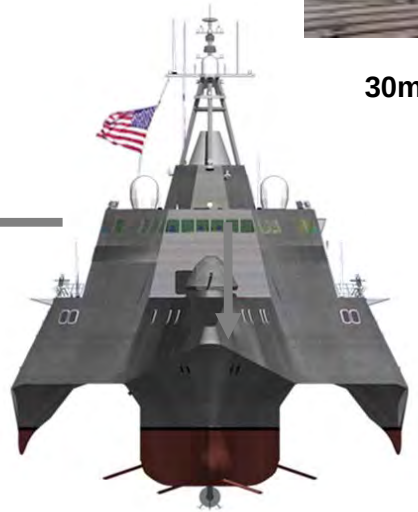
NETFIRES



30mm Gun

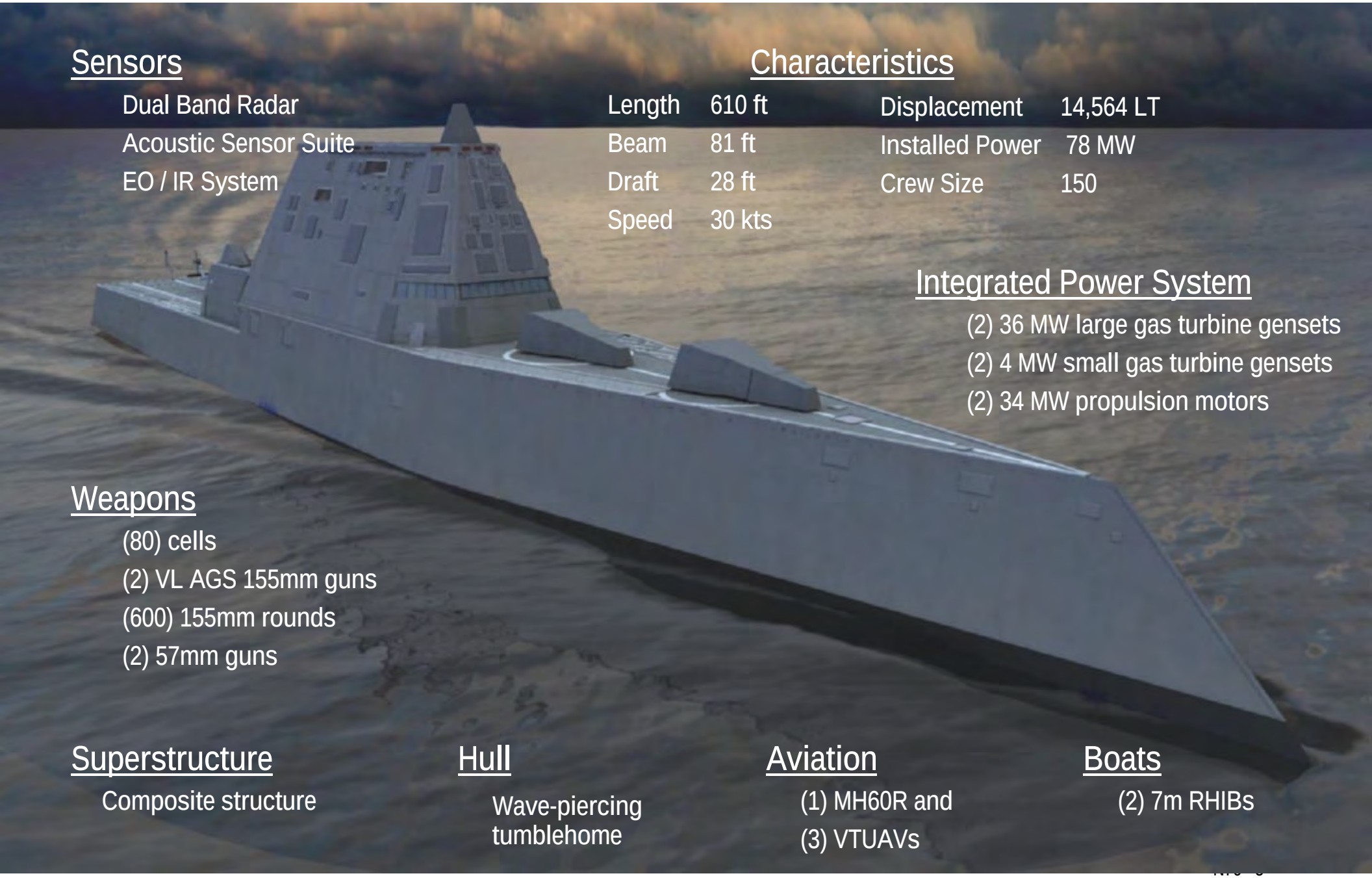
Installed in Mission Module Spaces





Surface Warfare N86

DDG 1000



Sensors

- Dual Band Radar
- Acoustic Sensor Suite
- EO / IR System

Characteristics

Length	610 ft	Displacement	14,564 LT
Beam	81 ft	Installed Power	78 MW
Draft	28 ft	Crew Size	150
Speed	30 kts		

Integrated Power System

- (2) 36 MW large gas turbine gensets
- (2) 4 MW small gas turbine gensets
- (2) 34 MW propulsion motors

Weapons

- (80) cells
- (2) VL AGS 155mm guns
- (600) 155mm rounds
- (2) 57mm guns

Superstructure

Composite structure

Hull

Wave-piercing tumblehome

Aviation

- (1) MH60R and
- (3) VTUAVs

Boats

(2) 7m RHIBs

Cruiser Modernization

CG Baselines 2,3,4

BMC4I
CEC
SGS A/C (B/L 2)
CDLMS (B/L 2)

AIR DOMINANCE
AWS CR2 Computer Program
COTS computing plant
Radar and Display upgrades
VLS Modifications

FORCE PROTECTION
ESSM
CIWS BLK 1B
SPQ-9B (ASMD)
SARTIS
SQQ-89A(V)15 (B/L 3 & 4)

GUN WEAPON SYSTEM
(2) 5 inch/62 Guns
MK-160 Gun Computing System
OSS

HM&E
All Electric Mods
Smart Ship Upgrades
Structural Modifications
Quality of Service Upgrades

	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16
Full Mod	0	0	1	1	2	1	3	3	3	3	2
HM&E	1	2	1	0	0	0	0	0	0	0	0
C/S	0	0	0	1	0	2	0	0	0	0	0

B/L 2=CG52-58
B/L 3=CG59-64
B/L 4=CG65-73

Destroyer Modernization

Candidates

Warfighting Upgrades

C4I
NAVSSI BLK 4
IFF Modes 5
CEC

AIR DOMINANCE
CIC Display Upgrades
Open Architecture Computing Plant
VLS Mods (TACTOM/SM-2Blk4/ESSM/ Initial SM-6 Capability)
AWS CR-3 Computer Program
SPY-1D(V) COTS SIGPRO
SPY-1D Transmitter Upgrades
Multi-Mission BMD Capability
IABM
SM6/NIFC-CA
ESSM / STAMO Upgrades

FORCE PROTECTION
CIWS-1B
NULKA
SEWIP
SSTD (ATT)
MK 54 Torpedo/DFCI
SQQ-89A(V)15 w/MFTA

GUN WEAPON SYSTEM
MK-160 Mod X Gun Computing System

HM&E Modernization
Full IBS Upgrade
MCS/DCS Upgrades
GEDMS
Wireless Communications
Digital Video Surveillance
Quality of Life Upgrades
Advanced Galley
Mission Life Extension Upgrades

	FY10	FY 11	FY12	FY13	FY14	FY15	FY16
HM&E	2	3	3	3	3	3	3
CS			2	3	3	3	3

BACK UP

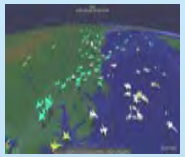
Cruiser & Destroyer Modernization

Mid-life modernization enables CG47 and DDG 51 class ships to achieve 35 year service life. Average life of unmodernized surface combatants < 20 years. Current 22 CG47s and 62 DDG 51s are required to achieve CNO's 2020 force structure

- The CG and DDG Mod Programs consists of upgrades to address changes in technology and likely threats since initial design that will ensure these ships are relevant through the 2020's.
  - Upgrade to All Electric to improve QOL and save manpower and maint $ (>$4.7M per year – CG 47 only)
  - Hull strengthening and stability mods to correct class issues
  - Smart Ship type installations to save manpower through better use of technology
  - Use of COTS to field 2nd and 3rd spirals of OA computing plant to support affordable and rapid future capability upgrades.
  - Improvement to strike group interoperability and data sharing
  - Improved capability against complex, high speed/maneuverable ASCMs
  - Improved AAW capability against small fast targets in clutter environment
  - Improved littoral SA and hard kill against low flying a/c and fast in-shore attack craft
  - Improved USW and enhanced torpedo defense, especially in littorals

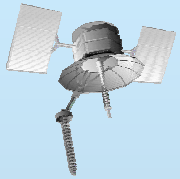
4 AEGIS ships can be modernized to achieve almost twice current average service life for less than the cost of 1 new AEGIS combatant

Cruiser Modernization



7PH 1C Computer Program,
Cooperative Engagement
Capability (CEC) &
Common Data Link Management
System (CDLMS)

Robust Joint
Command
& Control





"Smart Ship"
COTS-based
Integrated
Control Systems



Navy Precision Fires:
5" / 62 Gun/MK 160 GCS



ASW:
SQQ 89A V(15)





Force Protection:
CIWS BLK 1B, Evolved Sea
Sparrow Missile &
SPQ-9B

MH-60R

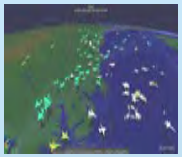




VLS Mods:
Tactical Tomahawk

Transforming the Existing Fleet

DDG Proposed Upgrades



OA Computing Environment, Cooperative Engagement Capability (CEC)



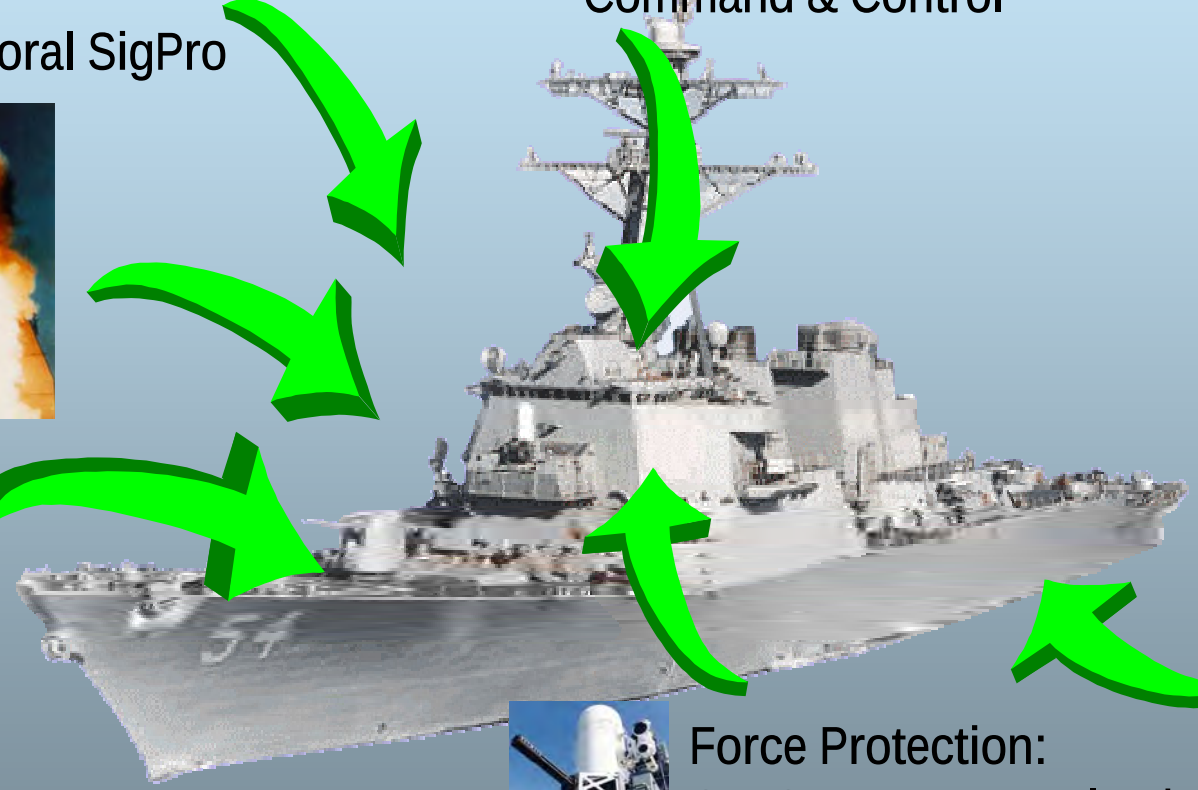
Robust Joint Command & Control

TBMD & Littoral SigPro



Tactical Tomahawk







ASW: SQQ 89A(V) 15



Force Protection: CIWS BLK 1B, Evolved Sea Sparrow Missile, SM-6



MH-60R

Building and Transforming the Existing Fleet

DDG Mod HM&E Upgrades

ADVANCED GALLEY



DIGITAL VIDEO SURVEILLANCE SYSTEM



WIRELESS COMMS

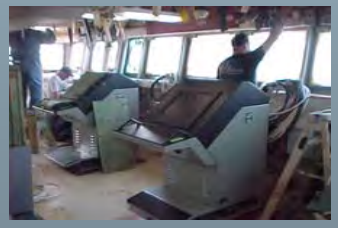


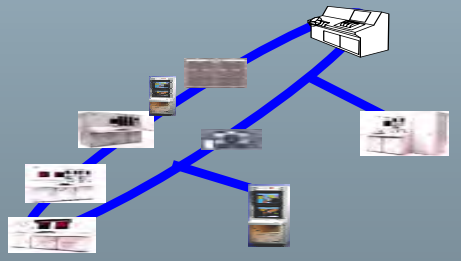


MCS and DAMAGE CONTROL UPGRADES



INTEGRATED BRIDGE





GIGABIT ETHERNET LAN

Achieving the Full Service Life

Edward McCallum

Combating Terrorism Technology Support Office

NDIA 11th Expeditionary Warfare Conference

23-26 October 2006

"Humanity was informed that it could make machines that would fly through the air. The conquest of the air and the perfection of the art of flying fulfilled the dream which for thousands of years had glittered in human imagination."

Winston Churchill
March1949, M.I.T.

System Challenges

- Rapid equipping vs. traditional acquisition
- Information Age vs. Industrial Age
- Operational analysis drives acquisition

Opaque Engagement



Operational Challenges

- Tactical/Law enforcement-style targeting
- Cyber-sanctuaries & internet criminality
- Tactical intelligence driven operations
- Building indigenous capability
- Strategic communications



"90% of this war will take place in the information domain."

- Ayman al-Zawahiri

Policy Challenges

- Communications & commerce law
- Interagency & international best practices
- Strategic organizational model for the Long War

"We are not yet organized, interagency or internationally; to execute this war."

- GEN John Abizaid, CENTCOM Commander, 2005



“The old metrics no longer worked…”



Sea Control and Expeditionary Power Projection



Brigadier General Thomas L. Conant, USMC
Director, Capabilities Development Directorate
Marine Corps Combat Development Command
Quantico, Virginia

Our Mission

- " ...THE SEIZURE AND DEFENSE OF ADVANCED NAVAL BASES AND FOR THE CONDUCT OF SUCH LAND OPERATIONS AS MAY BE ESSENTIAL TO THE PROSECUTION OF A NAVAL CAMPAIGN.



- ...DEVELOP, IN COORDINATION WITH THE ARMY, NAVY AND AIR FORCE, THE DOCTRINE, TACTICS, TECHNIQUES, AND EQUIPMENT EMPLOYED BY LANDING FORCES IN AMPHIBIOUS OPERATIONS.

- …PERFORM SUCH OTHER DUTIES AS THE PRESIDENT MAY DIRECT."

NATIONAL SECURITY ACT OF 1947 AS AMENDED BY TITLE 10, U.S. CODE IN 1952





Our Tradition: Most Ready When the Nation is Least Ready

Why We're Unique

- **Maneuver Warfare Philosophy**
  - Nature of war: a violent struggle between hostile, independent, irreconcilable wills…
  - …Chaos, friction, & uncertainty
  - Combine high-tempo ops with a bias for action
  - …To achieve advantage – in any dimension.
- **Expeditionary Heritage**
  - Primarily a naval force, equally home at sea or ashore
  - Operating from very austere environments – worldwide
  - Across the full range of military operations
- **Concepts: Organize, Deploy, Employ**
  - Integrated concepts
  - The Marine Air-Ground Task Force (MAGTF)







The Naval Operating Concept (NOC)

A Mandate for Change



NOC Focus Areas

"*A Shared Navy - Marine Corps Assessment*"

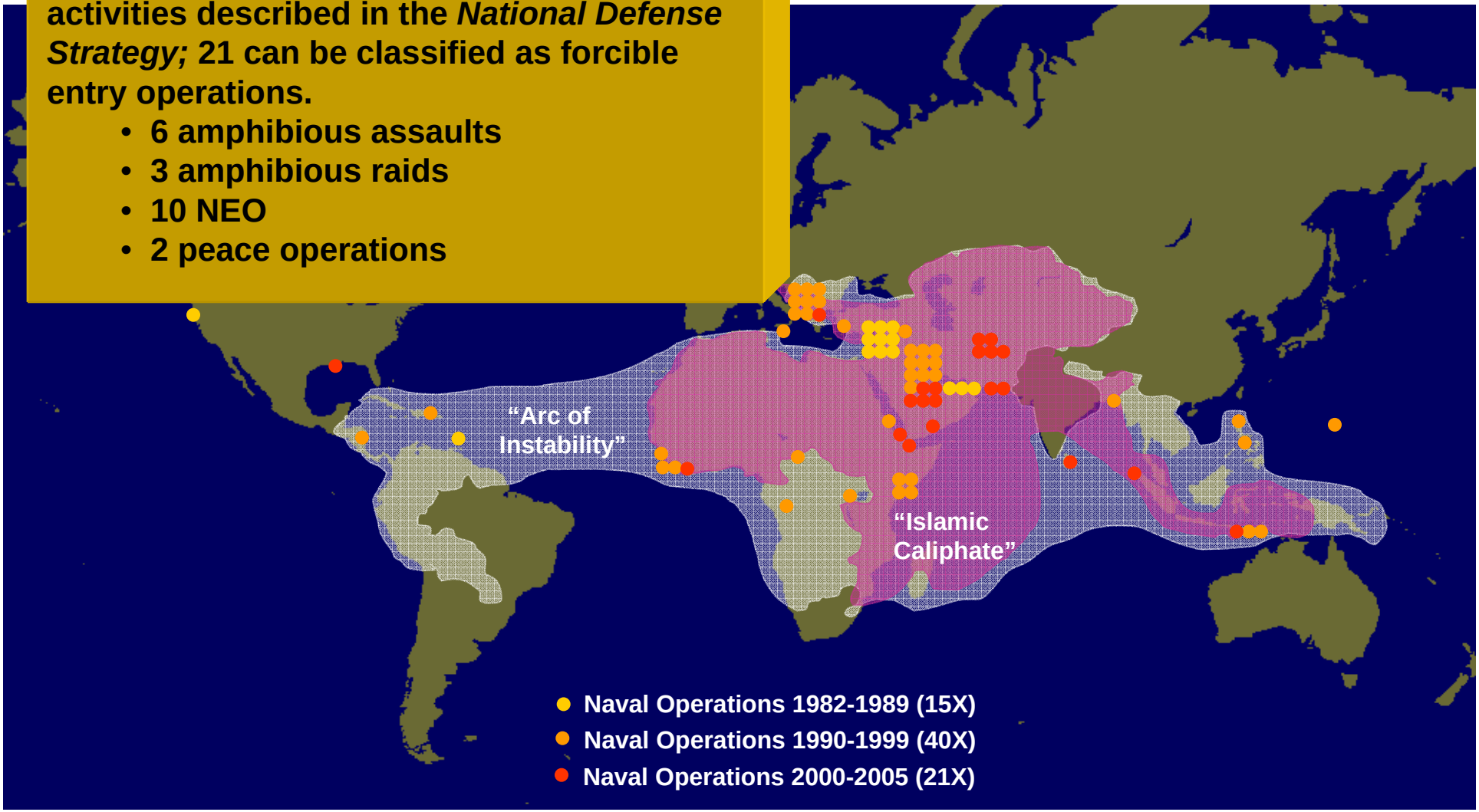


The NOC provides the conceptual foundation for Naval capability development in support of CONPLAN 7500 and Homeland Defense.

Recent Operations by U.S. Amphibious Forces

76 applications of amphibious capability in the past 23 years, covering the range of activities described in the *National Defense Strategy;* 21 can be classified as forcible entry operations.

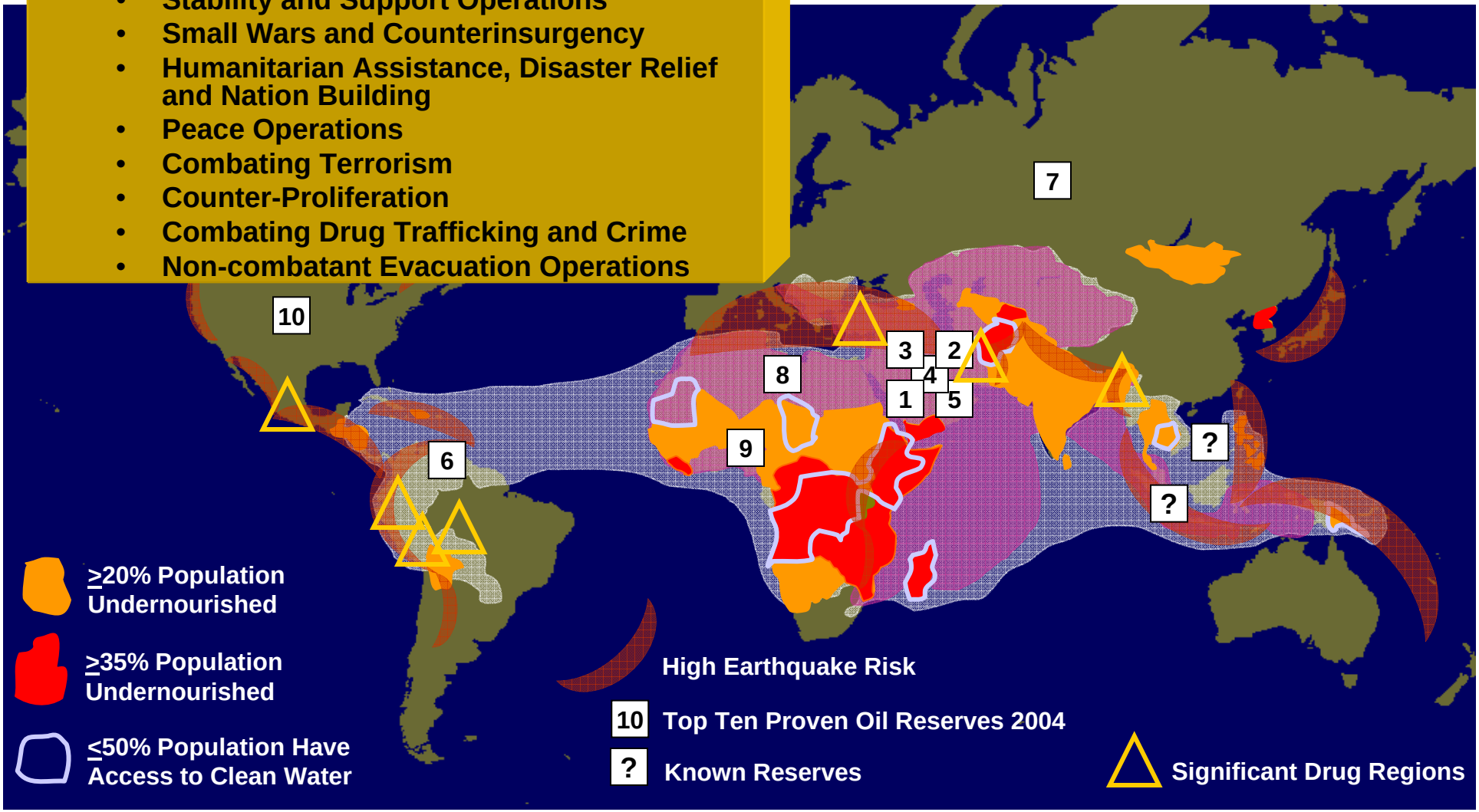
- **6 amphibious assaults**
- **3 amphibious raids**
- **10 NEO**
- **2 peace operations**



Likely Crises and Missions

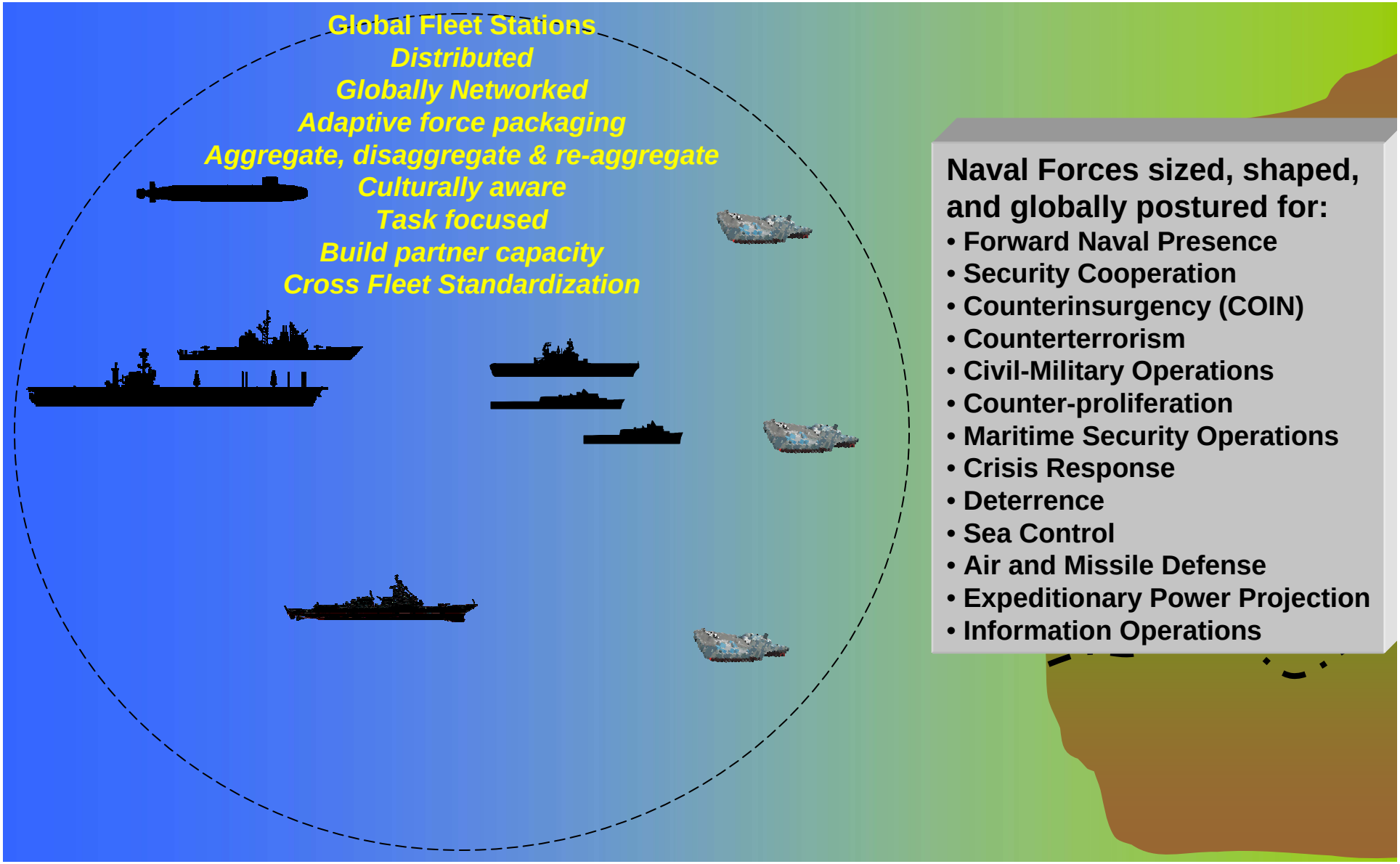
Likely Operations (from the Marine Corps Midrange Treat Estimate 2005-2015)

- Stability and Support Operations
- Small Wars and Counterinsurgency
- Humanitarian Assistance, Disaster Relief and Nation Building
- Peace Operations
- Combating Terrorism
- Counter-Proliferation
- Combating Drug Trafficking and Crime
- Non-combatant Evacuation Operations



Enhancing Phase 0-2 & 4-5 Capabilities

Via Expanded Naval Missions



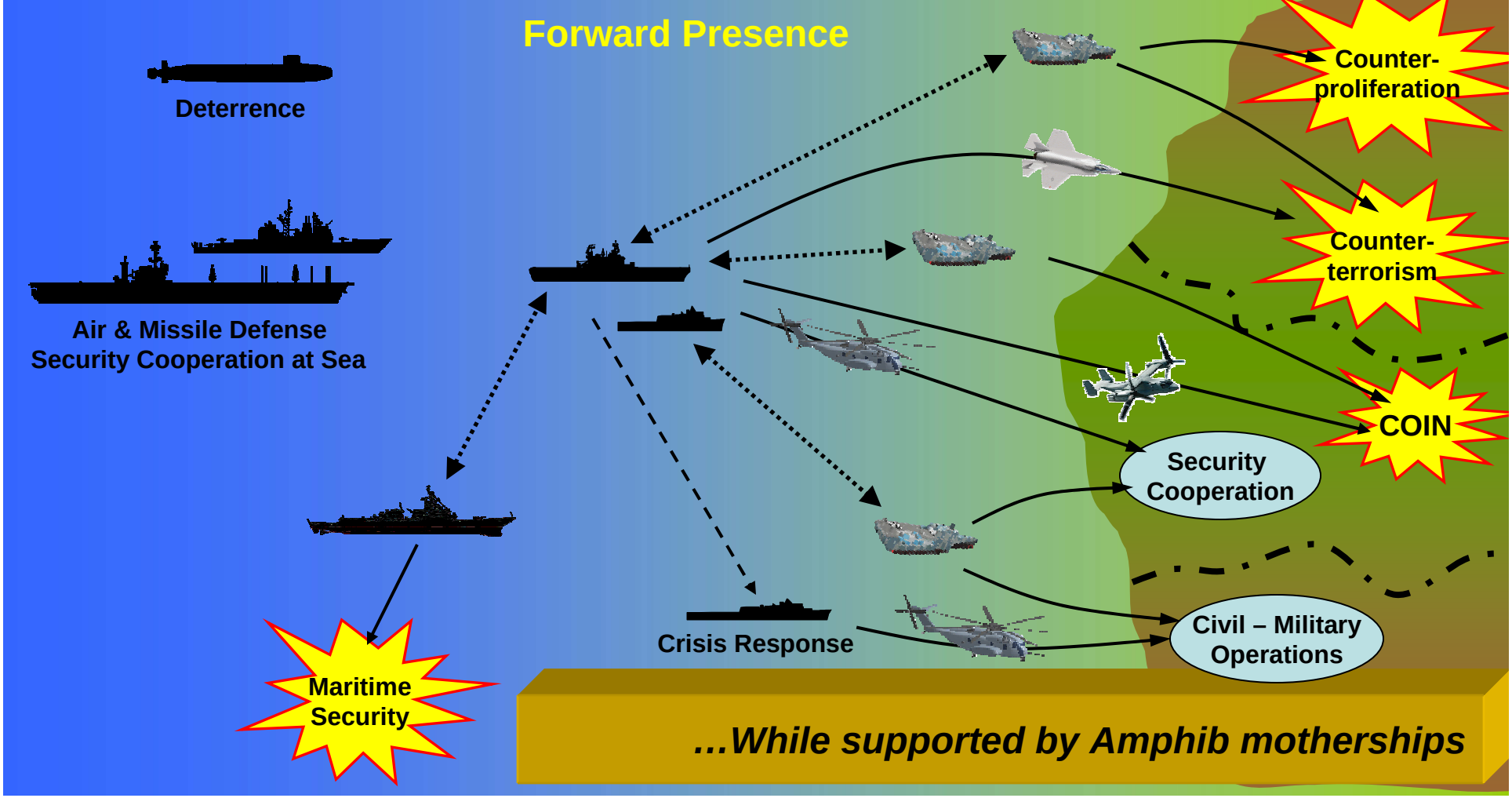
Naval Forces sized, shaped, and globally postured for:

- Forward Naval Presence
- Security Cooperation
- Counterinsurgency (COIN)
- Counterterrorism
- Civil-Military Operations
- Counter-proliferation
- Maritime Security Operations
- Crisis Response
- Deterrence
- Sea Control
- Air and Missile Defense
- Expeditionary Power Projection
- Information Operations

Enhancing Phase 0-2 & 4-5 Capabilities

Via Distributed Operations Capable SPMAGTFs

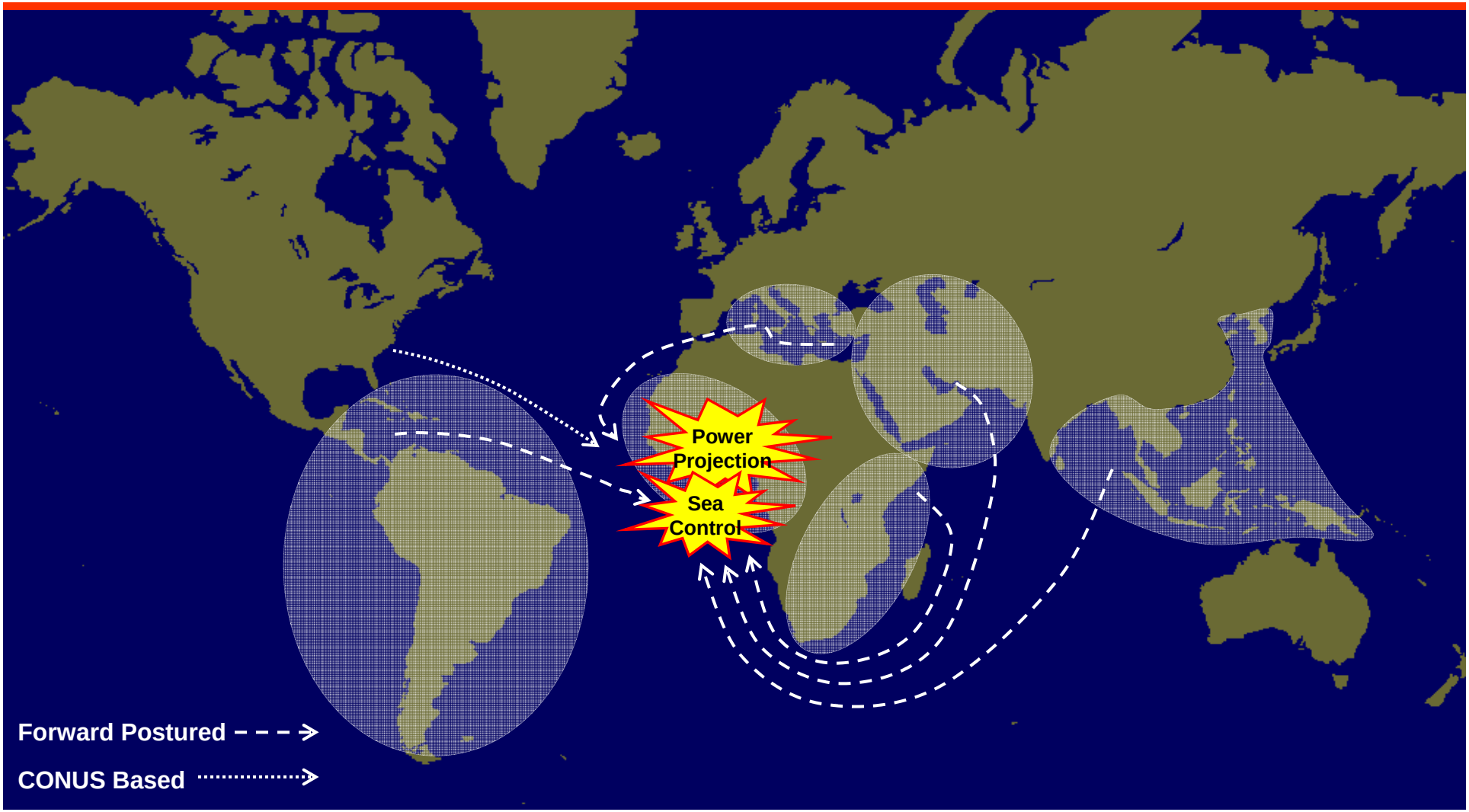
Employed from platforms like Littoral Combat Ship, riverine craft, destroyers…



…While supported by Amphib motherships

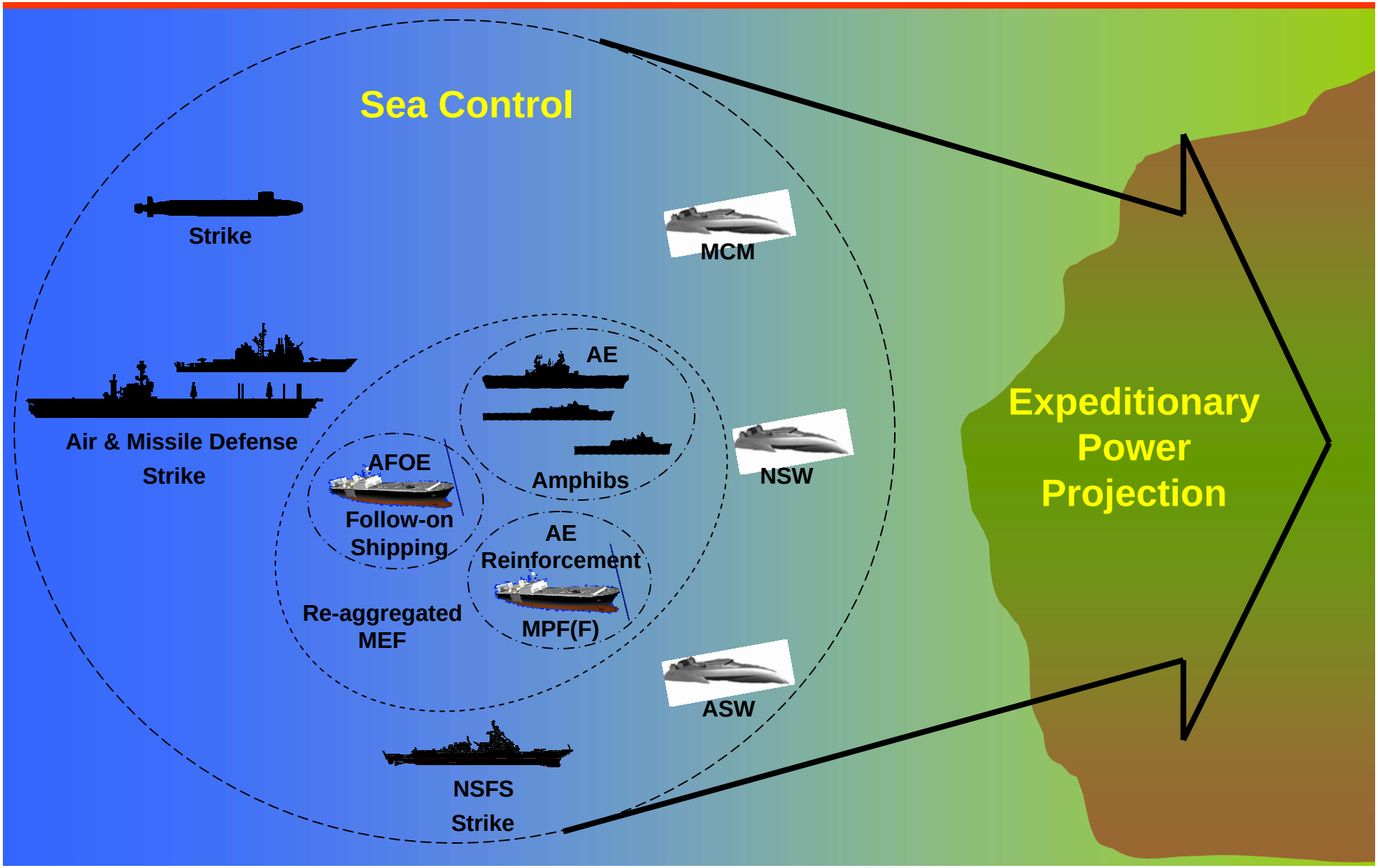
Enhancing Phase 2-3 Capabilities

By Re-aggregating Naval Forces



Enhancing Phase 2-3 Capabilities

Joint Forcible Entry by Re-aggregated Naval Forces



Summary

- **Executing U.S. strategy is dependent on continuous regional shaping, stability operations, and overcoming challenges to access.**
- **Naval forces are crucial for Phases 0, 1, 2 & 3 (Shape, Deter, Seize Initiative, & Dominate)**
- **Amphibious ships remain the critical centerpiece of seabased persistence and the hub of force projection & influence ashore**
- **Innovative force packaging and the ability to tailor forces on the fly**





Sea Control and Expeditionary Power Projection



Brigadier General Thomas L. Conant, USMC
Director, Capabilities Development Directorate
Marine Corps Combat Development Command
Quantico, Virginia

The NOC at a Glance

Naval Operations Concept Construct

Commander's Guidance: Leverage Historic Interdependence, Assess/Consult, Open Discussion/Debate With a Common Goal

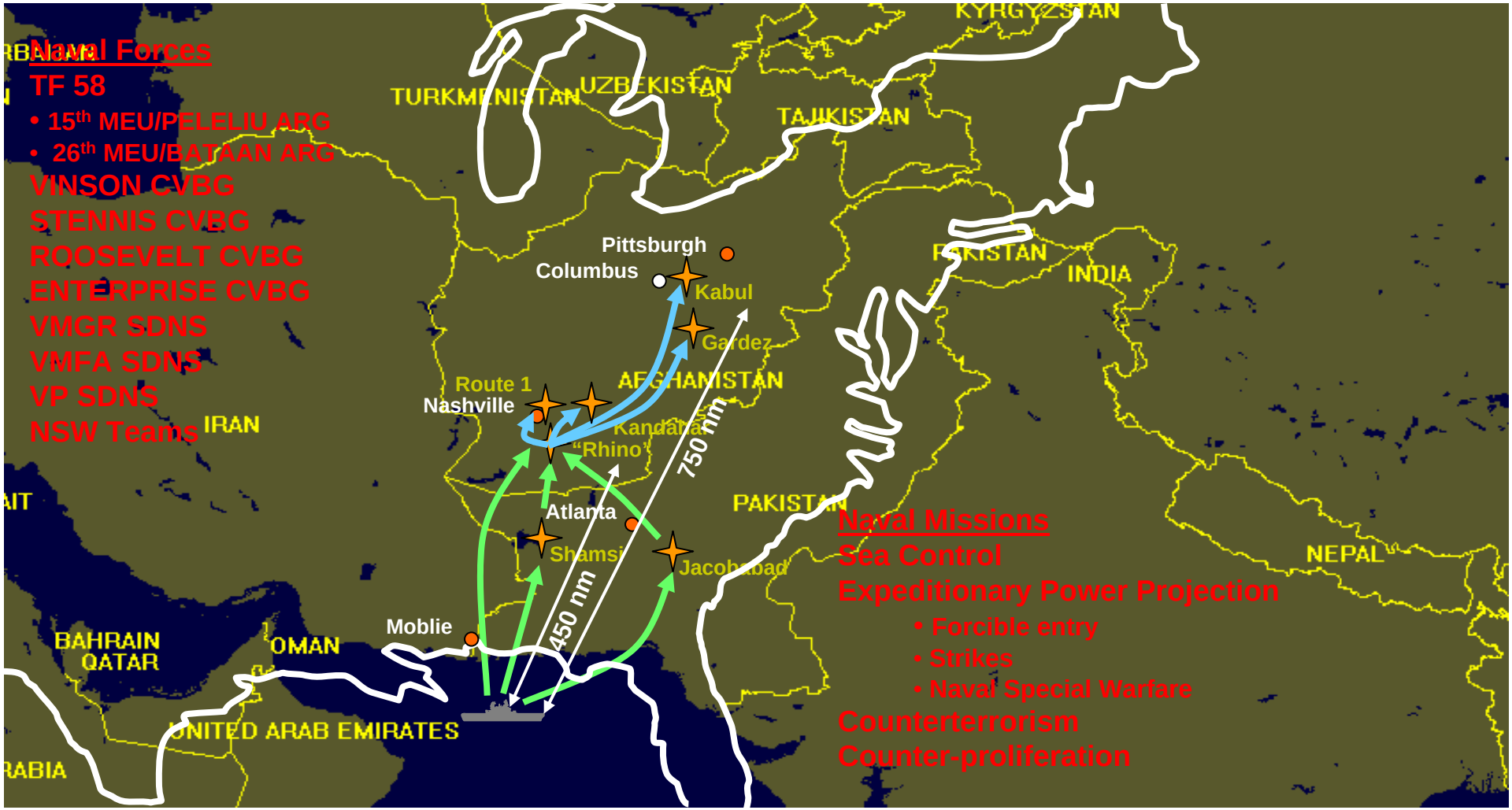
Strategic Missions	Naval Missions	Guiding Naval Principles	Methods	Strategic Objectives/Outcomes
Homeland Defense (HLD) War on Terror (WOT)/ Irregular Warfare (IW) Conventional Campaigns Deterrence Shaping and Stability Operations (SSO)	Forward Naval Presence Crisis Response Expeditionary Power Projection Maritime Security Operations Sea Control Deterrence Security Cooperation Civil-Military Operations Counterinsurgency Counterterrorism Counter-proliferation Air and Missile Defense Information Operations	Agility Coordinated Global Influence Deployability and Employability Interoperability Persistent Presence Adaptive Force Packaging Precision Speed Unpredictability for Our Adversaries and Reliability for Our Friends	Globally Networked Operations Distributed Operations Adaptive Force Packaging: Right Force, Right Time, Right Place Aggregate, Disaggregate, Re-aggregate Cross Fleet Standardization Task Focused Training Cultural Awareness Sea Basing Building Partner Capacity	Help Win the Nation's Wars Establish Favorable Security Conditions Secure Strategic Access & Retain Global Freedom of Action Strengthen Alliances and Partnerships Secure US from Attack

Foundations of NOC: Leadership and Professionalism, Mission Type Orders, Global Awareness (Maritime Domain Awareness and Beyond), and Interdependence

15th MEU (SOC)/PELELIU ARG
Nov 2001



Aggregated Naval Forces in OEF



National Defense Strategy

- **Given US preeminence in *traditional* forms of warfare, our potential adversaries are driven toward *irregular*, *catastrophic* and *disruptive* methods.**

- **Describes the current and future strategic environment as an uncertain one, with a variety of potential challenges posed by:**
  - Rising potential peer competitors
  - Failing or failed states that undermine regional stability and threaten our interests
  - Non-state actors who seek to undermine legitimate governments.
    - Terrorists
    - Insurgents
    - Criminals
    - Pirates

- **Countering these challenges calls for more widely dispersed forces that can:**
  - Provide increased forward presence
  - Conduct security cooperation with an expanding set of international partners
  - Act swiftly to preempt non-traditional threats
  - Globally respond to crises in spite of challenges to access.

Hierarchy of Marine Corps Concepts

The National Defense Strategy	Outline approach to dealing with 21st Century challenges.
The 21st Century Marine Corps	Broad guidance and direction for the future of the Marine Corps.
Marine Corps Midrange Threat Estimate 2005-2015	Description of the environment, threats, and types of operations Marine Corps forces will likely encounter.
Operational Maneuver From the Sea *Ship-to-objective Maneuver*	Conceptual foundation for littoral power projection.
Draft *Naval Operations Concept (NOC)* ***Marine Corps Operating Concepts for a Changing Security Environment***	**Descriptions of how, when and where Naval forces will contribute to the *National Defense Strategy.***
Concepts of Operation (CONOPS)	Operating concepts applied against likely scenarios in order to inform capability development and investment decisions.
Seabasing; Distributed Operations; Command and Control/FORCEnet; Intelligence; Fires & Maneuver; Logistics; Force Protection	Enabling and functional concepts that drive DOTMLPF changes.

NOC Implementation

- **"This concept articulates the U. S. Naval contribution to the national defense…"**
  - Congress and the American people to gain public support
  - Joint, Interagency & Multinational players to solidify partnerships
  - Sailors & Marines to foster innovation

- **"It delineates how, when, and where the Navy and Marine Corps will support the Combatant Commanders' efforts to counter traditional, irregular, catastrophic and disruptive challenges."**
  - Unified Command Plan has a regional focus while we are fighting a global war…how does the Naval team meet Combatant Commanders' needs in a manner that achieves coordinated global influence?
  - Where, when, and how can Naval forces be most effective?
  - What adaptive force packages might be most appropriate for each focus area?
  - What are the key venues for developing an integrated, global approach?

- **"It is also intended to foster innovation and initiative, while maintaining unity of effort, as we refine our forces to best serve our nation…"**
  - How do we make this a truly collaborative Naval effort? Key interdependencies?
  - Fostering a Naval intellectual renaissance? Revisions to training, education, and professional development? Seminars, wargaming, experimentation, professional debate?
  - Closer alignment of command and staff organization and processes?
  - Coordinated Naval input to the Joint Capabilities Integration and Development System?

Extant Concepts

- ***Operational Maneuver from the Sea*** **(OMFTS)**
  - Still relevant given the challenges to access noted national strategy documents
  - Provides our conceptual foundation for littoral power projection against both traditional and non-traditional challenges.

- ***Ship to Objective Maneuver*** **(STOM)**
  - Still applies but will require a re-balancing of capabilities to address a wider range of missions, such as raids against terrorist base camps and infrastructure, securing WMD, and providing humanitarian assistance/disaster relief.

- ***Seabasing***
  - The key enabling concept for OMFTS/STOM
  - Provides the means of maneuver, support and sustainment
  - Reduces our footprint and associated vulnerabilities ashore

- ***Distributed Operations*** **(DO)**
  - The key enabling concept for preparing Marines to deal with diverse challenges
  - Promotes training, education and equipment innovations

Forward Presence, Security Cooperation & Counterterrorism

- **Problem: The strategic environment, objectives and approach described in the national strategy call for increased forward presence, security cooperation with an expanded set of partners, and enhancing our ability to counter terrorism.**

- **Central Idea: Determine requisite Navy and Marine Corps capability and capacity enhancements:**
  - Security Cooperation
  - Foreign Internal Defense
  - Civil-Military Operations
  - Maritime Interdiction/Visit, Board, Search and Seizure
  - Raids/Strikes vs. sanctuaries, base camps, transit routes, leadership, C2, mobility assets, etc.
  - Safeguard/Recover WMD
  - Safeguard/Recover personnel and property

- **Implications:**
  - Explore additional sizing options for the MAGTF, other Marine Corps forces, and associated ship mix to meet the expanded requirement.
  - Evolve the Naval element of the global defense posture.
  - Impact of forward presence requirements on balancing the fleet.

Crisis Response

- **Problem: The optimal force structure, associated lift, and global posture that balances the requirements for security cooperation and counterterrorism with the competing requirement to effectively respond to crises across the spectrum of conflict has not been determined.**

- **Central Idea:**
  - Comprehensively re-examine what resources should be:
    - Forward deployed
    - Pre-positioned
    - Retained at home stations
  - Include an assessment of:
    - Available lift
    - Time required to deploy, employ and sustain forces

- **Implication:**
  - Assessment of Theater Security Cooperation plans and the relation to crisis response, global lay-down, and campaign design

Forcible Entry

- **Problem: Forcible entry will likely be initiated on a compressed timeline, by forces concentrating from dispersed locations across significant distances, and with varying degrees of access within the operating area.**

- **Central Idea:**
  - Each forcible entry operation will be unique based on the mission, the adversary, the operating environment and time considerations.
  - Will be executed by a combination of forward-based, forward deployed, pre-positioned and CONUS based forces
  - Will be conducted through phased, overlapping and interdependent actions:
    - Gaining and maintaining access – controlling air, sea, land & cyberspace
    - Opening entry points – assaulting designated objectives
    - Transitioning to follow-on operations – facilitating the rapid buildup of combat power
  - Critical aspects are speed, unpredictability, and assessment of enemy capabilities and actions.

- **Implications:**
  - Forcible entry must be understood as scaleable, not just “high end.”
  - Impact on lift, basing, and deployments
  - Joint interdependencies
  - Joint Forcible Entry CONOPs: Chartered through JROC

Prolonged Operations

- **Problem:**
  - The Marine Corps is organized, trained and equipped as an expeditionary – general purpose force (most ready, when the Nation is least ready).
  - The characteristics that make the Marine Corps a rapidly deployable, expeditionary assault force for high intensity, short duration operations create certain challenges when assigned tasks of sufficient scope, scale, or duration to demand significant change in normal personnel policies, training, or equipment.

- **Central Idea:**
  - USMC provides 30% of the nation's ground combat power and 25% of its tactical airpower, so our commitment to prolonged operations is unavoidable.
  - Marine Corps forces have historically been heavily committed to prolonged operations.
  - Characteristics of prolonged operations:
    - Stress on personnel tempo and increased reliance on Reserves
    - Interruption or modification of normal individual or unit rotation cycles
    - Shortened training cycles to meet operational requirements
    - Lowered materiel readiness
    - Modifications to organizations and equipment focused on a specific mission

- **Implications:**
  - Adjustments to organization, training and equipment for prolonged operations must balance short and long-term requirements.
    - Ex: EFV versus vehicles more suited for counterinsurgency

Countering Irregular Threats: A New Approach to Counterinsurgency

- **Problem: We struggle with conceptualizing the threat and designing campaigns for countering irregular threats and subsequently focus on combat operations. In successful conflict resolution against irregular threats a comprehensive campaign along with the capabilities and capacities that contribute to the defeat of irregular threats is necessary.**

- **Central Idea:**
  - The military should reconsider the role it will play in the pursuit of political objectives beyond combat operations and the use of coercive force.
  - Should view both the problem and the solution more holistically and completely.
  - The Marine Corps should expand its lines of operation to include the following:
    - Information
    - Combat Operations
    - Establish Essential Services
    - Train and Advise Host Nation Military and Security Forces
    - Economic Development
    - Promote Governance

- **Implications: Provides the conceptual foundation for multiple development efforts.**

Irregular Warfare Connecting Files

Tentative Manual for Countering Irregular Threats

- ***USMC concept for battalion & above***
- ***Foundation for partnerships & efforts in IW***

- ***Counterinsurgency doctrine***
  - Army-Marine Corps effort with Aug 2006 publication
  - Targeted at the battalion level and above
- ***Small Unit Leader's Guide for Counterinsurgency***
  - Targeted at the company level and below
  - Initial publication underway w/immediate fielding to deploying battalions and MARSOC
- ***Irregular Warfare concept***
  - SOCOM-Marine Corps concept to apply and counter irregular warfare: Version 1.8
  - Supports CONPLAN 7500
- ***Joint Operating Concept for Irregular Warfare***
  - *USSOCOM / USMC led*
  - *Anticipate release in Dec 2006*
- **Other efforts;**
  - EXPEDITIONARY WARRIOR 06
  - Distributed Operations Experimentation & Implementation
  - DoD 3000.05 Security, Stability, Transition & Reconstruction
  - USMC – UK: *Countering Irregular Activity Concept*
  - Interagency Seminars: Responding to States in Crisis: New Approaches to Humanitarian and Conflict Intervention Table-top Exercise

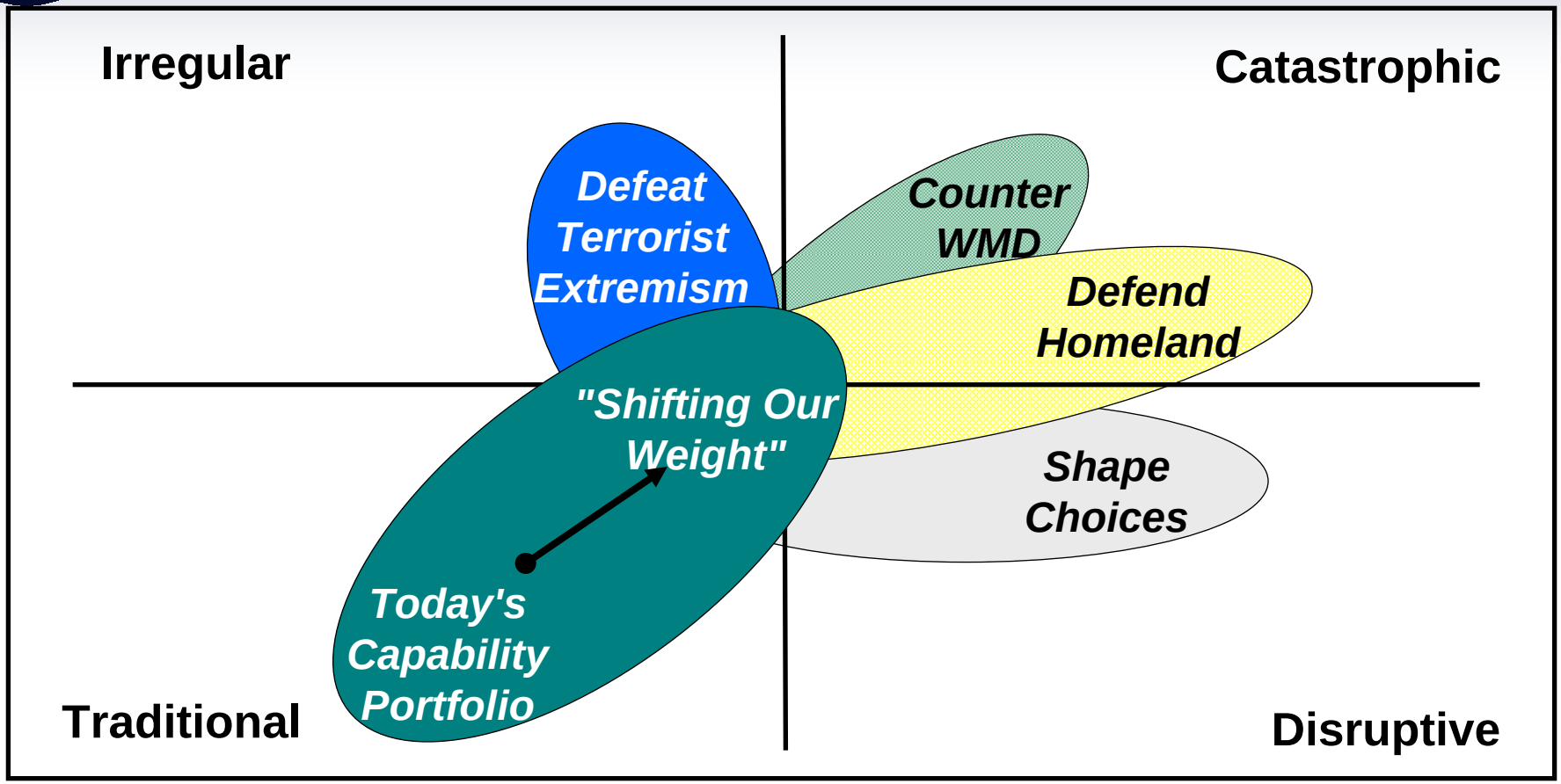
Force Structure
~~Un~~Certainty



VADM Terry Etnyre

25 October 2006

QDR 2006: Shifting Focus



"*This is a different world we're in today. It's unconventional instead of conventional; it's asymmetric instead of symmetric; it's irregular instead of regular; and it is so different for us that we need to...learn to fight this battle as effectively as we were successful with respect to the Cold War.*"

Secretary Rumsfeld, April 2006

Issues and Challenges

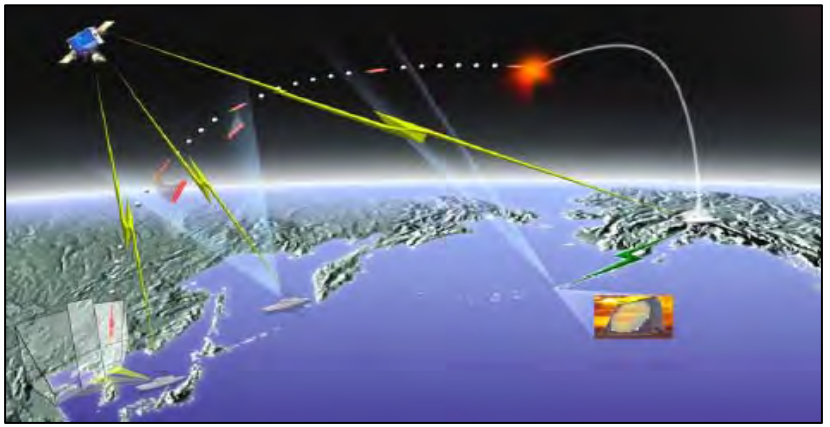
- Uncertain threats
  - MCO...The Long War...Tomorrow's Focus?



- Define Requirements
  - Prevent Requirements Creep



- What is the Right Mix?
  - Capabilities must meet the threat
- Resources
  - Must Control Costs



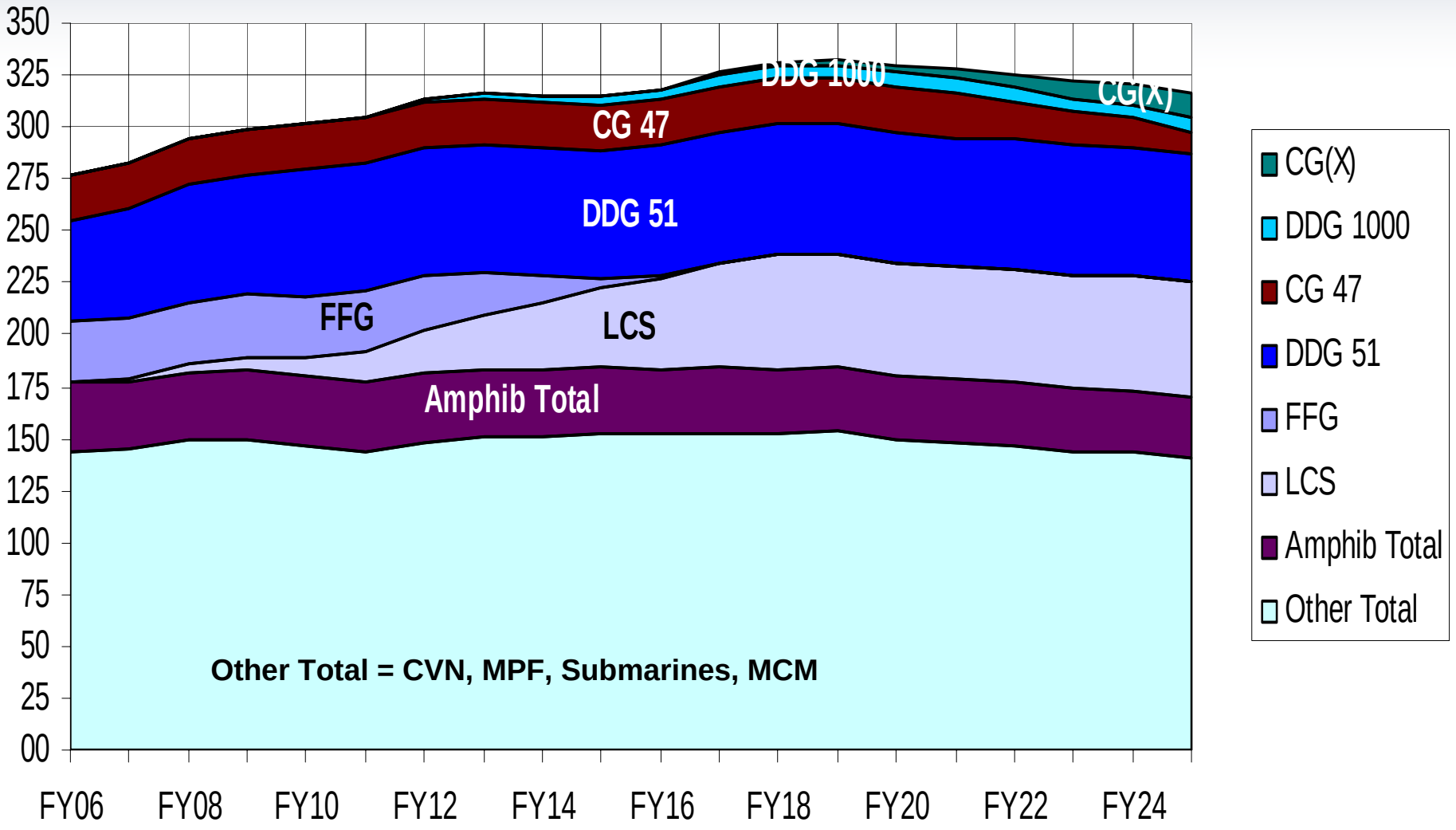
Future Fleet: 313 Ship Navy

Type/Class	Required
Aircraft Carriers	11
Surface Combatants	88
Littoral Combat Ships	55
Attack Submarines	48
Cruise Missile Submarines	4
Ballistic Missile Submarines	14
Expeditionary Warfare Ships	31
Combat Logistics Force	30
Maritime Prepositioning Force (Future)	12
Support Vessels	20
Total Naval Force	**313**



Balances Capability with Affordability

The Right Mix

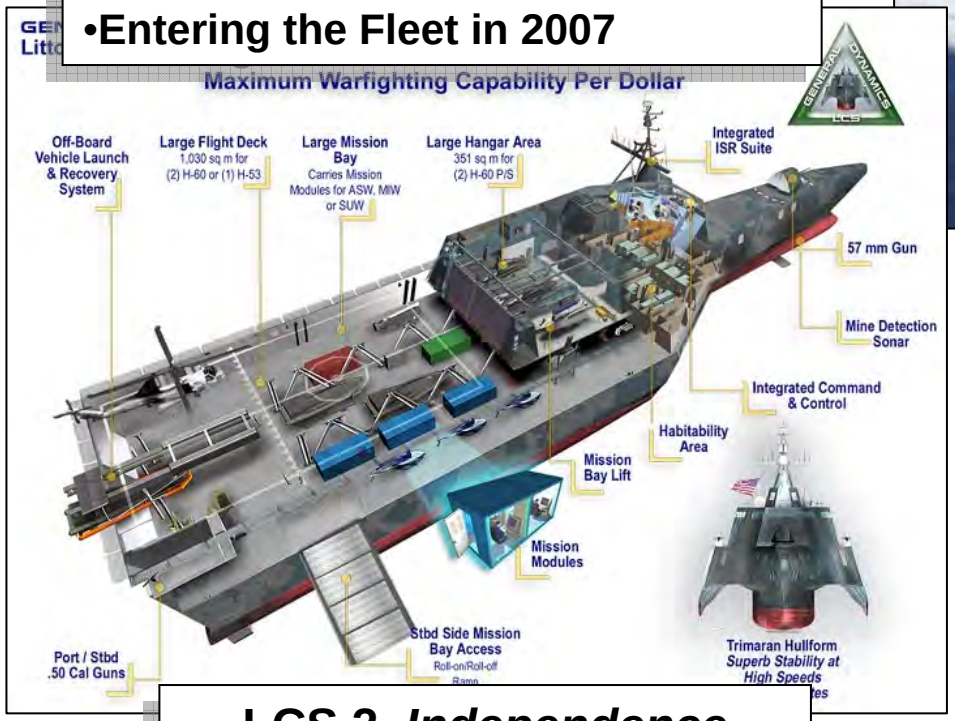


Capable and Affordable: LCS

- Access to the world's littorals
- Spiral Development
- 50 knot maximum speed
- Reconfigurable Mission Modules
- Optimally Manned Crew
- Entering the Fleet in 2007



LCS 1, *Freedom*
Lockheed-Martin Design



LCS 2, *Independence*
General Dynamics Design

LCS will have an immediate impact in the Global War on Terror

LCS Design Concept



Fast, Maneuverable, Shallow Draft Hull



Total Ship Computing Environment



Air & Watercraft Capability

C4I
Navigation
Self Defense
Radar
Vehicle Control
Maint & Support

Core Systems



Core Crew



SEAFRAME

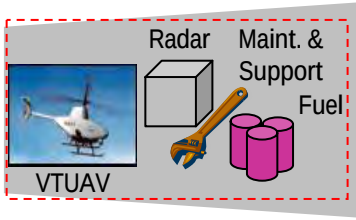
LCS



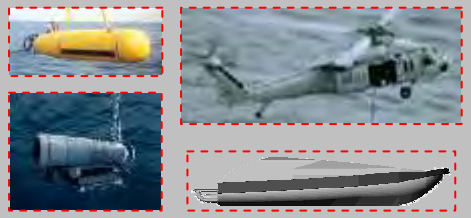
MISSION PACKAGE

Core Capabilities

Interface



Mission Systems



Mission Modules



Mission Crew

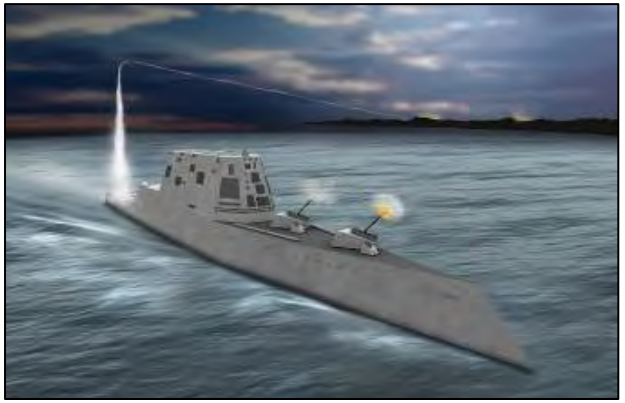
Focused Capabilities
MIW
ASW
SUW

Affording the Future Fleet

- Navy Strategic Plan
  - Focus on Capabilities
  - Build to the Requirement



- Modernization
  - Prevent early retirement



- Sea Enterprise
  - Transformation
  - Navy Enterprise Construct

Meeting warfighting requirements at an affordable price and acceptable level of risk

Modernization

Mission Life Extension Upgrades
CG Baselines 2,3,4

BMC4I
CEC (Variant)
SGS A/C (B/L 2)
CDLMS (B/L 2)

AIR DOMINANCE
7 PH 1C computer program
COTS computing plant
Radar and Display upgrades
VLS Modifications

FORCE PROTECTION
ESSM
CIWS BLK 1B
SPQ-9B (ASMD)
SARTIS
SQQ-89A(V)15 (B/L 3 & 4)

GUN WEAPON SYSTEM
(2) 5 inch/62 Guns
MK-160 Gun Computing System
OSS

HM&E
All Electric Mods
Smart Ship Upgrades
Structural Modifications
Quality of Service Upgrades

B/L 2=CG52-58
B/L 3=CG59-64
B/L 4=CG65-73

Getting full service lives from existing ships is a critical enabler in affording our future

Avoiding early-retirement requires commitment to keeping these ships relevant

DDG-51 Class

AIR DOMINANCE
CIC Display Upgrades
Open Architecture Computing Plant
VLS Mods (ESSM)
AWS CR-3 Computer Program
Multi-Mission SIGPRO
SPY-1D Transmitter Upgrades
Multi-Mission BMD
IABM (SIAP)
SM6/NIFC-CA (IOC FY14)
FCS STAMO Upgrades
CEC

C4I
NAVSSI BLK 4
IFF Mode 5

FORCE PROTECTION
CIWS-1B
NULKA
SEWIP
SSTD (ATT) – IOC FY13
MK 54 Torpedo/DFCI
SQQ-89A(V)15 w/MFTA

GUN WEAPON SYSTEM
MK-160 Mod X Gun
Computing System

HM&E
Full IBS Upgrade
MCS/DCS Upgrades
GEDMS
Wireless Communications
Digital Video Surveillance
Quality of Life Upgrades
Advanced Galley
Mission Life Extension Upgrades

Surface Force Transformation

CNSF Mission: ***Deliver trained, highly effective, and technologically capable Surface forces that are certified across a full spectrum of warfare areas…***

Today's SURFACE FORCE





Surface Warfare Enterprise

Personnel

Maintenance/ Modernization

SURFOR TRANSFORMATION

Training

Logistics

Warships Ready For Tasking

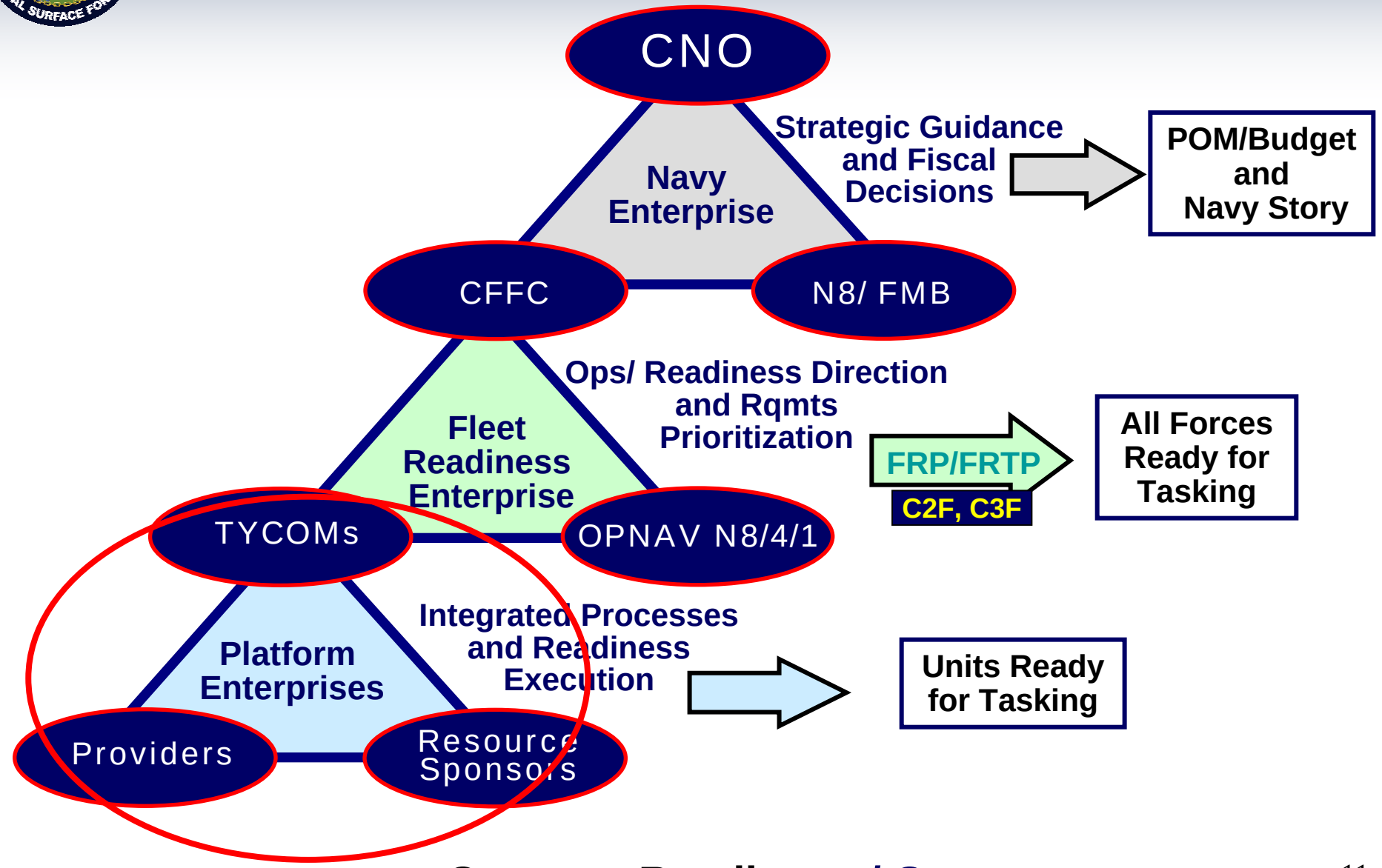
SURFACE FORCE of the Future





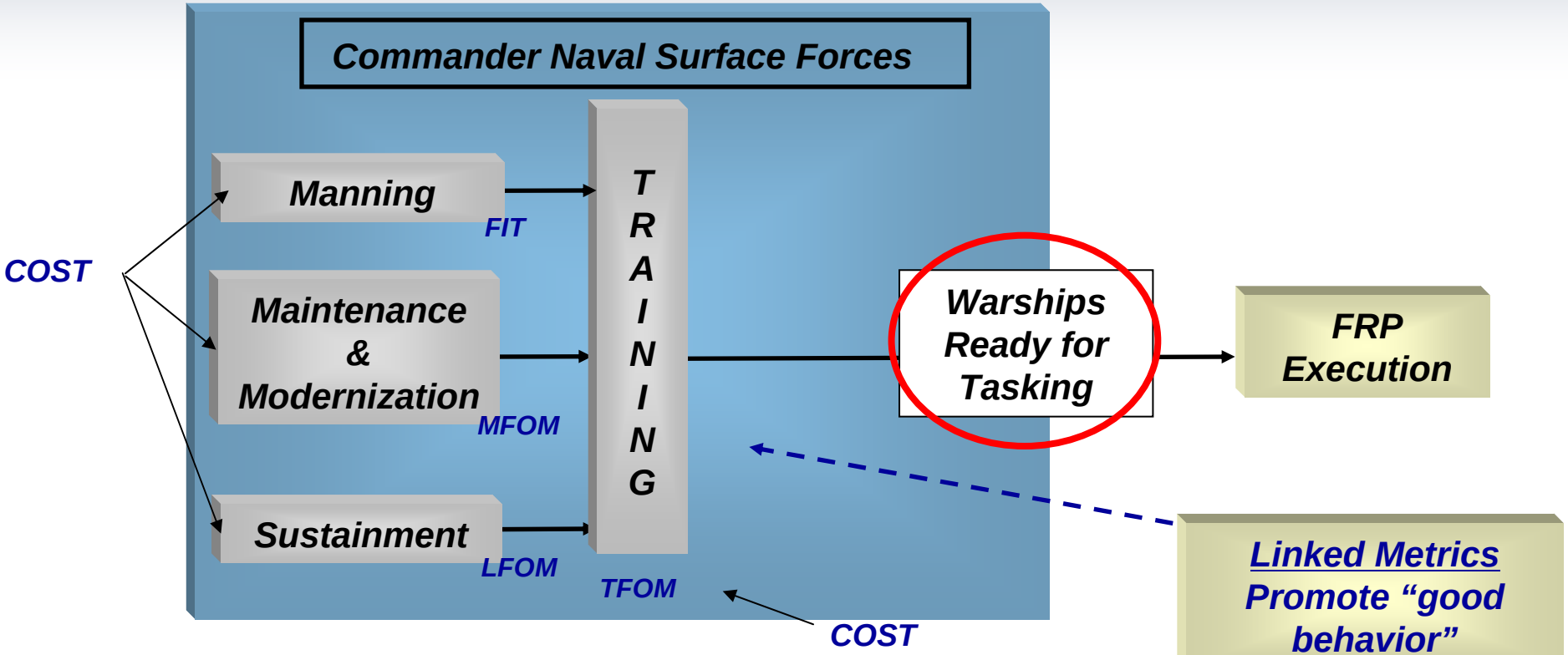


Navy Enterprise Construct



Output = Readiness / Cost

Surface Warfare Enterprise



For each process, measure output vs. demand, and measure cost

Productivity is Key

SWE Oversight

SWE Board of Directors (BOD)

** EXCOMM*

*VADM Sullivan, NAVSEA
*RADM Curtis, DCNSF/CNSL
*RADM McCullough, OPNAV N86
*MGEN Benes, OPNAV N85
*RADM Hamilton, PEO SHIPS
*RDML Campbell, OPNAV N43B

*VADM Etnyre, CNSF
RADM Thompson, OPNAV N41
RADM Nowakowski, INSURV
RADM Stone, NAVSUP
RADM Reilly, MSC
RADM Hugel, SEA 04
RDML Orzalli, RMC Commander
RDML Holloway, PERS4
RDML Carr, OPNAV N86F

RDML Frick, PEO IWS
RDML Goddard, V-NAVSEA
RDML Shatynski , CNSF
RDML Pottenger, MSFSC
RDML Buzby, OPNAV N86B
RDML Deets, NNWC
Jeff Klein, SPAWAR
James Thomsen, PEO LMW

VADM Sullivan, NAVSEA
Chief Operating Officer

Communications Team
AO: LCDR Owens, CNSL PAO

Over-arching Metrics Team
AO: Mr. Warner, CNSF N8A

RADM McCullough, OPNAV N86 Chief Financial Officer

RADM Curtis, DCNSF Chief Readiness Officer

CLASSRONS

Sustainment & Modernization Team
FLAG Lead: RDML Frick
AO: CNSF N43 CAPT Lewis
Co-AO: NAVICP 05 CAPT Costello

Logistics (Parts/Food/Fuel/Ordnance)

Maintenance

Modernization

Personnel Readiness Team
FLAG Leads: RDML Holloway / RDML Shatynski
AO: CNSF N1 CDR Deehr
Co-AO: PERS41 CAPT Kurta

Requirements Planning

Personnel Assignment

Individual Training

Unit / Intermediate / Sustainment Training

Strategic Financial Management Team
FLAG Leads: RDML Carr/RDML Caesar
AO: CNSF N41 CAPT Davis
Co-AO: CNSF N8 CAPT Kaufmann

Strategic Financial Planning

Financial Reporting / Metrics

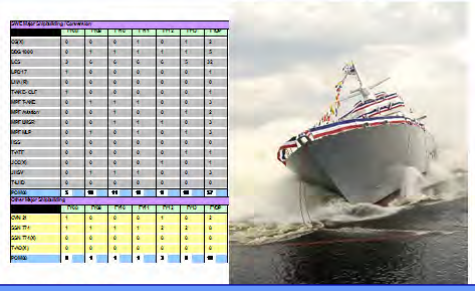
Strategic Cost Management

Variance analysis for course corrections

Cost Area	Targeted %	Actual %	Variance %	Corrective Plan
RDT&E	14	21	7	
Procurement	32	14	(18)	
O&S	32	35	3	
Manpower	22	30	8	

Continuing Improvement

The Inspiration - Shipbuilding Plan



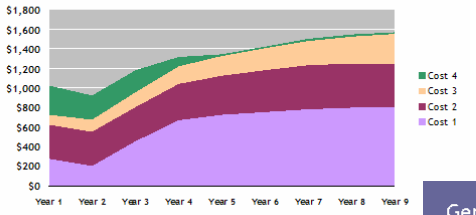
Inspiration

Ship Driven Costs



Cost Analysis

Capturing the gains



Savings

Disciplined Cycle

Financial Analysis



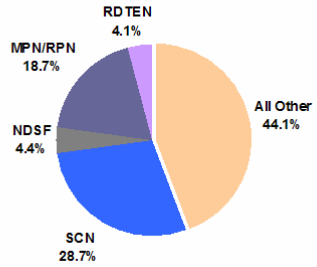
Gap Identification

Generate and implement the opportunities

	Initiative (Examples Only)	Start	Estimated Completion	Champion	Estimated Value
1	Diesel Engine Program	Aug 06			TBD
2	CLASSRON	Oct 06			TBD
3	R&D Productivity	May 07			TBD
4	Requirements	Jan 07			TBD
5	Call Centers	Nov 06			TBD
6	PBL	Feb 07			TBD

Specific Action Plans

Cost targets guide our resource management



Cost Model

A Fleet for the Future

- 30 Year Shipbuilding Plan
  - 313 Ships
  - Provides Structure and Stability
  - Balances Capability and Affordability
- Affording the Future
  - Control Costs
  - Modernization
  - Enterprise Approach



Balanced, Rotational, Forward Deployed, and Surge Capable

Discussion

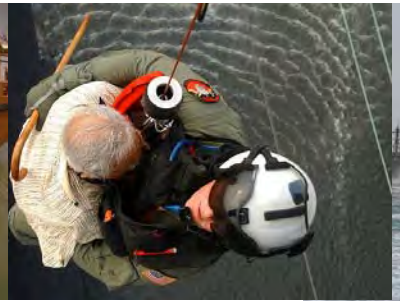


Recapitalizing the Navy's Battle-Line

Brief to National Defense Industrial Association (NDIA) Conference

CDR Greg Gombert
Deputy, Shipbuilding Mgr
Warfare Integration Division (OPNAV N8F1)
25 October 2006











A Maritime Nation at War:

230 Years of Courage Under Fire

Sea Power in a New Era:

A 1,000 ship Navy – leveraging allied and coalition Naval Forces

A Balanced Force:

Right Size, Right Mix, Right Capabilities, Right Cost

The Navy Today

- **Global War on Terrorism**
  - **A Direct Navy Issue!**
    - Over 28,000 Marines and ~19,500 Navy (ground/shipboard) personnel engaged in CENTCOM AOR in support of GWOT
    - Naval medical personnel deployed to Iraq in support of Marine forces
    - CSG and ESG provide continuous on station CENTCOM AOR operational & combat support
  - **Indirect Navy commitment**
    - Global engagement and partner nation support
    - Stability operations in the Philippines and elsewhere
    - Humanitarian assistance and disaster relief throughout the world
- **Maritime Presence, Domain Awareness and Supremacy**
  - **Navy's core competencies!**
    - Worldwide presence with a purpose – deterrent shield against major combat operations across the globe
    - Transitioning from legacy to revolutionary platforms
    - World Class people
    - Heavy investment in transformational technology
    - Platforms and people postured for short duration high intensity conflicts







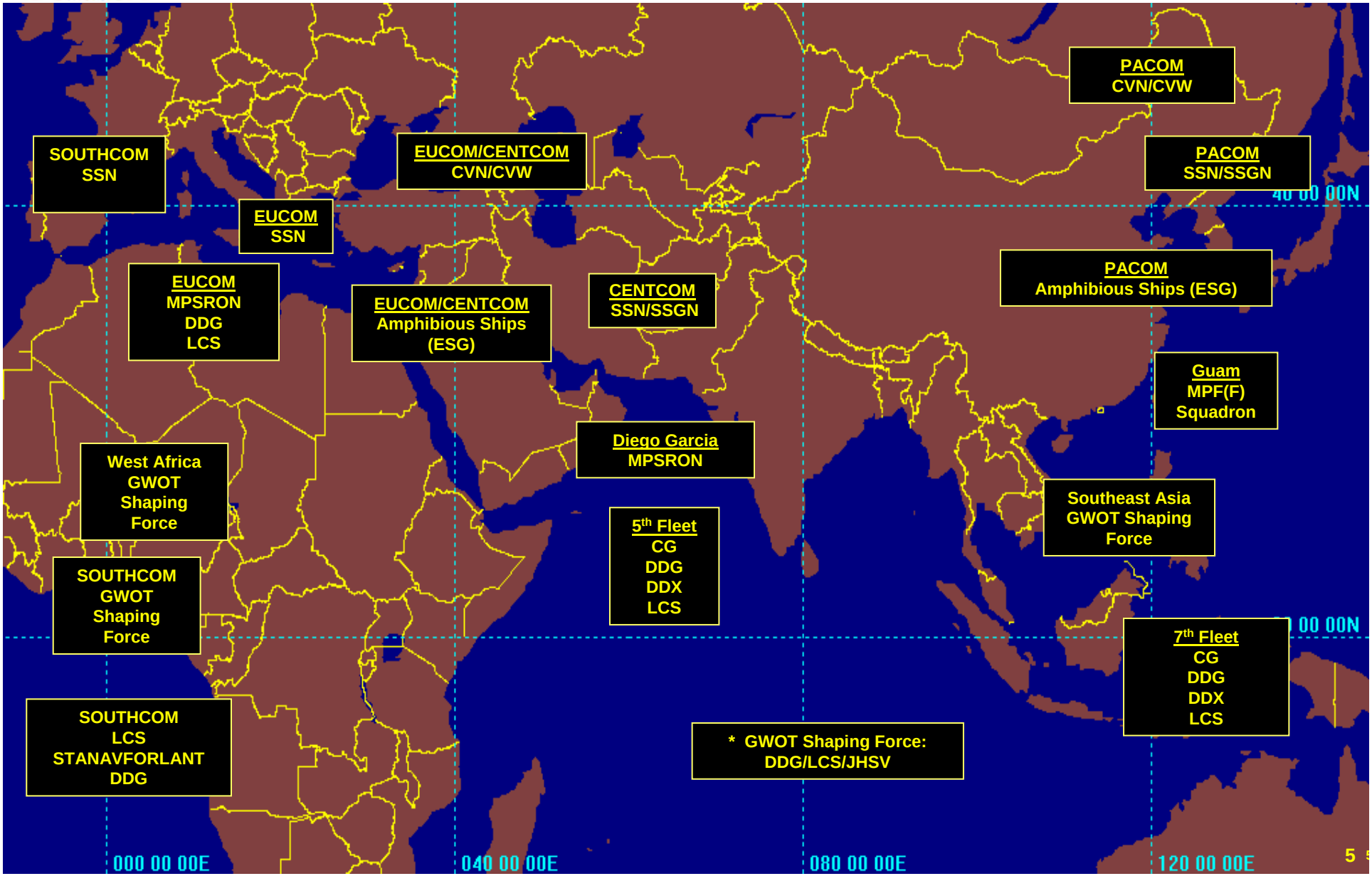
We must remain prepared, strong, and ready to meet the challenges of the future . SECNAV JAN 06

GWOT

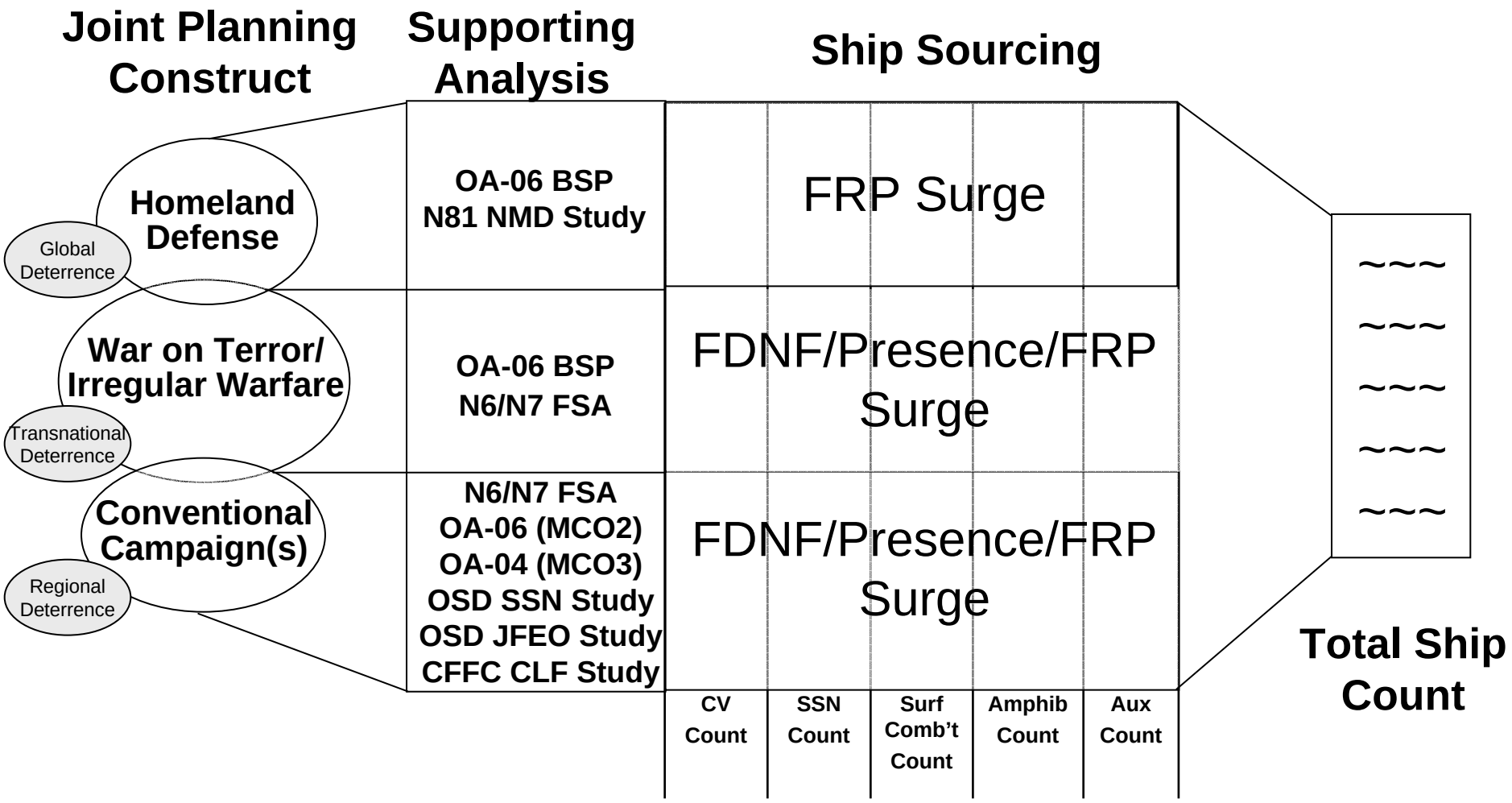
What we are up Against



Force Demand

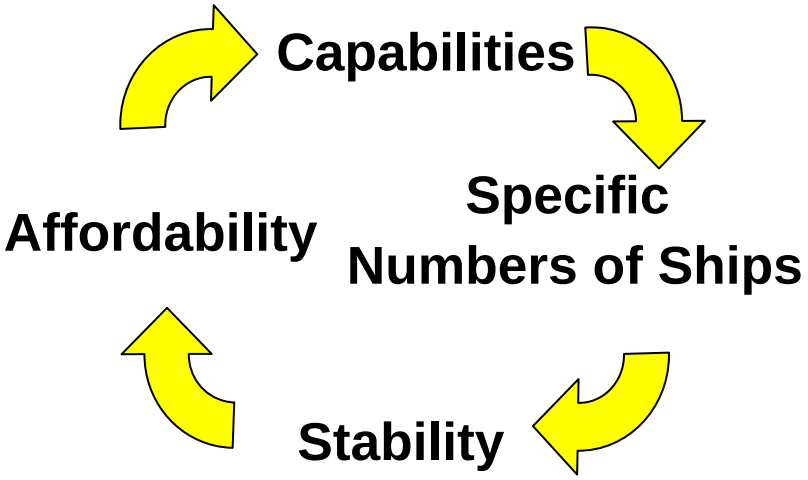


Analytic Basis



All platform types analyzed in common, integrated frame of reference

Future Force Structure



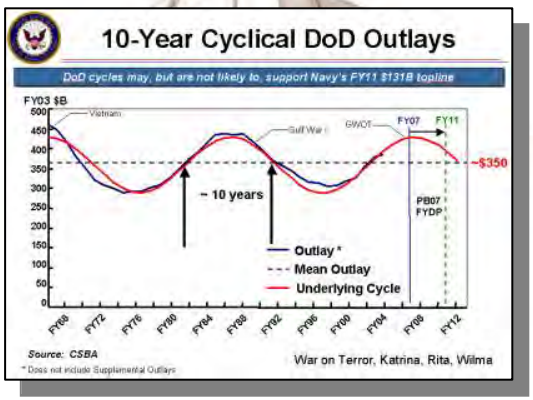
- **Generally accepted by all analytic bodies (CBO, CSBA, PA&E, etc.)**
  - Appropriate force content for the anticipated threat
  - Issues are not with the force content
  - Rather, they are about affording this force level

Ship Type	*Today 2006*	*2013 PB07*	*2020 Force Structure*
CV/CVN	12	10	11
CG	22	22	19
DDG	49	62	62
DD(X)	0	2	7
FFG	30	20	0
LCS	0	27	55
Dedicated MIW	16	14	0
SSBN	14	14	14
SSGN	4	4	4
SSN	55	55	48
Expeditionary	33	32	31
MPF(F)	0	4	12
CLF	30	30	30
Command & Support*	16	21	20
Total	**281**	**317**	**313**

*Includes T-AGOS,T-ARS, AS, T-ATF, LCC, AGF

Fiscal Environment

…Can't do everything…tradeoffs and risk mitigation required



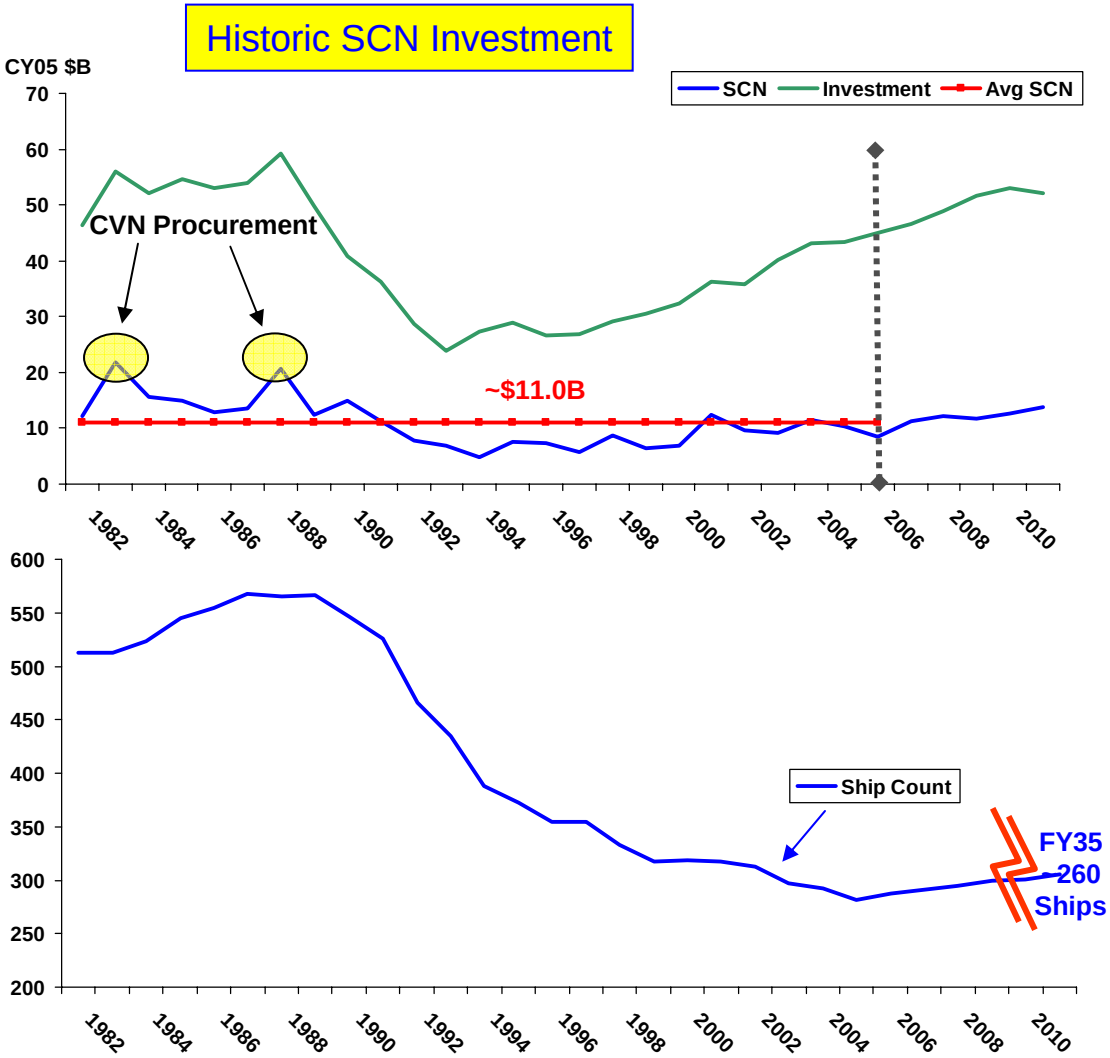
Resources



Requirements

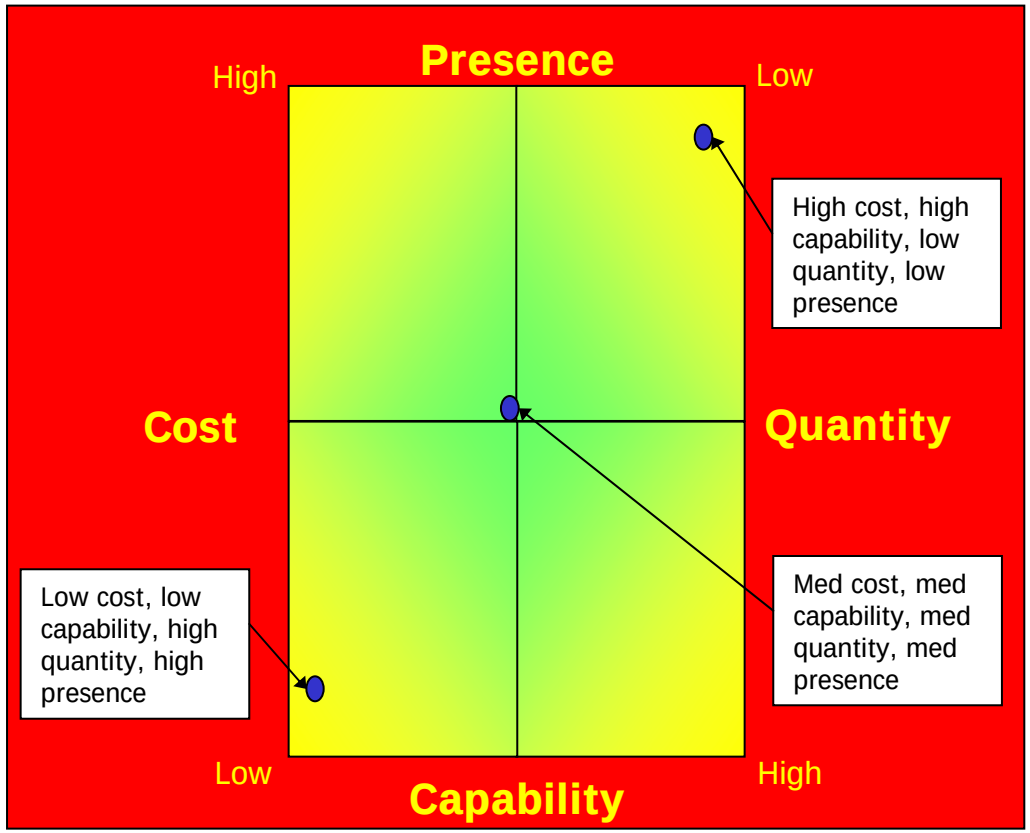
Shipbuilding Affordability

- Historical figures indicate Navy has invested ~$11B annually (FY05$) in new ship construction
  - Only supports ~260 ship Navy over long term
- Warfighting requirement for capacity and capability is 313 ships
  - This requires ~$13.4B(FY05$) in new construction shipbuilding
- Affording the Navy's future is the cornerstone of forward presence
  - We must specify our requirements and justify the investment
  - Commitment to the number of ships, build plan, and investment strategy is critical
  - Stability will assist in meeting affordability goals



Specificity ⇨ Stability ⇨ Affordability

Tradespace



- **Goals:**
  - Achieve balance between resources and requirements
  - Fill any gaps in "What it Takes to Win"
  - Prioritize Navy around CONPLAN 7500
    - Don't "give away" an MCO
    - But, assume more risk where appropriate
  - Risk priority:
    - CONPLAN 7500
    - MCO2
    - MCO1
    - MCO3

Options for recapitalization are limited by the need for relevancy, capability and capacity - maintaining the balance between quantity and quality is the challenge in today's Navy

Affordability



Low Risk/Unaffordable

~350 Ship Navy

Acceptable Risk

$13.4B

~313 Ship Navy

Unacceptable Risk

~286 Ship Navy

- **Capability impact (2020)**
  - Stabilizes @ ~313 ships
  - Satisfies warfighting requirement
  - Provides the necessary capabilities
- **Industry Impact**
  - Stabilizes shipbuilding account
- **Requires concerted modernization effort to achieve full service life**

Aligned with risks accepted in QDR

Recapitalizing the Navy's Battle-Line

Brief to National Defense Industrial Association (NDIA) Conference

CDR Greg Gombert
Deputy, Shipbuilding Mgr
Warfare Integration Division (OPNAV N8F1)
25 October 2006

NDIA Brief 2006

Captain Eugene Gray

Chief, Office of Security and Defense Operations

USCG Headquarters

National Security Cutter (NSC)

(Maritime Security Cutter – Large WMSL)

- **Provides capabilities for extended on-scene presence and forward deployment**
- **Upgraded capabilities for GWOT**
  - State-of-the-art C4ISR for improved interoperability
  - Common Operating Picture (COP)
- **57mm gun system with fire control radar**
- **Hull 1 Keel Laid March 2005**



U.S. Coast Guard
Port Security Unit (PSU)

- **Antiterrorism/Force Protection**
  - Seaports of embarkation/debarkation
  - Expeditionary and Domestic expertise
  - Adaptable force packages



- **6 armed smallboats/117 personnel**
  - Waterborne Security
  - Self Protection
  - Self contained





CASA CN-235 Medium Range Surveillance (MRS) Aircraft

- **Transport and surveillance, fixed-wing aircraft**
- **Multi-mission:**
  - SAR
  - Maritime Law Enforcement
  - Environmental Protection
  - Military Readiness
- **Sensors**
  - Inverse Synthetic Aperture Radar
  - Electro-Optical/Infrared (EO/IR)
  - Specific Emitter Identification



National Strike Force

- **Recognized experts in preparedness and response to mitigate the effects of hazmat incidents**
- **Highly trained cadre of specialist prepared to deploy on short notice**
  - Biological Response
  - Chemical Response
  - Oil Spill Response
  - Radiological Response
- **3 Strike Teams**



Questions?

Background Slides

- Counter-mine
  - DHS is the lead MOTR agency for interdiction of maritime threats in, and near, the U.S. USCG is primary DHS maritime asset.
  - DHS tasked with planning for prevention and detection of sea mining and swimmer operations in U.S. waters
  - Requires coordination between USCG, DoD, other DHS Agencies
- Small Boat Threat – waterborne IEDs
  - Area of evolving Tactics and capabilities
  - Regulatory / Legislative Issues
  - One shot-one kill as it relates to the Coast Guard Mission
    - US waters - Collateral damage is not an option
- Fielding anti-swimmer detection and response systems
- Prototyping Operations in CBRNE environment

U.S. Coast Guard
National Defense Role

- Provide non-redundant, complementary resources that support the National Military Strategy

- Recognized USCG unique national defense capabilities:
  - Maritime Interception Operations
  - Military Environmental Response Operations
  - Port Operations, Security and Defense
  - Peacetime Military Engagement







- Coast Guard is a full partner with the COCOMs and Services overseas and domestically
  - Operations ENDURING FREEDOM & IRAQI FREEDOM
  - Integrated into NORTHCOM / PACOM response EXORDs to Homeland Defense events
- Domestic / Homeland Security is daily focus
  - Maritime transportation system critical to Nations economic power base and military force projection
  - Coast Guard works daily with DoD, federal, state, local and foreign agencies
    - Maritime Security
    - Disaster Response

- Coast Guard is uniquely situated to work with all key players in the maritime domain
  - Regulatory Agency working with industry (foreign & domestic)
  - Law Enforcement Agency working with all levels of Law Enforcement and Intelligence
  - Nation's 5th Military Service working with DoD, COCOMs and foreign coalition partners
  - Disaster Response Agency working with all levels of 1st Responders

- Maritime Sentinel
  - Strategic Plan for Combating Maritime Terrorism
  - Achieving Maritime Domain Awareness
  - Conducting effective maritime security operations
    - Overseas
    - On the high seas
    - US territorial sea and internal waters
  - Creating and overseeing an effective maritime security regime

- National Fleet
  - CNO / COMDT signed policy statement
    - Recapitalize forces – together!
    - Surface Combatants, major cutters, aircraft
      - Deepwater
    - Adaptable, interoperable, complimentary
    - Synchronize planning / training / procurement
    - Common Equipment & Systems
    - Interoperability improves mission effectiveness
  - Coast Guard is a partner / participant in the CNO's 1000 ship Navy organizing concept

Robotic Systems
Joint Project Office

Ground Robots in War

Presented to

Expeditionary Warfare Conference

26 October 2006

A “Sleeping Giant” Awakened



The World Changed

- **WWII History Showed…**
  - **…That a "Sleeping Giant" Awakened**
  - **… Unprecedented Technology Development**
- **9-11 Changed…**
  - **…Not Just the Way War Waged Against Us…**
  - **…But, Once Again, the Way that We Respond**
- **OIF/OEF History will Show…**
  - **… Surge in Technology Development/Application**
  - **… Advent of Ground Robots in Combat**

Evolution of Ground Robotics in War

2004 162 Systems

- No Single Vendor Could Produce 162
- 5 Vendors, Multiple Configurations
- Joint Effort, EOD Focused
- Joint Robotic Repair Facility Evolution

2005 1800 Systems

- Robots' Proven Ability to Save Lives
- Expansion Beyond EOD Mission
- Recognition of Need for "Single Bellybutton"
- MOAs with AMC and REF

2006 4000 Systems

- Continued Proliferation
- Engineers, Infantry, and Special Forces
- Route Clearance, Countermine, Weaponization.
- Pre-Deployment Training and Embedded Repair Teams (ERTs)
- Supply Chain Management of COTS

The Cost in Lives

WAR	US Deaths per Day
World War I	200
World War II	219
Korea	32
Vietnam	19
Iraq	2

Thousands of Ground Robotic Missions Have Saved Lives…

GROUND ROBOTS WILL SAVE MORE!

A Service Member….
or a Robot



Ground Robots in Action

- **Over 150 Missions a Day**
- **More Than a Thousand Systems Destroyed**



Ground Robots in Action

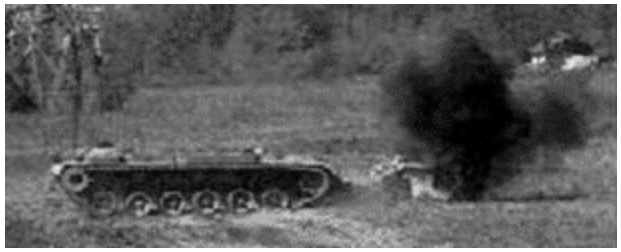


"Robotics 101"

- **Definition**
  - **Webster's (Robot): A Machine or Device That Works Automatically or by Remote Control**
  - **Military Application: Remote Combat Tasks to Accomplish the Mission and Save Friendly Lives**
- **Components**
  - **More than Vehicles**
  - **System (Chassis, Control Unit, Payload)**
  - **Software Intensive**
- **Levels of operation**
  - **Tether**
  - **Tele-op**
  - **Semi-Autonomous**
  - **Autonomous**

Toolbox Concept

Legacy Systems



Panther



Mini Flail



MATILDA

- **Panther**
  - Anti-Tank
  - Abrams with Roller
  - From Bosnia / Kosovo
  - To Iraq
- **Mini Flail**
  - Anti Personnel
  - Bosnia / Kosovo
  - Afghanistan
  - Retired
- **MATILDA**
  - Ft. Leonard Wood
  - Deployed OIF / OEF
  - Retired

Current Systems

PROGRAMS OF RECORD

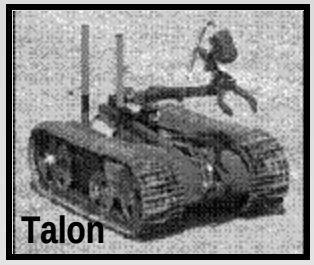


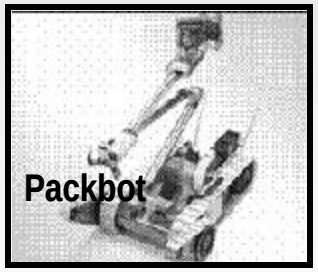




IED SYSTEMS







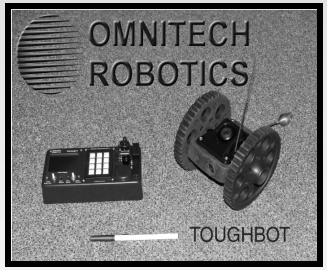


Global JRRFs/ERTs

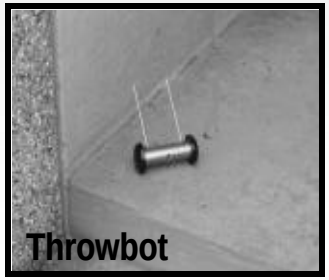
MULTIPLE S&T EFFORTS















ABV- Remote Control System

Assault Breacher Vehicle (ABV)





MV 4

DOK-ING MV4





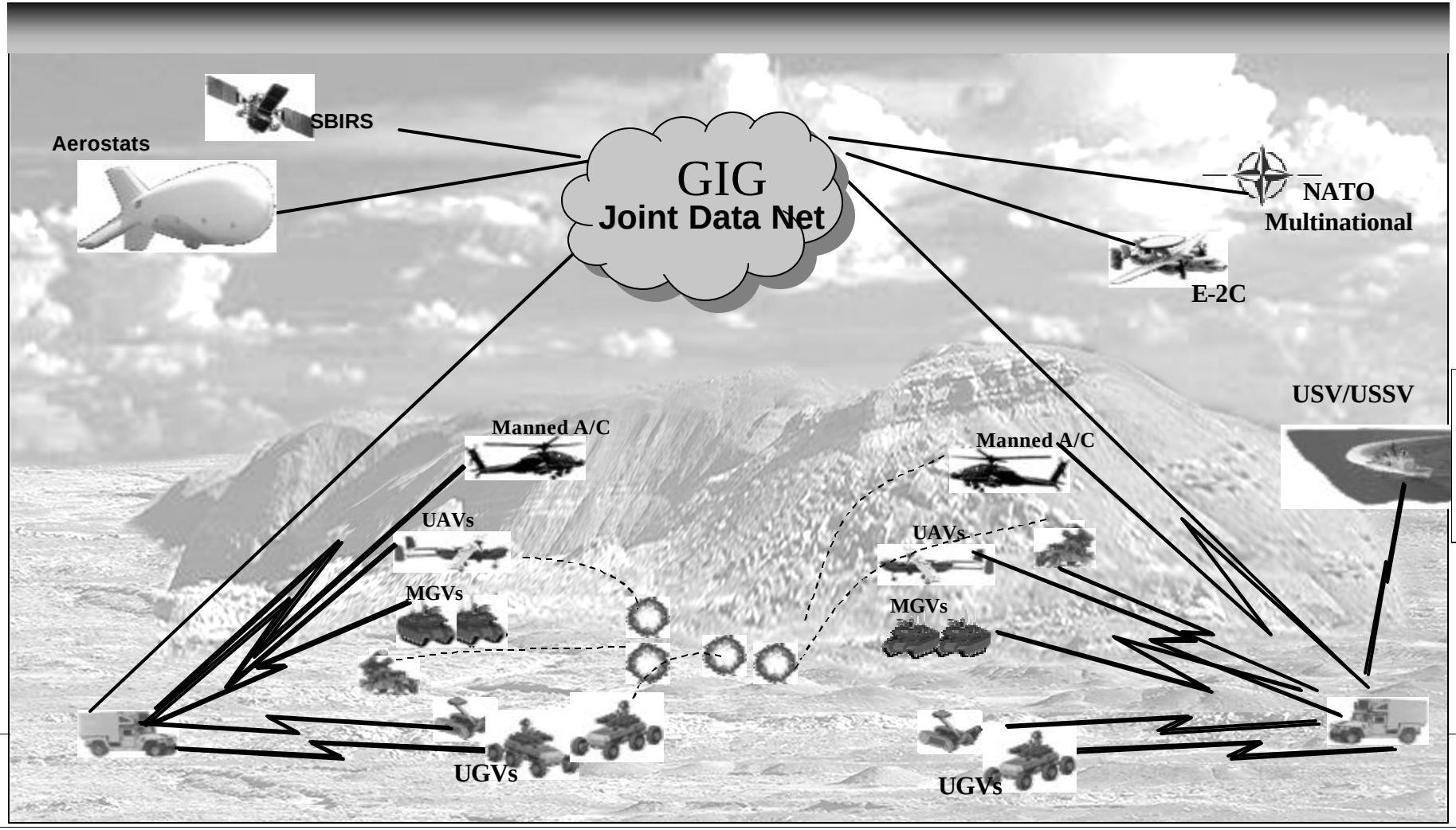
Gladiator

Gladiator



The Future? COLLABORATION

- Interoperability
- System of Systems
- Joint Shared Integrated Picture
- Sensors, Shooters, Command, Control & Communications
- Reconnaissance/Surveillance



FCS Ground Robotic Systems



Armed Robotic Vehicles-Assault-Light (ARV-A-L)



Multifunctional Utility/Logistics and Equipment MULE-Transport



Small Unmanned Ground Vehicle (SUGV)

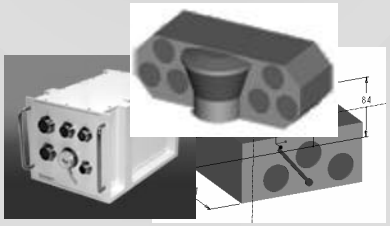




Countermine-Mule

Armed Robotic Vehicles ARV-RSTA





Autonomous Navigation System ANS

Armed Robotic Vehicles ARV-Assault



Ground Robotic Master Plan

- **GRMP Links Unmanned Systems S&T to Capability**
  - **Army-Marine Corps Activity (Not OSD "JRP Master Plan")**
  - **Systems Engineering Rather Than Ad Hoc Approach to Master Plan**
  - **Partnered with PM UAS and Defense Acquisition University**
  - **OSD JGRE (Previously Called JRP) to Have Similar Initiative 2007**

- **Technology Assessment & Transition Management (TATM)**
  - **Uses Capability Assessments / Gap Analyses**
  - **2 Key Components: Database/Tool Kit and a Process**
  - **Use of Data (e.g., Technology Maturity & Criticality)**
  - **OIPT/WIPT Process to Make Decisions/Recommendations**
  - **4 Overarching Stakeholders User / S&T / PM / Sustainer**
  - **Results in a Published Plan and Signed TTAs**

- **Stages**
  - **Version 1.0 July 2005 Army-Marine "Catalog," Not a "Plan" (Data Only)**
  - **Version 2.0 September 2006 Army-Marine Closer to "Plan" (Used Data & Process)**
  - **Version 3.0 June 2007 to Become First "Plan" (Tied to POM Process, Signed TTAs)**

Help Needed

- **Think JAUS (Joint Ground Interoperability Standard)**
- **Common OCU (Driven by Requirements)**
- **Improved Network Interoperability**
- **MANPRINT Standardization**
- **Logistical Efficiencies**
- **Budgetary Challenges**

Now More Than Ever…

…Because the World Changed

We Must Never Sleep Again

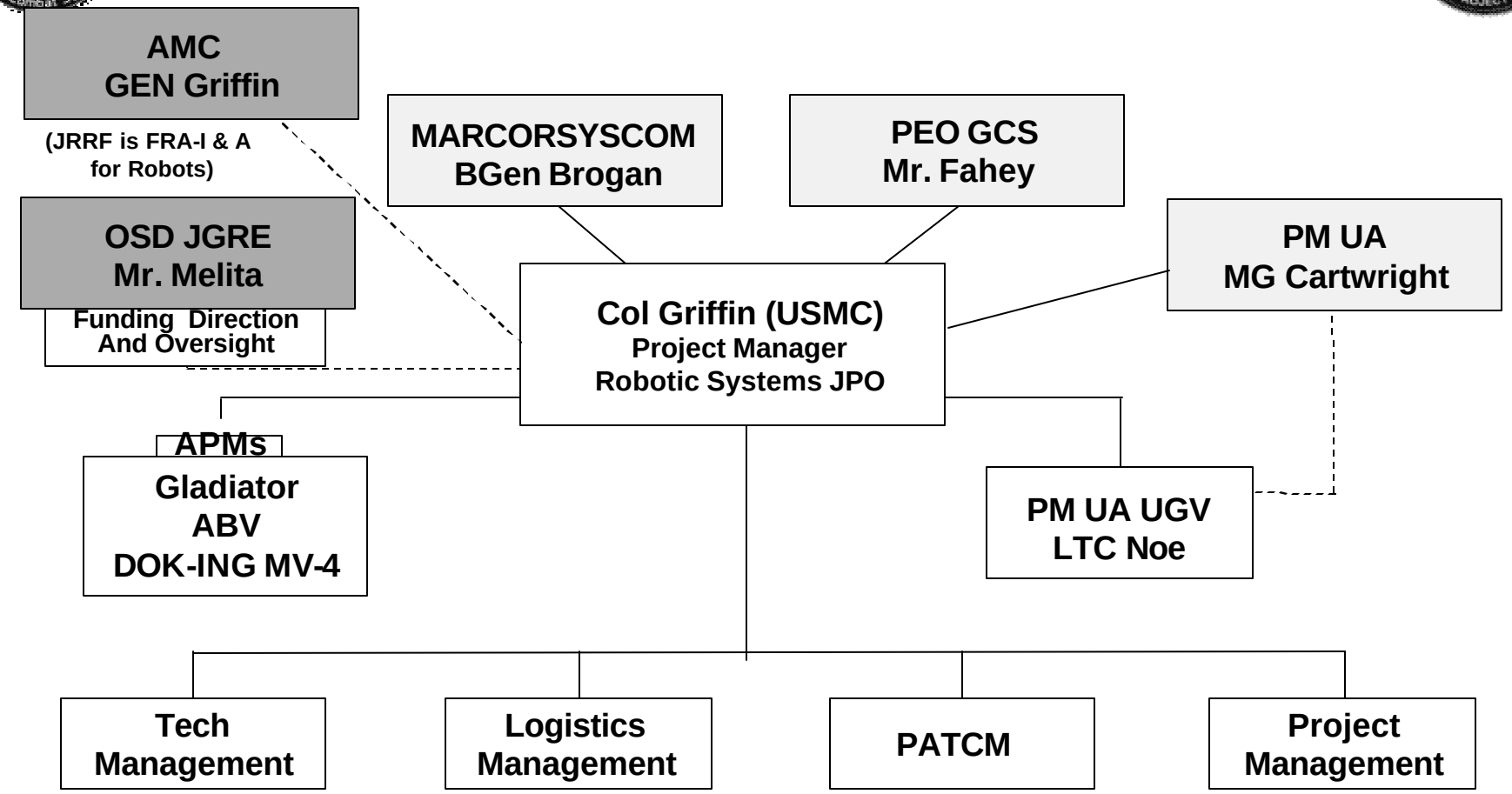


Robots Don’t Sleep



BACK-UPS

Robotic Systems Joint Project Office



Army – Marine MOA

Over 20 Robotic Systems

Chartered by AAE

Rapid Fielding "1-2-3 Process"

- **"1" Tech Insertion Experiment (Funding Varies)**
  - **"1-a" CONUS Assessment Before OCONUS**
  - **"1-b" Theater 90 Days if "1-a" is Faborable**
  - **Pre-Deployment Sustainment and Assessment Plan**
- **"2" ONS/UNS (GWOT, JIEDO, REF Funding)**
  - **If OCONUS "1-b" Assessment is Favorable**
  - **More Robust Sustainment and Assessment Plan**
  - **Process Link to Formal Requirements Domain**
- **"3" Enter Formal Acquisition Process**
  - **Feeder Requirement or New Requirement**
  - **More Rapid Acquisition (Enter at MS B or MS C)**

Challenges & Opportunities for Industry

- Autonomous Mobility
- Autonomous Mobility Performance
- Perception Safety (Moving Persons and Vehicles)
- Navigation Challenges (Adverse Weather, Negative Obstacles)
- System Control Devices
- Autonomous Operations
- Development of Tactical Logic/Command Control
- Non-Line-of-Sight Communications
- Non-Active (Stereo) Perception
- Reliability/Availability
- Anti-Tamper Capability
- Lightweight, Rugged Components
- Improved Battery Technology

Program Executive Office

SHIPS

We Are Ships
From Cradle to Grave

NDIA Expeditionary Warfare Conference: Force Structure Panel

RADM Charles Hamilton, PEO Ships

25 October 2006






Distribution Statement A: Approved for Public Release; Distribution Unlimited. (11/20/2006).
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CNO Priorities

- **Sustain Combat Readiness**
  - **Right combat capabilities – access, speed, agility, adaptability, persistence, awareness and lethality – for the right cost.**
- **Build a Fleet for the Future**
  - **Balanced, rotational, forward deployed and surge capable**
  - **Proper size and mix of capabilities**
    - **empower enduring and emerging partners**
    - **deter adversaries**
    - **defeat enemies**
- **Develop 21st Century Leaders**
  - **Through a transformed manpower, personnel, training and education organization that better competes for the talent our country produces and creates the conditions in which the full potential of every man and woman in our Navy can be achieved**

Navy Shipbuilding Plan

Ship Class	FY06	FY07	FY08	FY09	FY10	FY11	FY07-11
CVN 21	-	0	1	-	-	-	1
SSN 774	1	1	1	1	1	1	5
DDG 1000	-	2	0	1	1	1	5
CG(X)	-	-	-	-	-	1	1
LCS	3	2	3	6	6	6	23
LPD 17	1	0	1	-	-	-	1
LHA(R)	-	1	0	-	1	-	2
T-AKE	1	1	1	1	1	1	5
MPF(F)	-	-	-	0	0	0	0
MPF Aviation	-	-	-	-	-	1	1
MPF LMSR	-	-	-	-	1	1	2
MPF MLP	-	-	-	0	-	1	2
Intratheater Connectors	-	-	-	1	1	1	3
Sea-Shore Connectors	-	-	-	-	1	4	5
Total New Construction	**6**	**7**	**7**	**11**	**12**	**14**	**51**

- ***Congress authorized and appropriated funding requested in the 2007 President's budget for DDG 1000, LCS, LHA(R), LPD 17 and T-AKE***
  - ***DDG 1000 program received authorization to proceed with Dual Lead Ships strategy***
  - ***Cost caps placed on DDG 1000 (lead ships), LHA(R), LPD 17 ships 22-25***

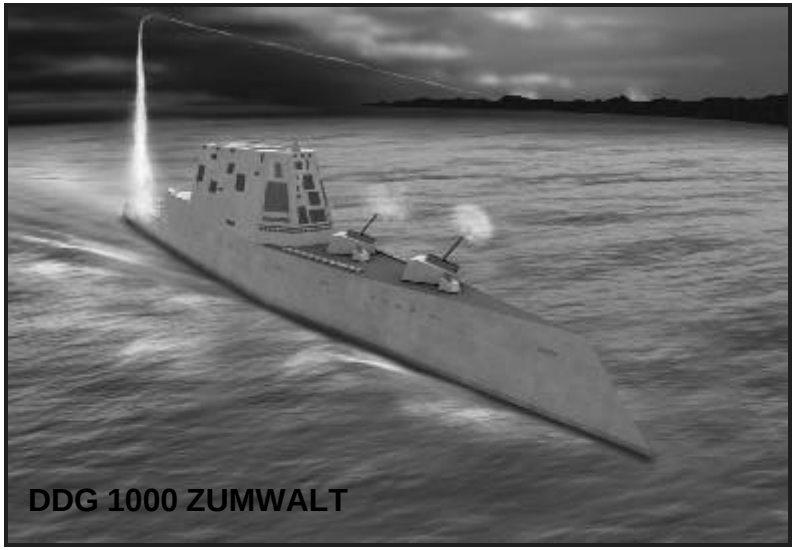
Obstacles to Designing Affordable Ships

- **Getting early, documented, validated requirements, informed by cost**
  - **Analysis of ship cost must include complexity, ship density, degree of warfare system integration and propulsion plan configuration in addition to labor and material costs**
- **Rising costs in combat systems and C4ISR suites, with limited user appetite suppression ("better" is the enemy of "good enough")**
  - **Weapons systems are approximately 40% of total cost on warships in the FYDP**
- **Material demand (global steel market) and vendor base**
  - **Material sourcing by parent shipbuilding corporations could be improved to coordinate leveraged material buys within the shipyards they own**

- **Streamlining the Shipbuilding Acquisition Process**
  - **Technology Maturation Model**
  - **CAIV Model**
  - **Requirements Model**
  - **Producibility Model**
  - **Lifecycle Optimization Model**
  - **Partnering Model**

- **Technology Maturation Model**
  - **Produce Engineering Development Models (EDMs) to elevate Technology Readiness Levels (TRLs) and gain mature cost insights from actual production of representative subsystems**

    Example: DDG 1000 EDMs



DDG 1000 ZUMWALT



DDG 1000 ZUMWALT

DDG 1000 Critical Technologies

Infrared Mockups (IR)

- Land-based suppressor testing complete
- At-sea panel testing complete



Integrated Composite Deckhouse & Apertures (IDHA)

- RCS testing complete
- Co-site testing complete



Advanced Gun System (AGS)

- Initial guided flight testing complete
- Land-based testing complete



Dual Band Radar (DBR)

- MFR land-based testing complete
- VSR final array assembly complete





Peripheral Vertical Launch System (PVLS) / Advanced VLS

- Two detonation tests conducted
- Missile restrained firing testing complete



Integrated Power System (IPS)

- Component factory testing complete
- Critical Test Parameters (CTPs) complete





SMC fly-through

Total Ship Computing Environment (TSCE)

- Software Releases 1, 2, and 3 successfully coded, tested, and authorized by the Government



Hull Form Scale Model

- Performance validated by model testing



Integrated Undersea Warfare (IUSW)

- At-sea mine avoidance testing complete
- Automation testing complete

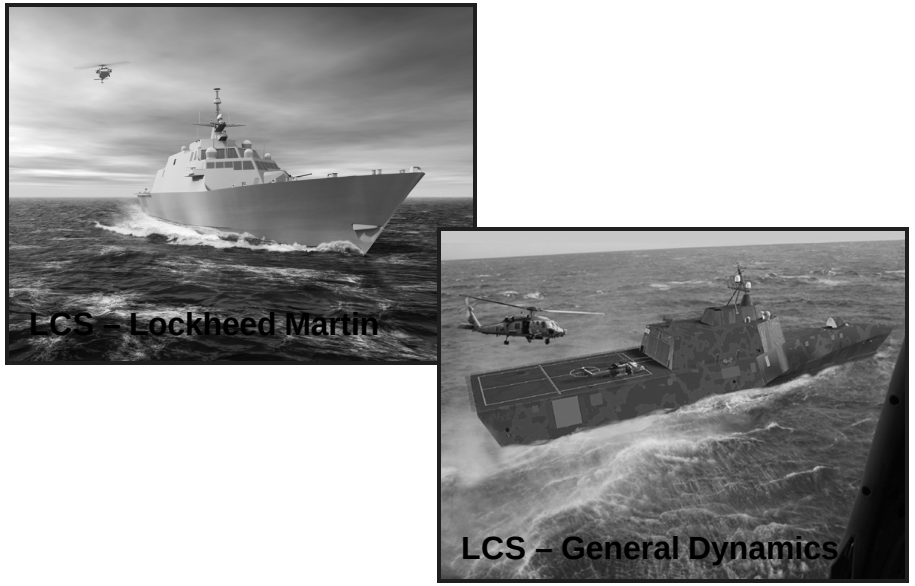
Autonomic Fire Suppression System (AFSS)

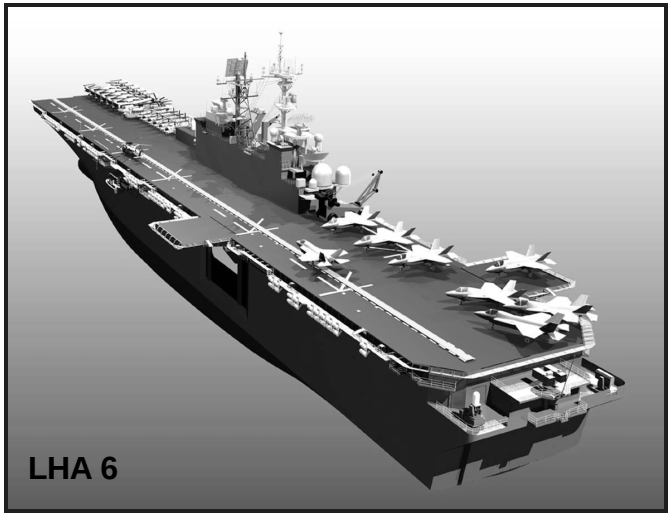
- At-sea weapons effect and autonomic fire suppression testing demonstrated



- **CAIV Model**
  - **Establish affordability targets for end item and permit capability trades to achieve desired unit cost**

    Example: LCS, LHA 6





CAIV Target $220M Seaframe



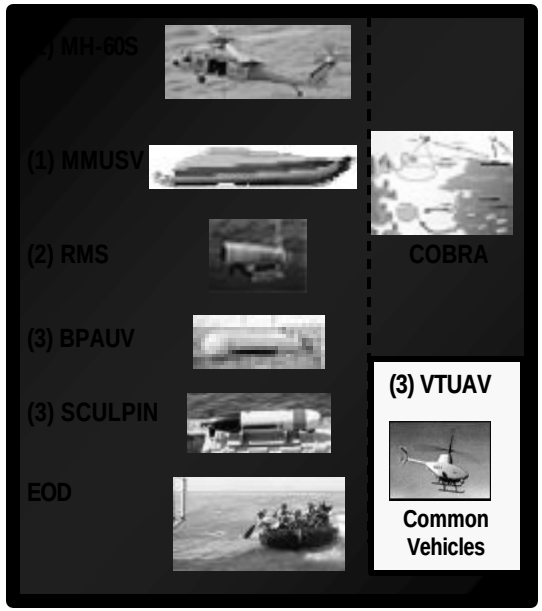
Lockheed Martin

Gibbs & Cox • Marinette Marine • Bollinger Shipyards

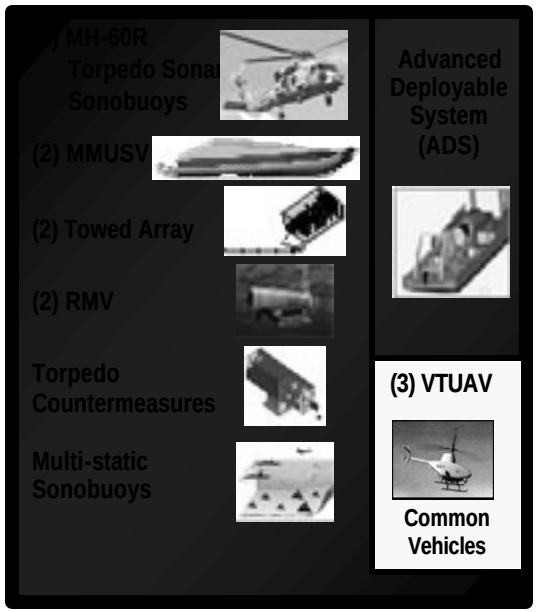


General Dynamics

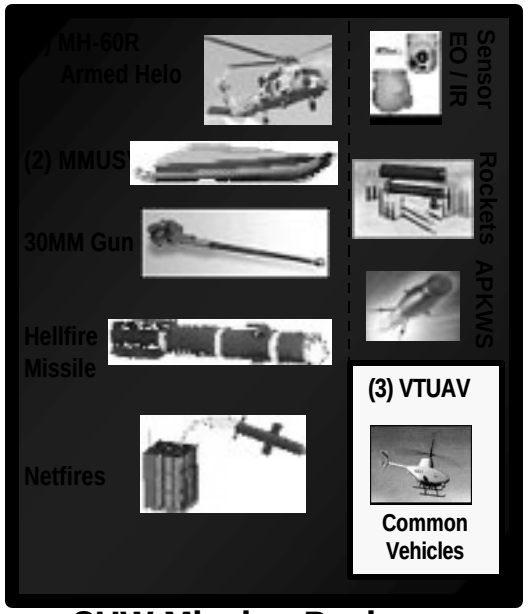
Bath Iron Works • Austal • BAE Systems • CAE • MAPC



MIW Mission Package



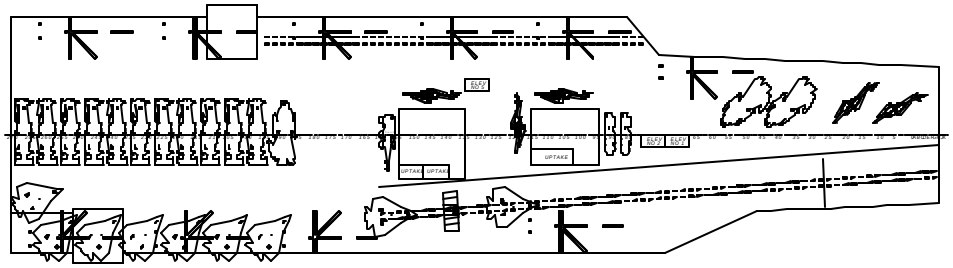
ASW Mission Package



SUW Mission Package

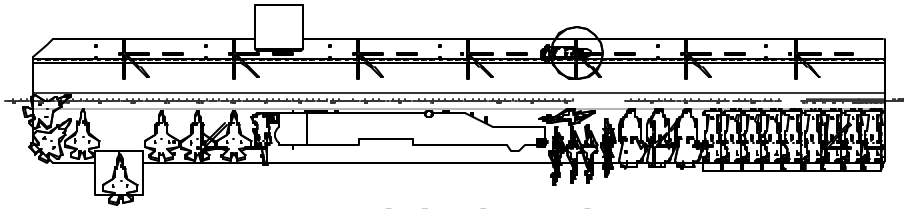
SUW Mission Package

LHA 6 Requirements vs. Cost – Tradeoff history



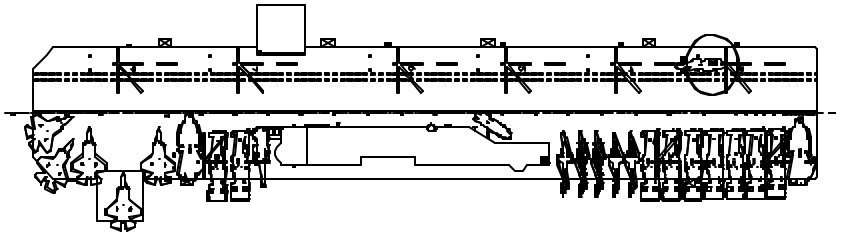
Dual Tram Line

- **Displacement – 69,000 Ltons**
- **Aircraft Capacity**
  - **37 aircraft**
  - **10 CH-53/MV-22 operational spots**
  - **Concurrent flight operations**
- **Cost - $5.1B (ROM) for an FY10 ship**



LHA(R) Plug Plus

- **Displacement – 50,000 Ltons**
- **Aircraft Capacity**
  - **33 aircraft**
  - **10 CH-53/MV-22 operational spots**
  - **Limited concurrent flight operations**
- **Cost - $3,780M for an FY07 ship**



LHA 6

- **Displacement – 45,000 Ltons**
- **Aircraft Capacity**
  - **31 aircraft**
  - **9 CH-53/MV-22 operational spots**
  - **Limited concurrent flight operations**
- **Cost - $2,762M for an FY07 ship**

- **Requirements Model**
  - **In lieu of asking for multi-mission platforms to solve all requirements needs, establish focused mission needs and permit mission swap out by facilitating common interfaces**

    Example: LCS
  - **In the definition of requirements, establish realistic threshold to objective KPPs and resource (execute to the threshold level)**

    Examples: DDG 1000, LCS, MPF(F), LHA 6

- **Designing for Producibility Model**
  - **Insertion of common interfaces in design**

    Example: DDG 1000, LCS
  - **Maximize reconfigurable internal volume**

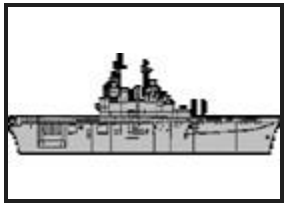
    Example: LCS
  - **Maximum reuse of existing production infrastructure and existing designs to achieve new requirements**

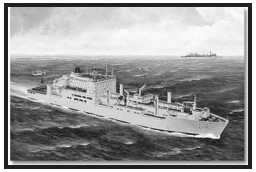
    Example: MPF(F) Squadron

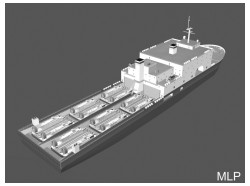
    Example: DDG 1000 hull to CG(X) hull

MPF(F) Decision – Hybrid Legacy Option

- **Meets the basic requirements – preferred option by USMC/USN leaders**
- **Flexible mix of ships and capabilities, transition opportunities**
  - **Provides opportunities for Joint applications**
- **MPF(F) Squadron selected has both low cost and schedule risk overall;**
  - **One new design – fits with industrial base capacity**
  - **Two hot production lines**
    - **Program benefits from non recurring engineering already accomplished and learning curve (LHA(R) and T-AKE)**
    - **Return costs available**
  - **Three existing designs (LHD, T-AKE and LMSR)**
    - **Mitigates cost for non recurring engineering**
    - **Return costs available**
  - **Minimizes workload disruption in shipyards**





MPF(F) Squadron

LHA(R) w/MEB C2



2

- Lightship Displacement: 30,862 MT
- Landing Spots: 9/ship
- Personnel: 3000/ship
- Ship Speed: 22 kts

LHD w Aviation C2



1

- Lightship Displacement: 28,540 MT
- Landing Spots: 9/ship
- Personnel: 3000/ship
- Ship Speed: 22 kts

LMSR



3

- Lightship Displacement: 36,289 MT
- Landing Spots: 2/ship
- Personnel: 345/ship (+500 surge)
- Ship Speed 24 kts

T-AKE



3

- Lightship Displacement: 25,700 MT
- Landing Spots: 2/ship
- Personnel: 194/ship
- Ship Speed 20 kts

Legacy Dense Pack

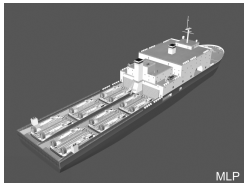


2

- Lightship Displacement: 19,900 MT
- Landing Spots: 1/ship
- Personnel: 62/ship
- Ship Speed 18 kts

- Squadron is 14 ships
- 6 hulls: 2 hot production lines, 1 new design
- Full MEB (1 vertical battalion and 2 surface battalions) are selectively offloadable
  - Personnel for second surface battalion are on Sea Base
- 11 of 14 ships built to commercial survivability standards (minor enhancements), 3 ships to military survivability standards
- MLP required for surface interface
- Meets delivery timeline for vertical and surface battalions
- Significant Industrial Base stability

MLP(w/Troops)



3

- Light Ship Displacement: 28,423 MT
- Landing Spots: VERTREP
- Personnel: 1300/ship
- Ship Speed 20 kts

- **Designing for Lifecycle Optimization Model**
  - **Modernization through mission module upgrades**

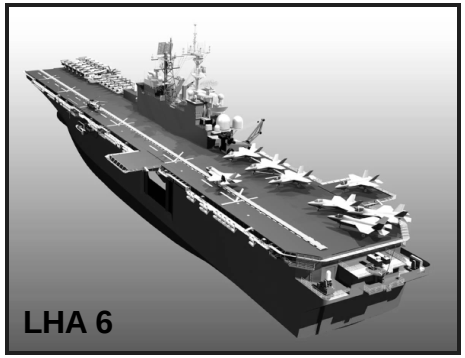
    Example: LCS
  - **Increased reliance on automation, HSI to remove touch labor in maintenance, supply support, watchstanding**

    Example: DDG 1000, LCS, LPD 17, LHA 6


LCS – Lockheed Martin


LCS – General Dynamics


DDG 1000 ZUMWALT


LHA 6


LPD 17 USS SAN ANTONIO

- **Increased partnering across the national and international spectrum model**
  - **Common requirements across services**
    - **Example: Joint High Speed Vessel (Army, Navy, USMC)**
    - **Example: MPF(F) Seabasing**
    - **Example: Potential LCS and USCG Deepwater**
  - **International cooperation**
    - **Example: LCS FMS cases**

Summary

- **CNO's Guidance:**
  - **Sustain Fleet size via stable SCN funding**
  - **Buy the right capability at the right cost**
- **Building the Fleet of the Future**
  - **DDG 1000 *ZUMWALT* class**
  - **LCS 1 *FREEDOM* class**
  - **LPD 17 *SAN ANTONIO* class**
  - **LHA 6 class**
  - **T-AKE 1 *LEWIS AND CLARK* class**
- **A stable shipbuilding plan, coupled with one or more affordability strategies, plus a focused industry push for cost reduction yields affordable platforms**

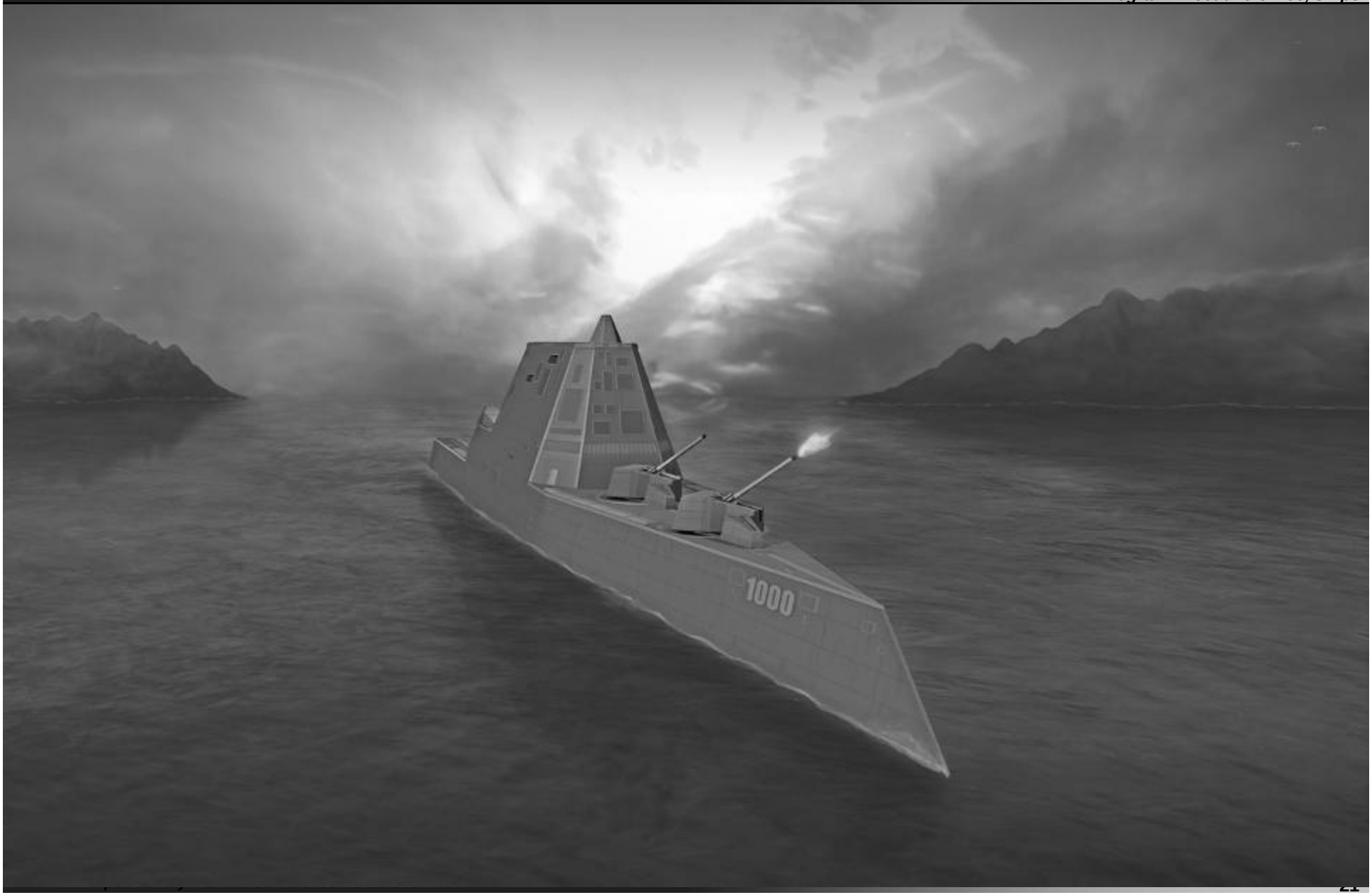
"We need to stop getting smaller… My biggest challenge is to build a fleet for the future… The goal is to have a plan which is stable and industry can build to."

- Admiral Mike Mullen, CNO
7 February 2006

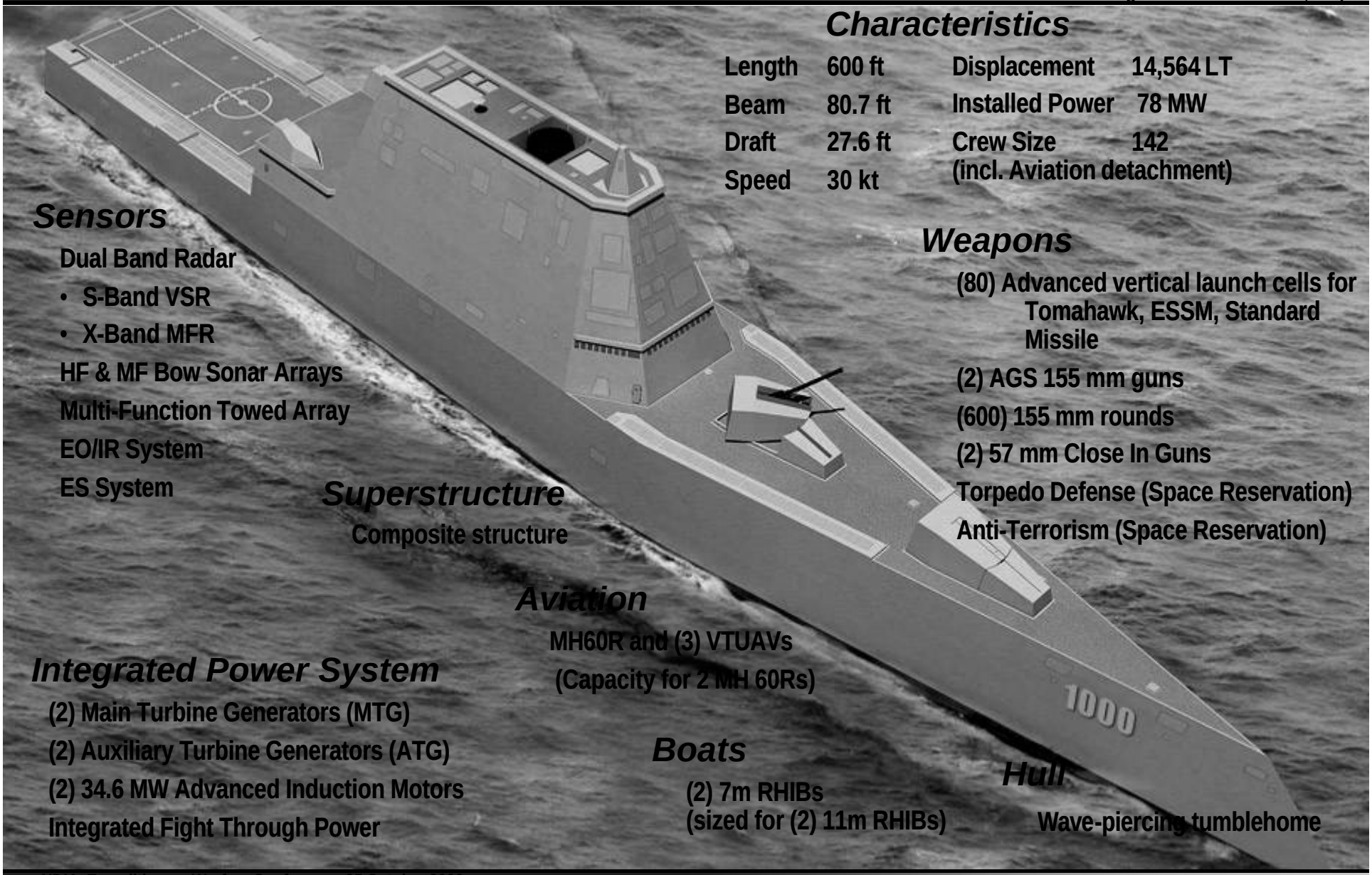
Questions?

- **DDG 1000 ZUMWALT**
- **LCS 1 FREEDOM**
- **LPD 17 SAN ANOTONIO**
- **LHA 6**
- **MPF(F)**
- **T-AKE 1 LEWIS AND CLARK**

DDG 1000 ZUMWALT Class



DDG 1000 Physical Design



Characteristics

Length	600 ft	Displacement	14,564 LT
Beam	80.7 ft	Installed Power	78 MW
Draft	27.6 ft	Crew Size (incl. Aviation detachment)	142
Speed	30 kt		

Sensors

Dual Band Radar
- S-Band VSR
- X-Band MFR

HF & MF Bow Sonar Arrays

Multi-Function Towed Array

EO/IR System

ES System

Weapons

(80) Advanced vertical launch cells for Tomahawk, ESSM, Standard Missile

(2) AGS 155 mm guns

(600) 155 mm rounds

(2) 57 mm Close In Guns

Torpedo Defense (Space Reservation)

Anti-Terrorism (Space Reservation)

Superstructure

Composite structure

Aviation

MH60R and (3) VTUAVs

(Capacity for 2 MH 60Rs)

Integrated Power System

(2) Main Turbine Generators (MTG)

(2) Auxiliary Turbine Generators (ATG)

(2) 34.6 MW Advanced Induction Motors

Integrated Fight Through Power

Boats

(2) 7m RHIBs
(sized for (2) 11m RHIBs)

Hull

Wave-piercing tumblehome

DDG 1000 Critical Technologies

Infrared Mockups (IR)

- Land-based suppressor testing complete
- At-sea panel testing complete



Integrated Composite Deckhouse & Apertures (IDHA)

- RCS testing complete
- Co-site testing complete



Advanced Gun System (AGS)

- Initial guided flight testing complete
- Land-based testing complete



Dual Band Radar (DBR)

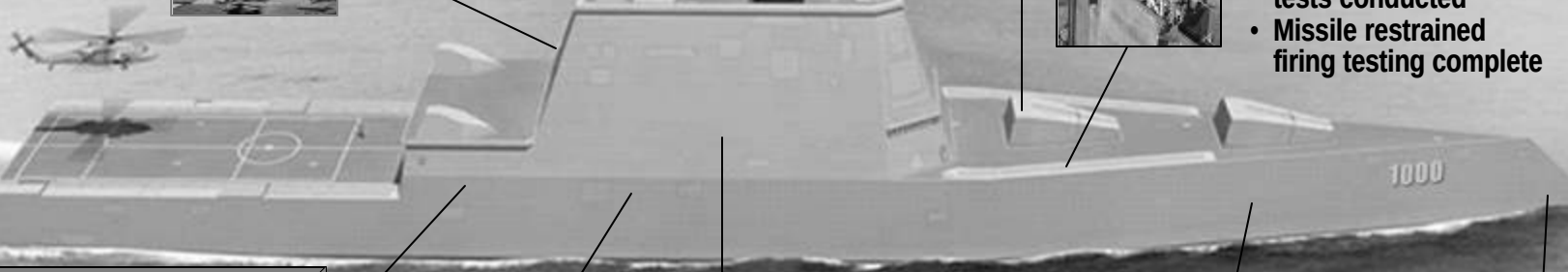
- MFR land-based testing complete
- VSR final array assembly complete





Peripheral Vertical Launch System (PVLS) / Advanced VLS

- Two detonation tests conducted
- Missile restrained firing testing complete



Integrated Power System (IPS)

- Component factory testing complete
- Critical Test Parameters (CTPs) complete







Hull Form Scale Model

- Performance validated by model testing
- UNDEX testing



Integrated Undersea Warfare (IUSW)

- At-sea mine avoidance testing complete
- Automation testing complete



Autonomic Fire Suppression System (AFSS)

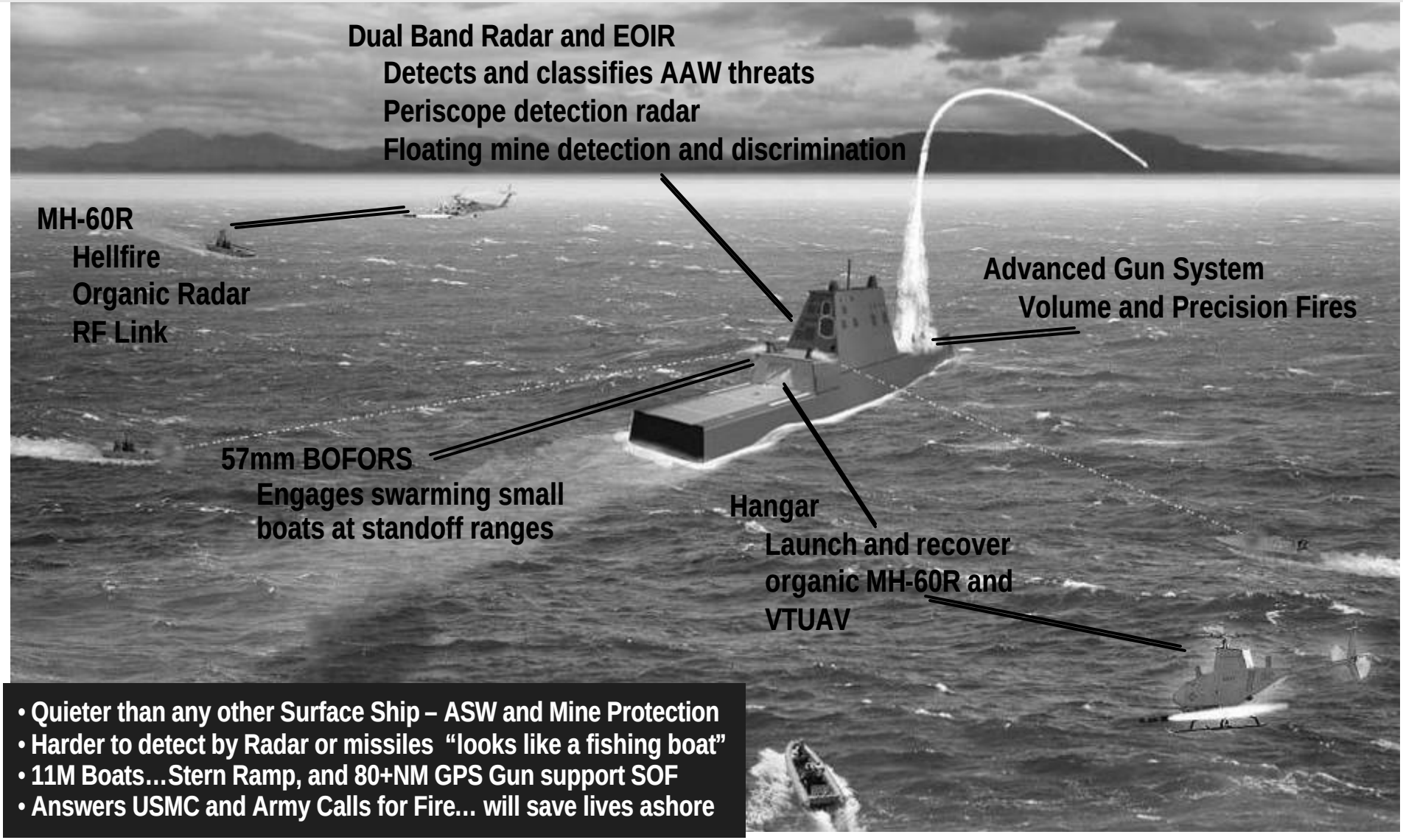
- At-sea weapons effect and autonomic fire suppression testing demonstrated

Total Ship Computing Environment (TSCE)

- Software Releases 1, 2, and 3 successfully coded, tested, and authorized by the Government

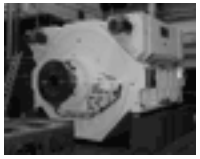
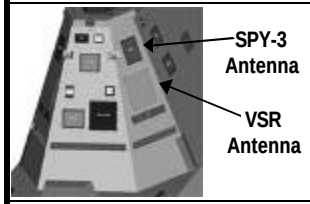
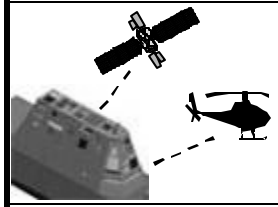
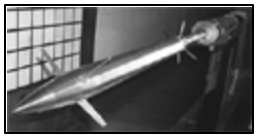
DDG 1000: Built to Dominate the Littoral

Persistent Surveillance, Tracking, and Rapid Engagement



- Quieter than any other Surface Ship – ASW and Mine Protection
- Harder to detect by Radar or missiles "looks like a fishing boat"
- 11M Boats…Stern Ramp, and 80+NM GPS Gun support SOF
- Answers USMC and Army Calls for Fire… will save lives ashore

DDG 1000 Capability Improvements

	Requirement	Technology	Capability Improvement
	Persistent presence in the littorals, survivability	Hull Form and Structures	Reduced signatures and vulnerability
	Improved acoustic signature, reduced O&S costs, 30 kt sustained speed, survivability	Integrated Power System	Signatures, fuel efficiency, power continuity and quality, future growth
	Cruise missile and small boat defense, periscope and floating mine detection in littorals	Dual Band Radar	Firm track range against stealthy targets in clutter environment
	Interoperability, low Radar Cross Section (RCS), optimal manning, reach-back	Command, Control and Communications	Fully integrated Command & Control, increased bandwidth, enables FORCEnet, Open Architecture based
	Increased rate of fire, improved lethality, and reduced manned	Advanced Gun System	Increased Fire Support Coverage
	Precision strike and volume fires	Long Range Land Attack Projectile	GPS Accuracy 155mm sized warhead

DDG 1000 Program Status

- **Phase III design and development contract (FY02 - FY05) closing out – radar efforts remain to complete (VSR, Wallops construction)**
- **Critical Design Review (CDR) completed 14 Sep 05**
  - **Demonstrated DD(X) is ready to proceed with detail design**
  - **EDMs and other activities sufficiently mitigated technical risk**
- **Phase IV transition design contracts awarded**
- **Milestone B Approved 23 Nov 05**
  - **Authorized entry into System Development and Demonstration (SDD) Phase**
  - **Approved LRIP of 8 ships (7 ships in CNO 313 plan)**
  - **Approved Milestone C exit criteria**
  - **Approved construction award DAB entrance criteria**
  - **Approved DD(X) Acquisition Program Baseline (APB)**
  - **Approved DD(X) Acquisition Strategy Report (ASR) and Dual Lead Ship Strategy**
  - **Directed Navy return to DAB prior to exercise of 2 lead ship construction options**
- **Designated DDG 1000 ZUMWALT Class 07 Apr 06**
- **Detail Design contracts awarded in Aug 06 to NGSS and BIW**
- **Construction contracts to be awarded Dec 06 to NGSS and BIW**

LCS 1 FREEDOM Class



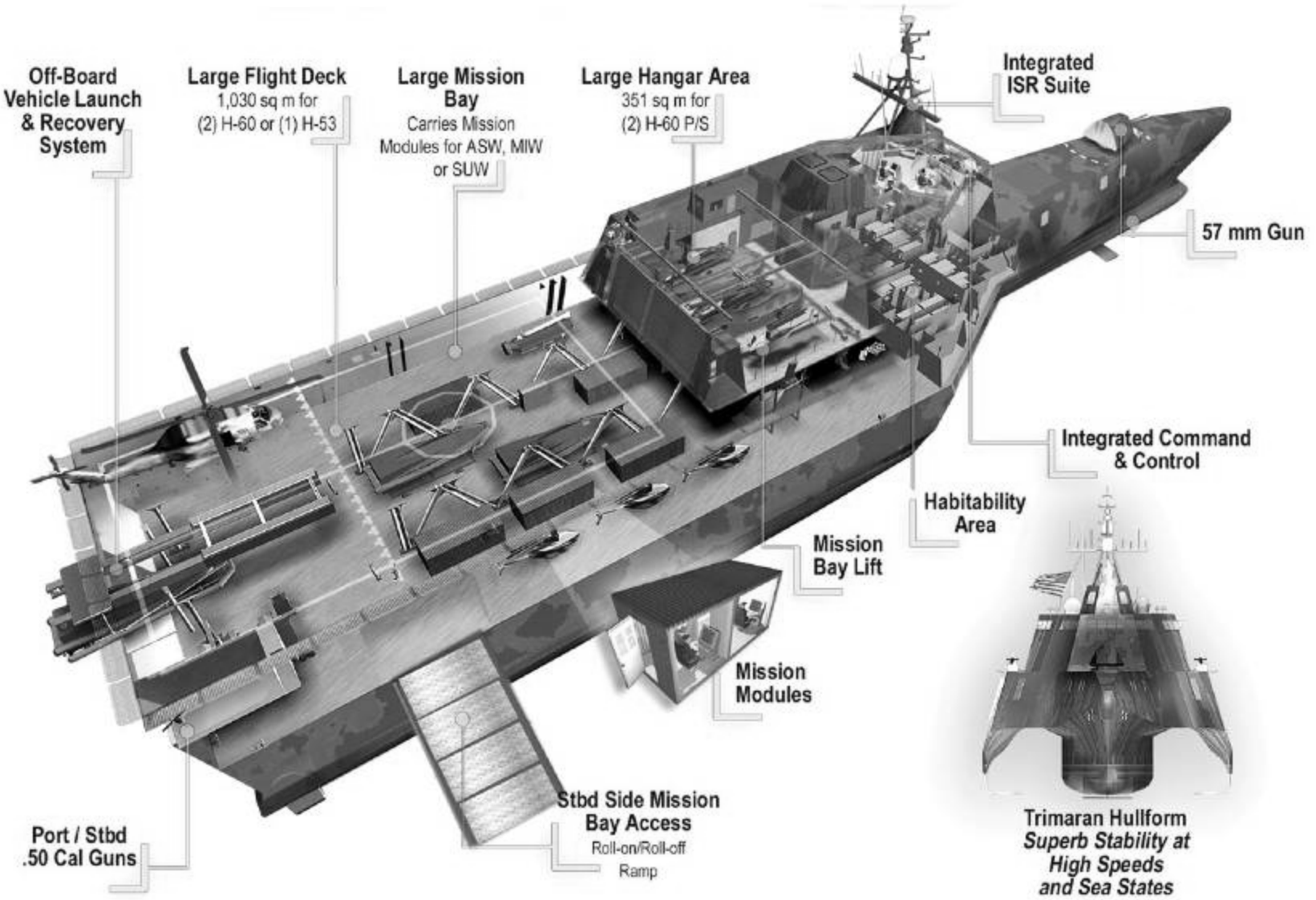
INDEPENDENCE (LCS 2)
General Dynamics
Bath Iron Works
Austal USA
BAE Systems

FREEDOM (LCS 1)
Lockheed Martin
Gibbs & Cox
Marinette Marine
Bollinger Shipyards

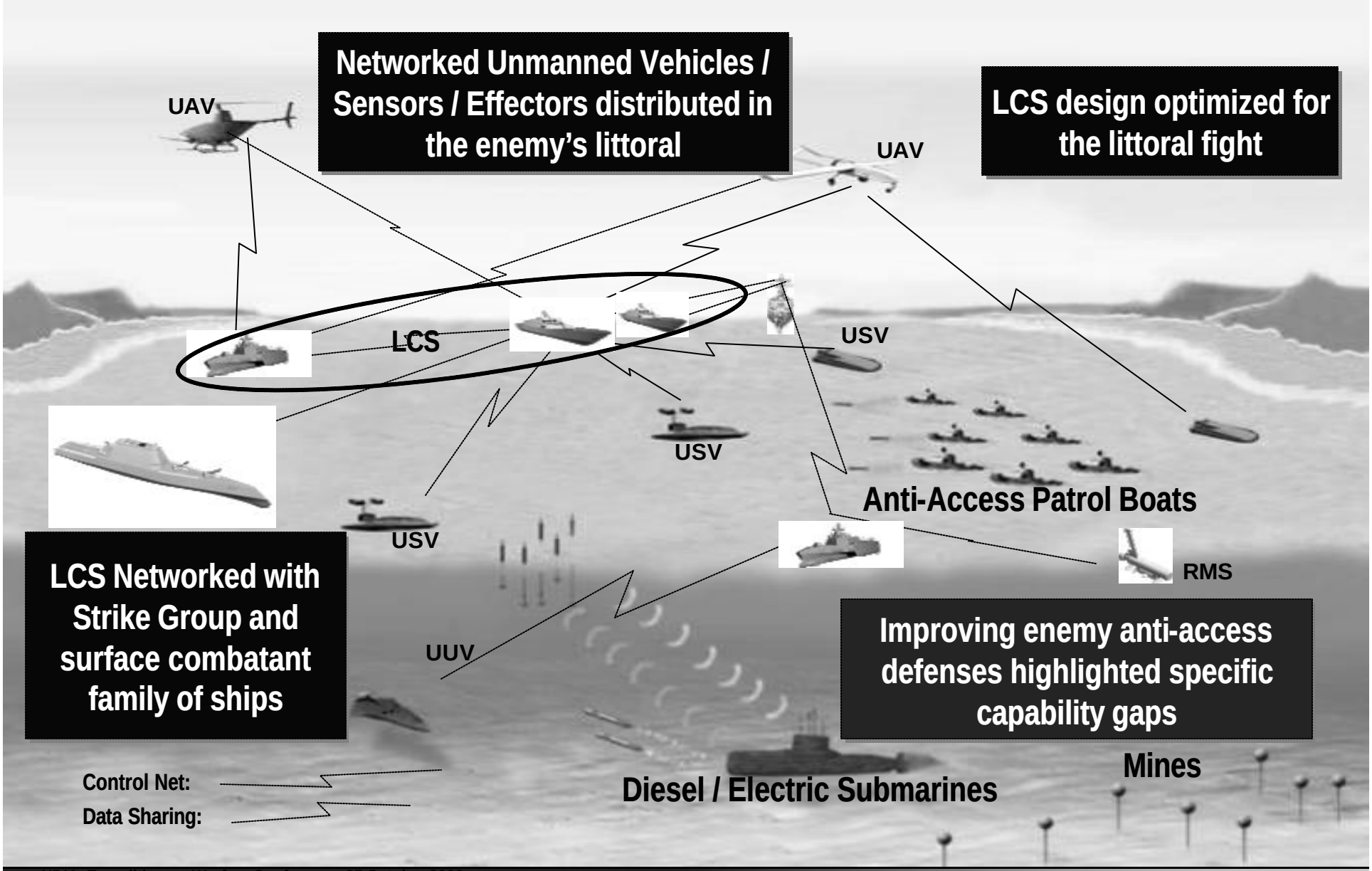
FREEDOM (LCS 1): Semi-Planing Monohull



INDEPENDENCE (LCS 2): Trimaran Hull



LCS Concept of Operations



LCS Mission Package Development

- **Mission Package Computing Environment**
  - MPDL connectivity demonstrated between NSWC PC and LM/GD facilities – Oct 2005
  - MIW Software build 0.2 delivered and testing completed – May 2006
  - MIW Software build 1.0 delivered and testing in progress – Sep 2006
- **Mine Warfare Mission Package**
  - First Mine Warfare Mission Package Support Modules Delivered to NSWC PC
  - Three support modules outfitted
    - AQS-20A
    - AMNS / ALMDS / AMNS
    - RMS
  - RMS cradle FAT and 200% load test
- **Anti-Submarine Warfare Mission Package**
  - Sea Talon ACTD transitioned to POR
  - USV Based Bi-Static sonar operations demonstrated in SOCAL
    - MS OBS (Active Source)
    - UTAS (Passive Array)
- **Surface Warfare Mission Package**
  - NLOS-LS
    - Successful PAM Seeker Captive flight test
    - Successful BTV launch from motion simulator (Sea State 3)
  - MK-46 Mod 01 30MM gun Structural Test Firing



- **Mission Package Integrator contract awarded – Jan 2006**
- **LCS Interface Control Document (ICD) Complete**
- **4 mission Package Crews onboard and training**
  - MIW Blue & Gold
  - ASW Blue & Gold

FREEDOM (LCS 1) Christening – 23 Sept 06





LCS Program Status

- **23 Feb 02** — ASN(RDA) directed establishment of LCS Program
- **08 Jul 02** — N76 letter: initiates exploratory studies for Family of Ships concept
- **14 Aug 02** — RFP released for Ship Concept Studies
- **17 Sep 02** — LCS Program Office Established (under PEO(S))
- **08 Nov 02** — Contract award for Family of Ships Concept Studies (FMHSS)
- **02 Dec 02** — Defense Authorization Act (Public Law 107-314) provided Congressional New Start authorization for the Littoral Combat Ship
- **28 Feb 03** — Solicitation for LCS Flight 0 Preliminary Designs
- **17 Jul 03** — Preliminary Design Contracts (3) Awarded

4 years

- **27 May 04** — DAB: Milestone A / Program Initiation
- **28 May 04** — Down select to two for final design
- **15 Dec 04** — Exercised 1st Detail Design & Construction option
- **02 Jun 05** — Lay Keel for USS FREEDOM (LCS 1)
- **14 Oct 05** — Exercised 2nd Detail Design & Construction option
- **19 Jan 06** — Lay Keel for USS INDEPENDENCE (LCS 2)
- **26 Jun 06** — Exercised construction option for third ship
- **23 Sep 06** — Launch USS FREEDOM (LCS 1)



LPD 17 SAN ANTONIO Class



LPD 17 SAN ANTONIO Class Capability

- **Functionally replace LPD 4, LSD 36, LKA 113, and LST 1179 Ship classes**
  - **Provide Increased**
  - **Lift**
  - **Survivability**
  - **Mission Flexibility**
  - **Service Life**
  - **Improved Quality of Life**
  - **Reduced Total Ownership Cost**



Ship Characteristics

Displacement	**24,900 lt**
Speed	**22 + kts**
Length	**684 ft**
Beam	**105 ft**
Draft	**23.0 ft**
Crew	**360 Sailors / 3 Marines**
Troop Lift	**699 Marines (800 surge)**
Med Capability	**2 Med / 2 Dental Operating Rooms**

Key Performance Parameters

Lift	Threshold		Objective
Troops	650	720 ◆	750
Vehicle Sq Ft	22K	23.6K ◆	25K
Cargo Cubic Ft	22K		25K 34K ◆
LCAC Spots	1 (+1)	2 ◆	2
VTOL Spots (CH-46/53/MV-22)	4/2/2 ◆	4/2/2	4/3/2

◆ = PM Current Estimate

LPD 17 Class Construction Status

NEW ORLEANS (LPD 18)
94% Complete



MESA VERDE (LPD 19)
89% Complete



GREEN BAY (LPD 20)
72% Complete



LPD 17 Class Construction Status (cont'd)

NEW YORK (LPD 21)
51% Complete



SAN DIEGO (LPD 22)



ANCHORAGE (LPD 23)
Start of Fabrication in 2007

ARLINGTON (LPD 24)
Start of Fabrication in 2007

SOMERSET (LPD 25)
Start of Fabrication in 2008

USS SAN ANTONIO (LPD 17) Status

✍ Christened/Launched	Jul 03
✍ Builders Sea Trial	Apr 05
✍ Acceptance Trial	Jun 05
✍ Delivery	Jul 05
✍ Crew Move Aboard	Aug 05
✍ Sail Away Trial	Nov 05
✍ Sail Away	Dec 05
✍ Commissioned	14 Jan 06
✍ Fitting Out Availability	30 Jan 06 – 30 Mar 06
✍ Post Shakedown Availability	Mar 07

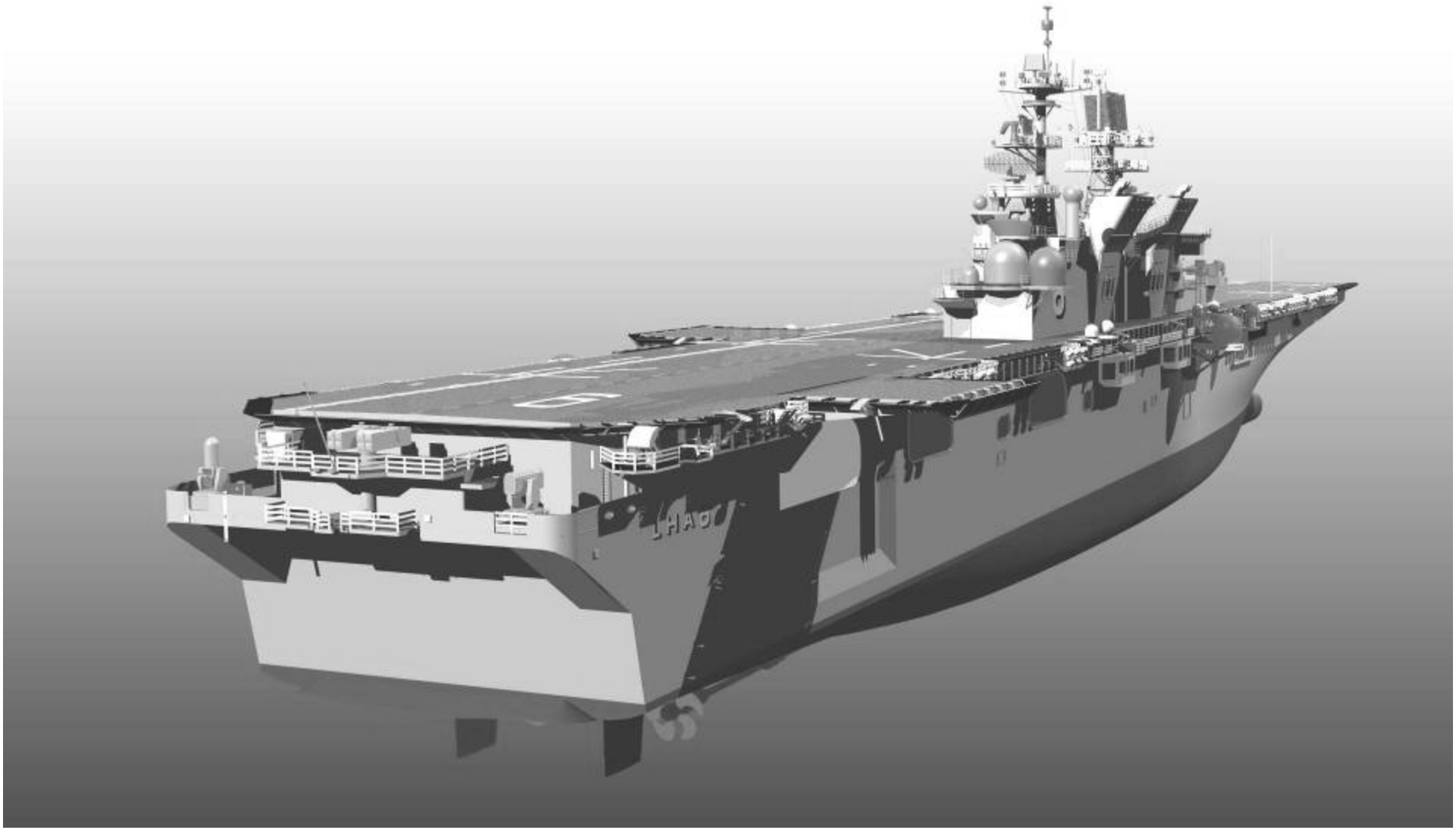
- FOA / PSA contract awarded to BAE SR (Norshipco)



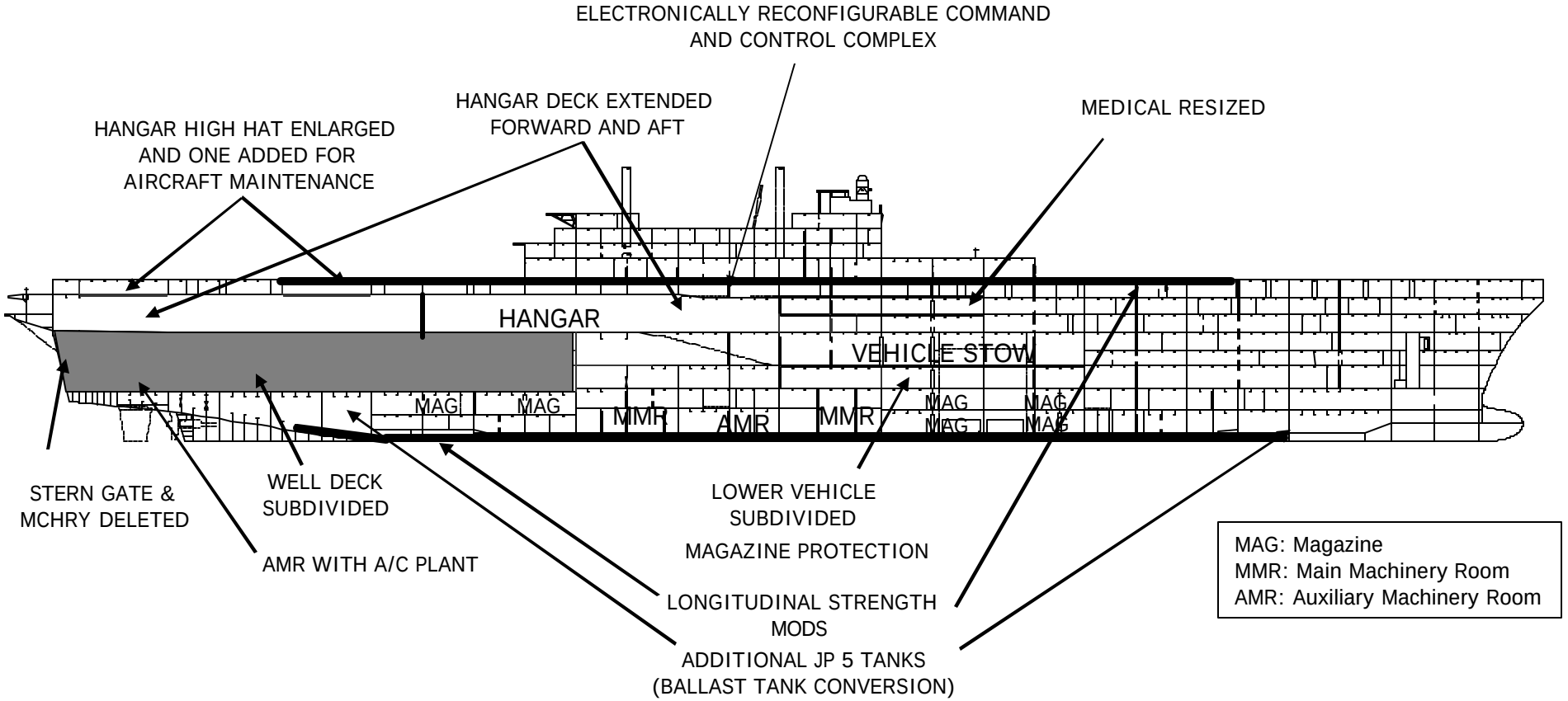
Post Delivery Test & Trials

- First of Class Trials/Certifications
- Combat System Ship Qualification Testing (CSSQT)
- Developmental Testing (DT)
- Crew Basic Phase Training
- Final Contract Trial
- OPEVAL
- Total Ship Survivability Test
- LCAC Interface Trials
- Post Shakedown Availability
- Intermediate/Advance Phase Training

LHA 6 Amphibious Assault Ship



LHA 6 Design: Optimized for Aviation



- Increased aircraft spotting factors for future Marine Corps aircraft as well as larger logistic footprint required hangar deck expansion and subsequent relocation of AVCAL (aviation test equipment, tools, parts etc.) and maintenance shops to the former well deck area
- Removal of well deck allowed for increased aviation fuel capacity through conversion of ballast tanks to JP-5 tanks

Capability Comparison: LHA 1 vs. LHD 1 vs. LHA 6

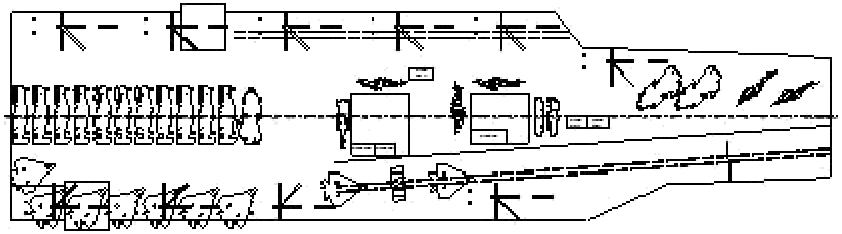
Requirements	LHA	LHD	LHA 6
Aviation (JSF)	0	19	23
Aviation Maint (MV22)	Limited	Limited	Full (2 MV22)
Cargo (K cubic ft)	109	125	160
Vehicle (K square ft)	25.4	20.9	11.6
Troops	1,713	1,686	1,686
Well Deck (LCAC)	1	3	0
JP-5 (K gallons)	400	617	1,300
Sustained Speed (kts)	22	22	22
Service Life Allowance:			
Disp	None	2.5%	>5%
KG	remains	+0.5 ft	>+1.0 ft
Survivability (armor)	None	Limited	Add'l

CAPABILITY VALIDATED BY JROC ON 8 FEBRUARY 2005

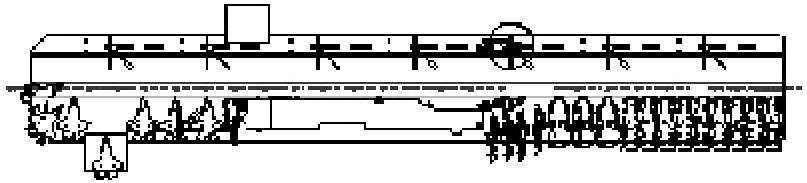
JROCM validated revised aviation, survivability and force protection KPPs on 19 December 2005

LHA 6 Program Status

- **Replace LHA Class Amphibious Assault Ship**
- **Milestone A completed Jul 2001**
- **Program redirected by DoN leadership Capabilities Letter, Apr 2004**
- **Restructured to "aviation variant"**
- **Procurement funding for lead ship, FY07 (PB06)**
- **Received Milestone B approval 11 January 2006**
- **Construction contract to NGSS anticipated in early FY07**



Dual Tram Line
$5.1B (ROM) for an FY10 ship



LHA(R) Plug Plus
$3,780M for an FY07 ship



LHA 6
$2,762M for an FY07 ship

T-AKE 1 LEWIS AND CLARK Class



T-AKE 1 Class Capability

- **Primary Mission: Provide Logistic Lift Capability as a Shuttle Ship from sources of supply for transfer at sea to Station Ships and other Naval Warfare Forces**
  - **Ammunition**
  - **Food**
  - **Repair parts**
  - **Expendable supplies and material**
  - **Limited quantities of fuel**

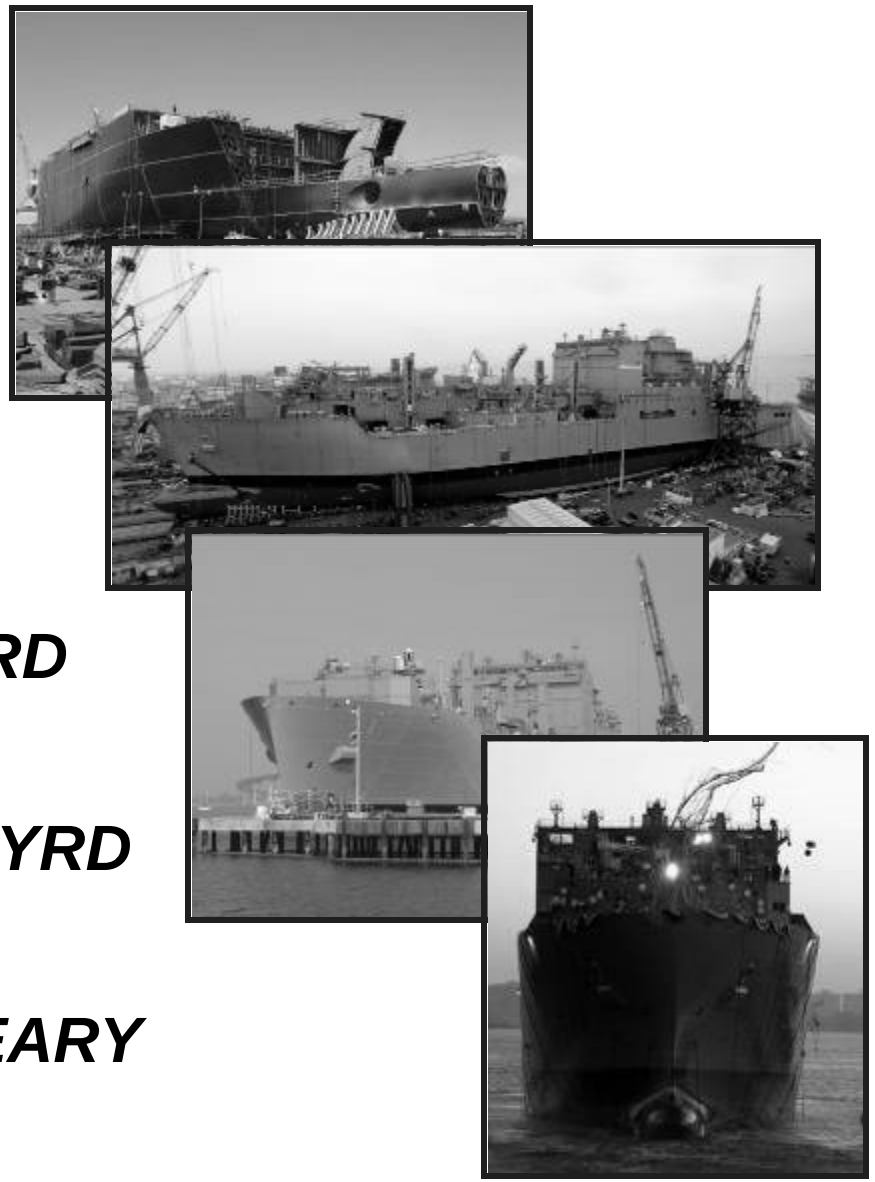


- **Secondary Mission: Operate in concert with a T-AO 187 Class Ship (Fleet Oiler) as a Substitute Station Ship to provide direct Logistics Support to the ships within a Battle Group**

- **Description: Dry Cargo/Ammunition Ship**

T-AKE 1 LEWIS AND CLARK Program Status

- **T-AKE 1 USNS *LEWIS AND CLARK***
  - **construction started, Sept 2003**
  - **Christened 21 May 2005**
  - **Delivered, Jun 2006**
- **T-AKE 2 USNS SACAGAWEA**
  - **Christened, 2006**
- **T-AKE 3 USNS *ALAN SHEPARD***
  - **Keel Laid, Feb 2006**
- **T-AKE 4 USNS *RICHARD E. BYRD***
  - **Keel Laid, Aug 2006**
- **T-AKE 5 USNS *ROBERT E. PEARY***



DDG 51 Christenings and Commissionings

- **2006 Christenings:**
  - **GRIDLEY (DDG 101)**
  - **SAMPSON (DDG 102)**
- **2006 Commissionings:**
  - **USS FORREST SHERMAN (DDG 98)**
  - **USS FARRAGUT (DDG 99)**
- **2007 Christenings:**
  - **STERETT (DDG 104)**
  - **TRUXTUN (DDG 103)**
  - **DEWEY (DDG 105)**
- **2007 Commissionings:**
  - **USS GRIDLEY (DDG 101)**
  - **USS SAMPSON (DDG 102)**





Alongside operations (also called skin-to-skin) permits the USNS Red Cloud to lower the ramp and transfer vehicles to the Dockwise Mighty Servant 3, for further loading onto LCACs. This simulates the assembly and offload of up to 1/3 of a surface Battalion Landing Team.

MPF(F): Enabling Sea Based Operations

- **MPF(F) Squadron Composition**
- **PMS 325 MPF(F) R&D Program FY06 At-Sea Test**
  - **Arrival and Assembly Tests**
  - **Amphibious Assault Vehicle (AAV) Testing**
  - **Mooring and Vehicle Transfer**
  - **Vehicle Selective Offload**
  - **Omni-Directional Vehicles**
  - **Transfer Unit and Storage Rack**
  - **LCAC Operations**
  - **Pallet and JMIC ASRS**
  - **Multi-Directional Material Handling System**
  - **Displacement Craft Interface**

MPF(F) Squadron

LHA(R) w/MEB C2



2

- Lightship Displacement: 30,862 MT
- Landing Spots: 9/ship
- Personnel: 3000/ship
- Ship Speed: 22 kts

LHD w Aviation C2



1

- Lightship Displacement: 28,540 MT
- Landing Spots: 9/ship
- Personnel: 3000/ship
- Ship Speed: 22 kts

LMSR



3

- Lightship Displacement: 36,289 MT
- Landing Spots: 2/ship
- Personnel: 345/ship (+500 surge)
- Ship Speed 24 kts

T-AKE



3

- Lightship Displacement: 25,700 MT
- Landing Spots: 2/ship
- Personnel: 194/ship
- Ship Speed 20 kts

Legacy Dense Pack

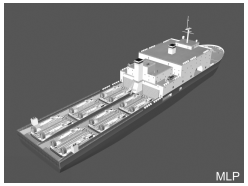


2

- Lightship Displacement: 19,900 MT
- Landing Spots: 1/ship
- Personnel: 62/ship
- Ship Speed 18 kts

- Squadron is 14 ships
- 6 hulls: 2 hot production lines, 1 new design
- Full MEB (1 vertical battalion and 2 surface battalions) are selectively offloadable
  - Personnel for second surface battalion are on Sea Base
- 11 of 14 ships built to commercial survivability standards (minor enhancements), 3 ships to military survivability standards
- MLP required for surface interface
- Meets delivery timeline for vertical and surface battalions
- Significant Industrial Base stability

MLP(w/Troops)



3

- Light Ship Displacement: 28,423 MT
- Landing Spots: VERTREP
- Personnel: 1300/ship
- Ship Speed 20 kts

Arrival and Assembly Tests

Prepositioned vehicles are assembled as part of the MPF(F) mission. Timing data was collected to support discrete event modeling of assembly area operations. These simulations will be used to support LMSR assembly space sizing, arrangement and procedure development efforts.





Food, water, ammo and fuel for a vehicle is loaded by hand from a pre-mixed pallet.



Vehicles park in assembly bays and forklifts pick up pallets at the ready service/elevator area.








Pallets are moved to the assembly bays by following a one way traffic circle. Returning forklifts wait until needed. All movements are controlled by traffic directors.

Pallets are placed in vehicles from one side or from the rear while keeping traffic lanes to other bays clear.

Vehicles depart assembly area.




Amphibious Assault Vehicle (AAV) transits to bay where Marines with packs load in the stern door.

Oxy-acetylene tanks are loaded into the AAV Recovery variant.



Amphibious Assault Vehicle (AAV) Testing



AAV swim onto Mighty Servant 3



AAV launch from Mighty Servant 3



AAV arrive on LCAC



AAV lifted by crane onto the Red Cloud

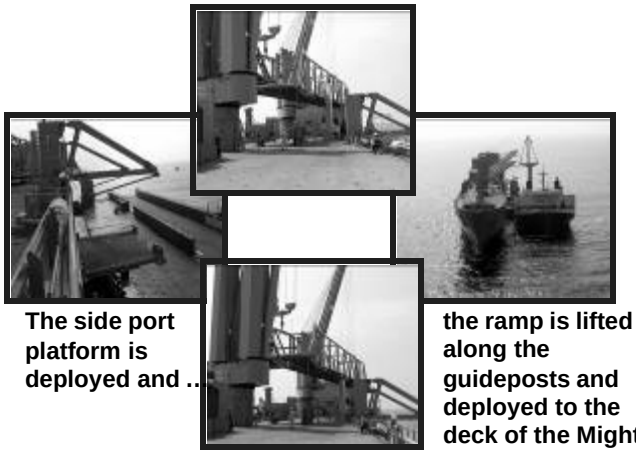


Simulating disabled AAV recovery by ship's winch line

Mooring and Vehicle Transfer



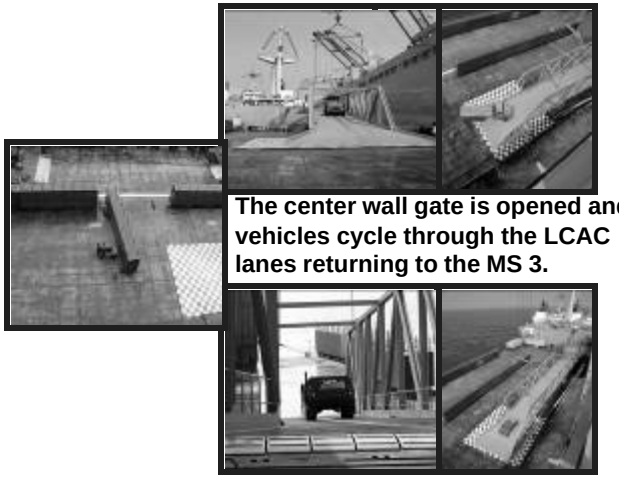
Red Cloud and Mighty Servant 3 approach and moor skin-to-skin at 4 kts.



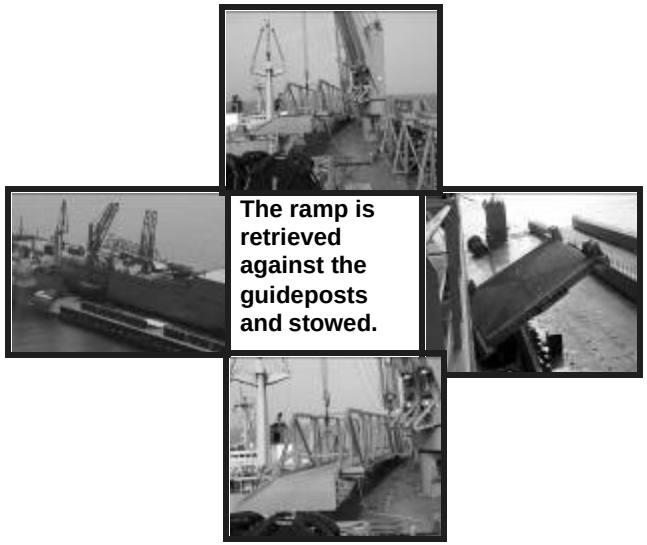
The side port platform is deployed and ..



the ramp is lifted along the guideposts and deployed to the deck of the Mighty Servant 3.



The center wall gate is opened and vehicles cycle through the LCAC lanes returning to the MS 3.



The ramp is retrieved against the guideposts and stowed.

Vehicle Selective Offload


MTVR Handling

Vehicle maneuvering tests were conducted at pier, anchor and underway with AIR SKIDS and GOJACKS. This capability would improve stow procedures and selective offload capability.


HMMWV on GOJACKS


HMMWV indexing test



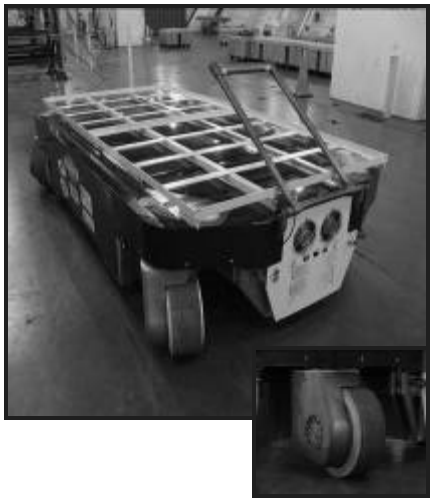

20 Foot Container Movement


Single and Double Air Skids

Omni-Directional Vehicles



Sidewinder, Airtrax Inc.



Compact Agile Material Mover (CAMM), Oak Ridge National Lab, Operated by NSWC Philadelphia



Hybrid Omni-wheeled Shipboard Sideloader (HOSS), NSWC Panama City



Omni-Directional Transporter (ODT), NSWC Panama City



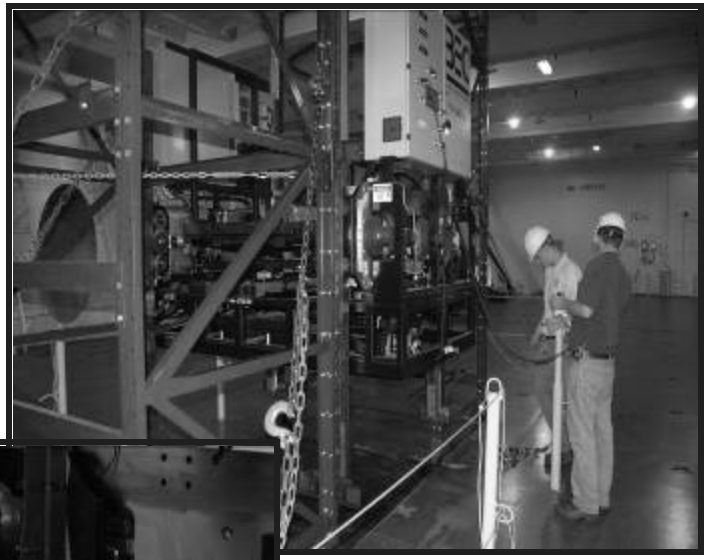
BEC Transport Unit (both an ODV and part of pallet stowage system), Benedict Engineering Co.

Various Omni-Directional Vehicles (ODV) demonstrated their ability to function in a shipboard environment. Their different stages of development and intended purpose does not allow a head to head comparison. All demonstrated the maneuverability that is an "omni" characteristic that provides easy cargo manipulation to enable dense packing and selective offload of cargo.

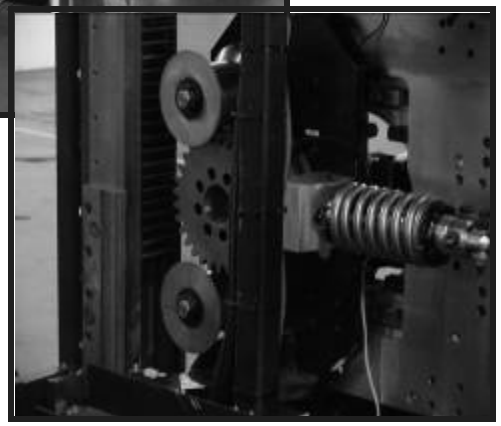
Transfer Unit and Storage Rack

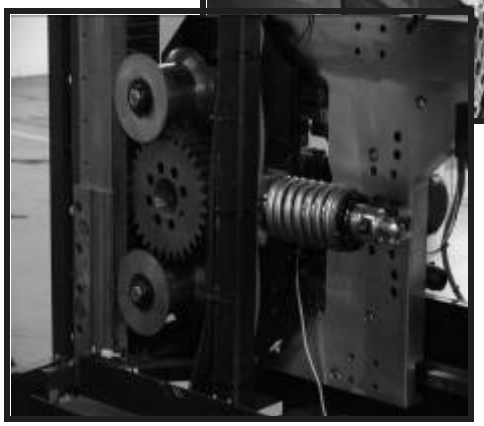


Transfer Unit enters shaft in pallet storage rack…



… aligns and engages the climbing system…





… and climbs up the shaft to store pallet In the rack.

The Benedict Engineering pallet stowage demonstrator consists of a Transfer Unit and a unique stowage rack with a vertical shaft. The Transfer Unit can climb the shaft and deposit a pallet in the rack or conceptually, climb a shaft between decks and drive out of the shaft to a different delivery point.

LCAC Operations









Night operations:
LCAC landing, vehicles backing on, vehicles being lashed down, and LCAC departing

LCAC operations were conducted in a variety of sea states, ship headings, ship speeds and an alternate side wall configuration. This information will support the MLP design and operational procedures. LCAC night operations were conducted including vehicle transfer to support the MPF(F) goal of movement of vehicles to the shore in a period of darkness. The feasibility of damaged LCAC recovery was also demonstrated.

Pallet and JMIC ASRS



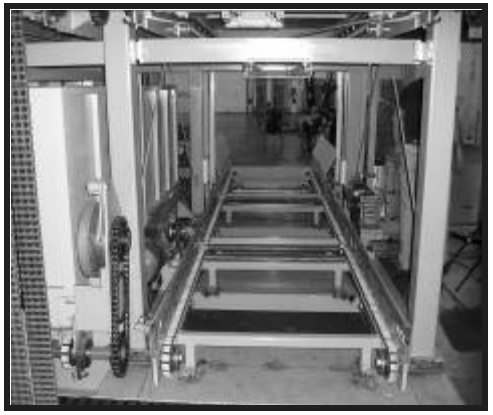
JMIC (left) and Pallet (right)
Pick and Deliver Stations



Storage Racks and Storage/Retrieval Machine





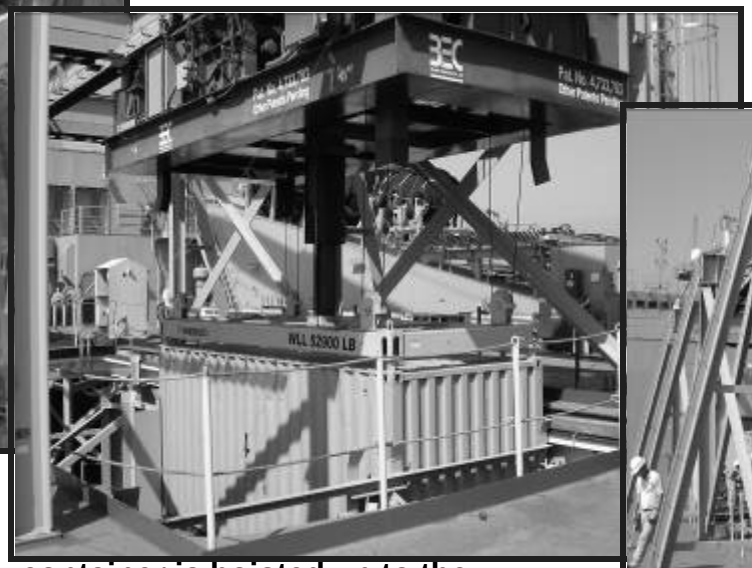


The ATI/General Dynamics/Siemens Shipboard Automated Stowage and Retrieval System (ASRS) demonstrates the feasibility of modifying a warehouse ASRS design to enable it to function at sea. This ONR funded prototype handles fully loaded pallets and JMIC boxes. It is designed to operate safely through sea state 5 .

Multi-Directional Material Handling System



Standard spreader bar is connected to a container within the cell guides,



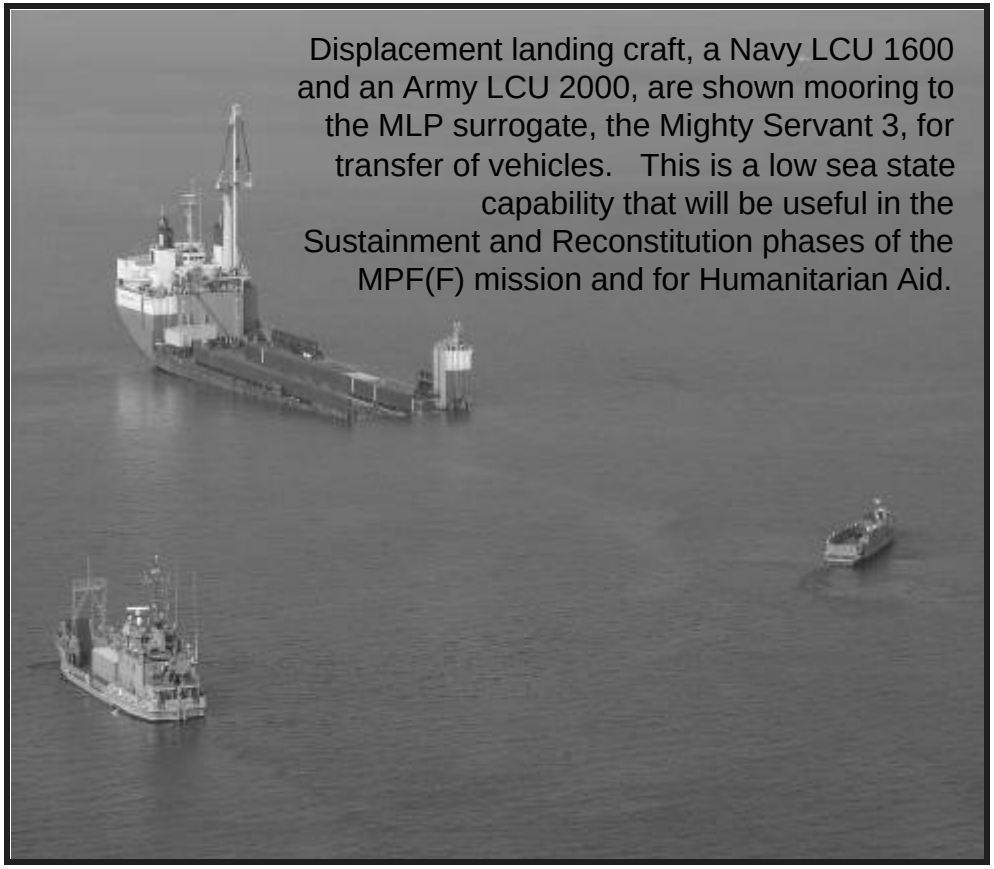
container is hoisted up to the Transfer Unit,



and Transfer Unit moves the container to any location in the grid.

The Benedict Engineering MDMHS was tested pierside, at anchor and underway to demonstrate the feasibility of a shipboard selective stowage and retrieval capability for 20 foot ISO shipping containers (funded by MSC/ USTRANSCOM).

Displacement Craft Interface



Displacement landing craft, a Navy LCU 1600 and an Army LCU 2000, are shown mooring to the MLP surrogate, the Mighty Servant 3, for transfer of vehicles. This is a low sea state capability that will be useful in the Sustainment and Reconstitution phases of the MPF(F) mission and for Humanitarian Aid.



Navy ACU 2 LCU-1600 transferring HMMWV



Army 7TH Transportation Group LCU-2000

Headquarters U.S. Air Force

Integrity - Service - Excellence



Air Force Engagement in Expeditionary Warfare

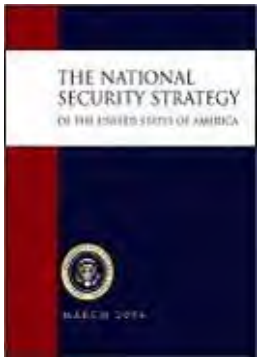
Brig Gen Kevin Henabray
Mobilization Assistant to AF/A8X
(AF Strategic Planning)

24 Oct 2006

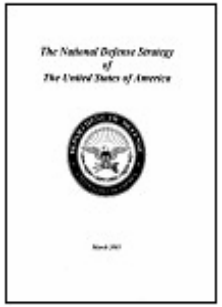
Air Force Engagement in Expeditionary Warfare

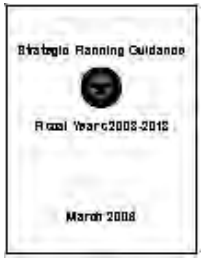
- In today's world. . .
  - Things We Need to Do
  - Places We Need to Be
- The Air Expeditionary Force (AEF)
  - Transformation within DOD
  - Transforming the Air Force
  - How the AEF works
- Enhancing Joint Warfighting – The Air Force Portfolio of Capabilities for Expeditionary Warfare
  - Global Strike
  - Global Mobility
  - Persistent C4ISR
  - Agile Combat Support

What We Need to Do –
Plenty of Strategic Guidance . . .



















Force Planning Construct



Strategic Guidance Directs Transformation

- Fight and win "the long war"
- Remain a military without peer
- Meet traditional, irregular, catastrophic, and disruptive threats
- Recapitalize and modernize
- Become a smaller, more capable force
- Reduce excess infrastructure

"We're fighting a global war, a real global war. We're focusing on developing more expeditionary notions of Airmen and more expeditionary notions of presentation of forces."

- CSAF, General T. Michael Moseley

Meeting the Requirements

COCOMs' Requirements to "Fight Tonight"

OSD / COCOM Guidance
QDR, IPL's, GWOT, New Missions

OSD's Requirements for Long-Term Transformation

MISSION AREAS

Global Strike | **Global Mobility** | **Persistent C4ISR** | **Agile Combat Support**

Modernization and Recap
Infrastructure
Readiness
People

RESOURCES

The Threat Requires an Expeditionary Force

- The Cold War military was not structured to face the new range of irregular, catastrophic, and asymetric threats
  - Long War on Terrorism
  - Counterinsurgencies
  - Stability operations
  - Diminished protection of geographic distance
  - Proliferation of WMD
  - Unpredictability of conflict locations
  - Reduced access and need for garrison bases
  - Urban operations
- The joint force must effectively conduct operations across the entire spectrum of conflict – no more “lesser included cases”







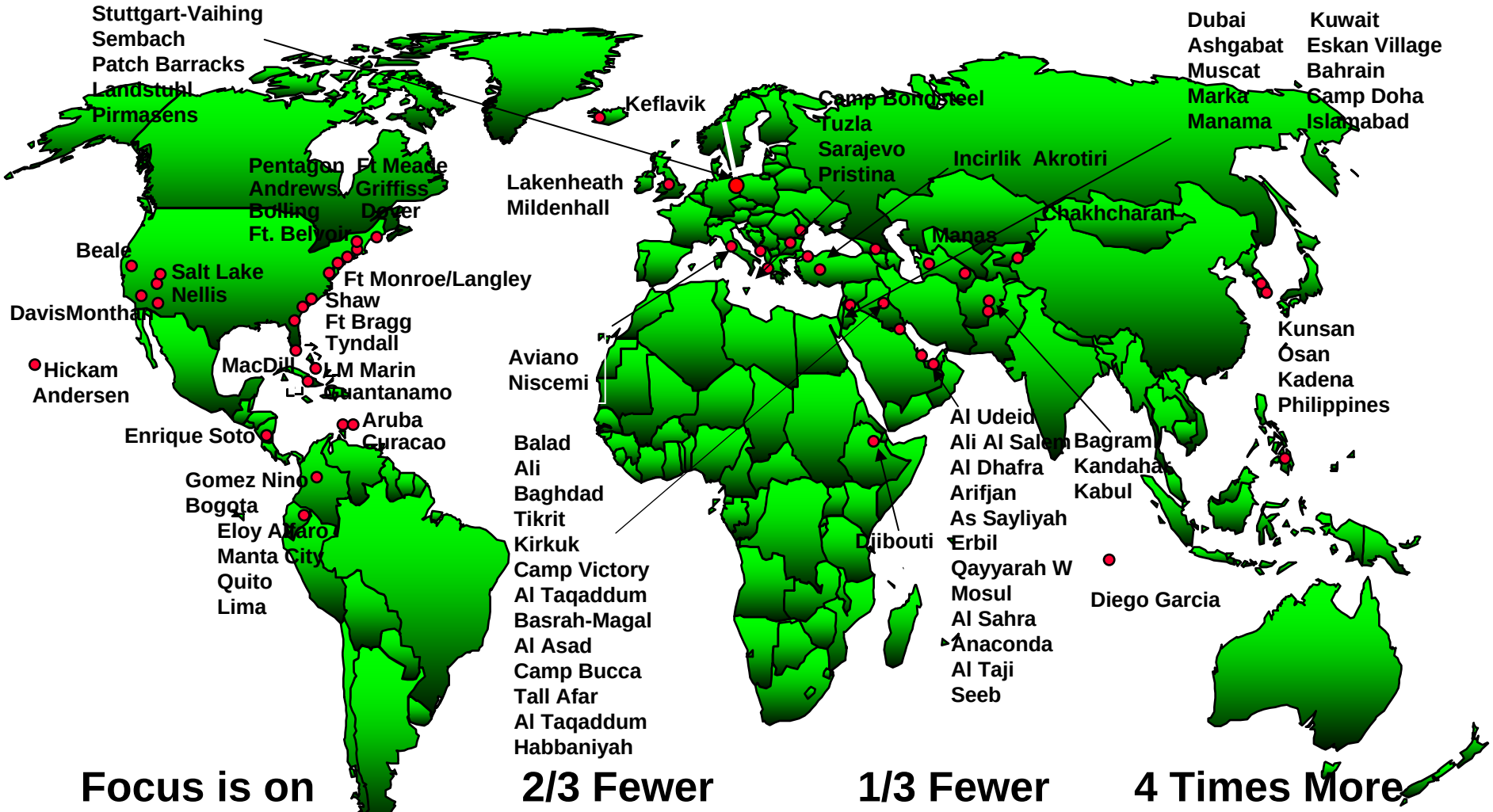
The Air Force "Warfighters" Vision

- **Mission Statement**
  - ***Deliver sovereign options for the defense of the United States of America and its global interests – to fly and fight in Air, Space, and Cyberspace***
- **Priorities**
  - ***Maintain a razor-sharp focus on fighting the Global War on Terror***
  - ***Continue developing our Airmen***
  - ***Recapitalize and modernize our inventory***

Where We Were –
The Cold War Garrison Force

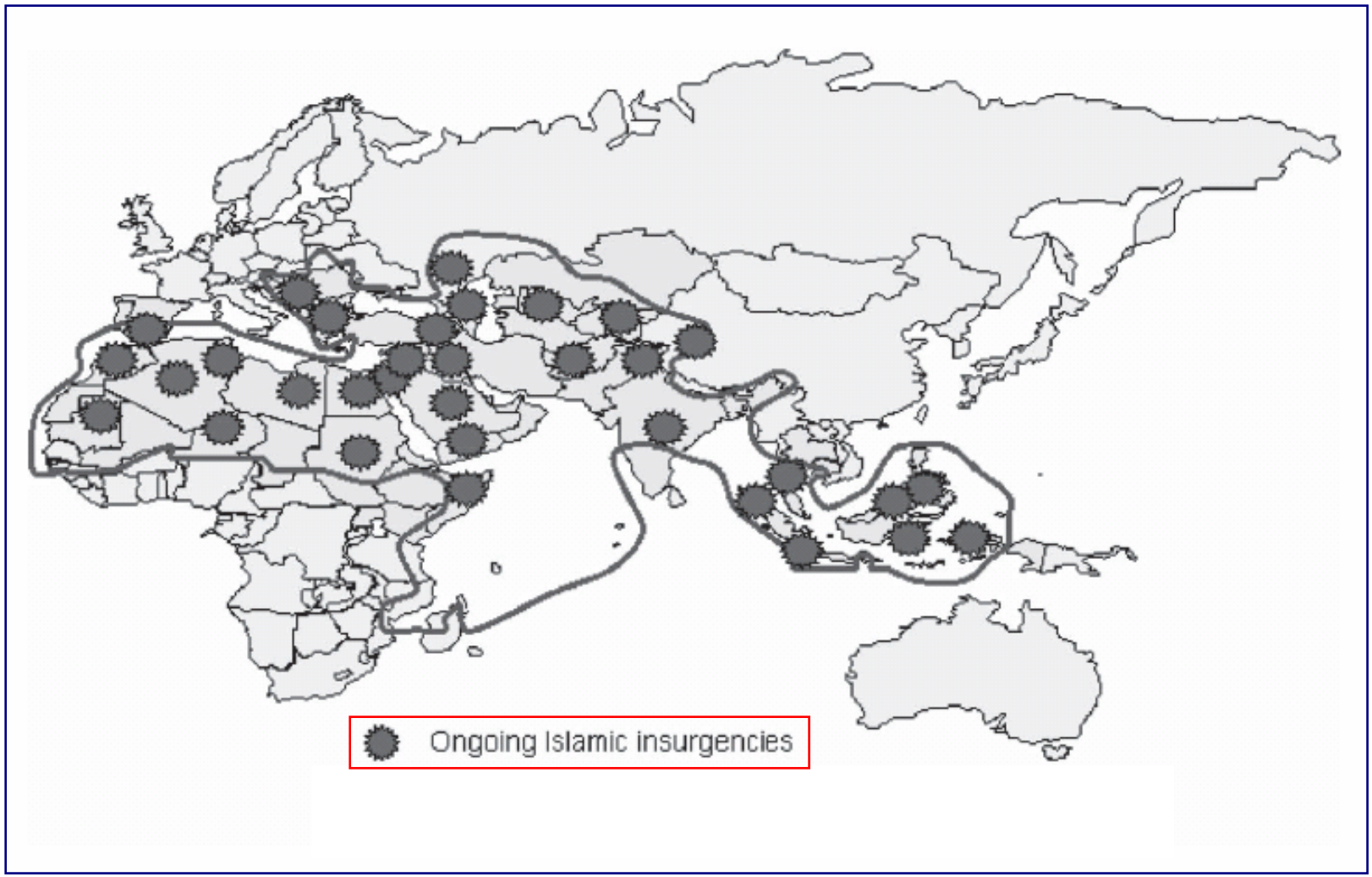


Where We Are Today. . .
An Engaged, Expeditionary Force



Focus is on Engagement | **2/3 Fewer Overseas Bases** | **1/3 Fewer People** | **4 Times More Deployments**

Where We Might Be Tomorrow. . .
"The Arc of Instability"

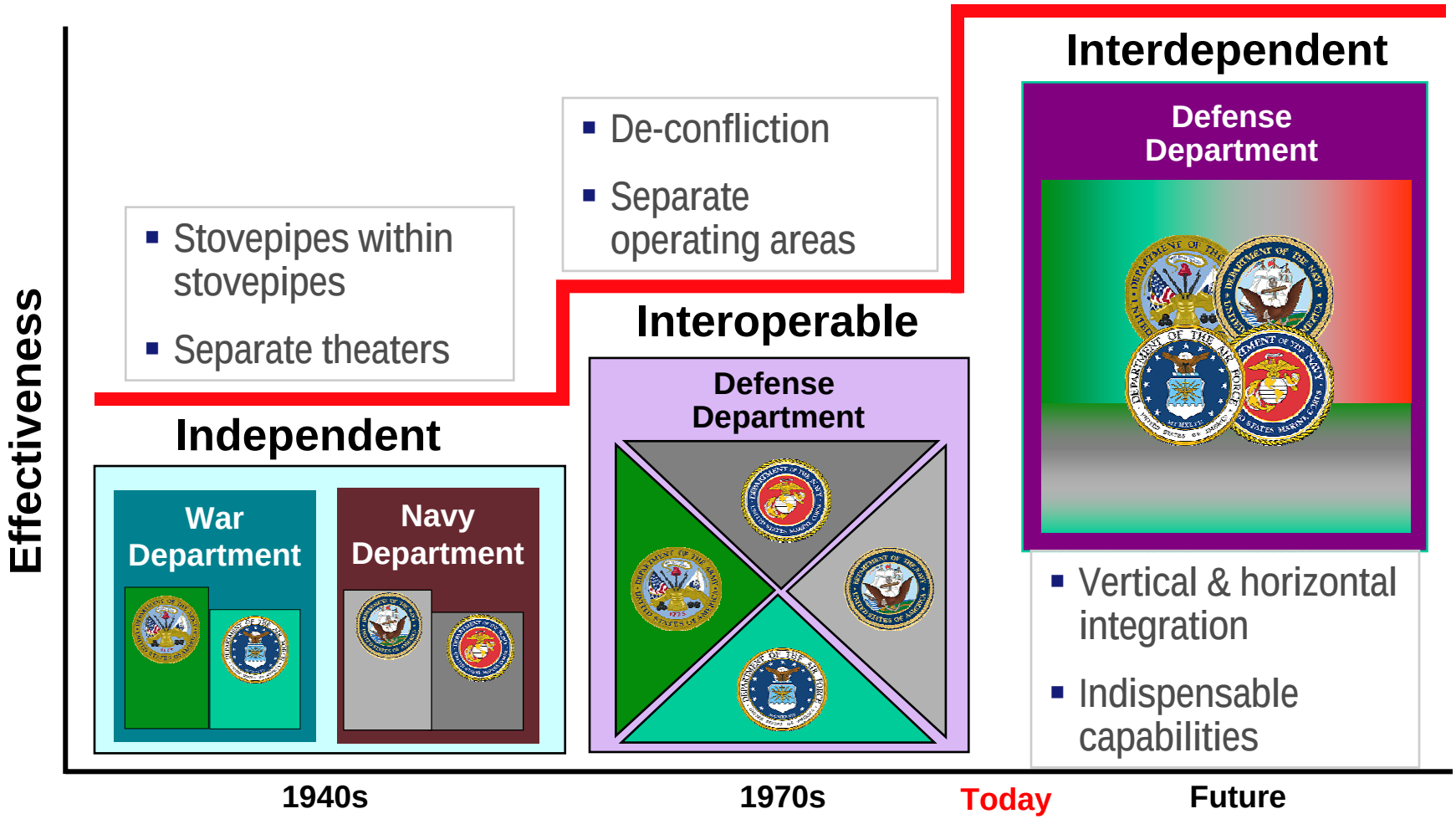


*Kilcullen, David J., "Countering Global Insurgency," Journal of Strategic Studies (Aug 2005): p. 599 – which cites Patterns of Global Terrorism 2004 by State Dept as source for data.

Air Force Engagement in Expeditionary Warfare

- In Today's world . . .
  - Things We Need to Do
  - Places We Need to Be
- **The Air Expeditionary Force (AEF)**
  - **Transformation within DOD**
  - **Transforming the Air Force**
  - **How the AEF works**
- Enhancing Joint Warfighting – Air Force Portfolio of Capabilities for Expeditionary Warfare
  - Global Strike
  - Global Mobility
  - Persistent C4ISR
  - Agile Combat Support

Enhancing Joint Warfighting – Interdependence Requires a Portfolio Approach to Capabilities



Air Force Transformation into an Expeditionary Force

"Tactical" and "Strategic" define effects, not platforms

SAC/MAC/TAC Reorganized Into ACC & AMC To Meet New Strategic Environment

1998: Air & Space Expeditionary Force (AEF) concept unveiled

TODAY: Total Force Integration And Warfighting HQs







1980 *1990* *2000* *2005*

1992 Functional Organization Shift

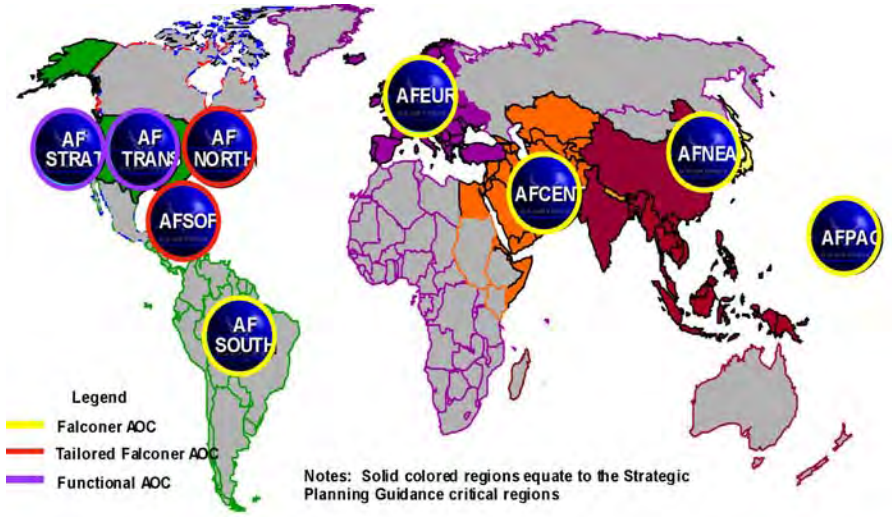
1998 Expeditionary Structure Shift

Enhancing Joint Warfighting – Organize Around Warfighting Headquarters

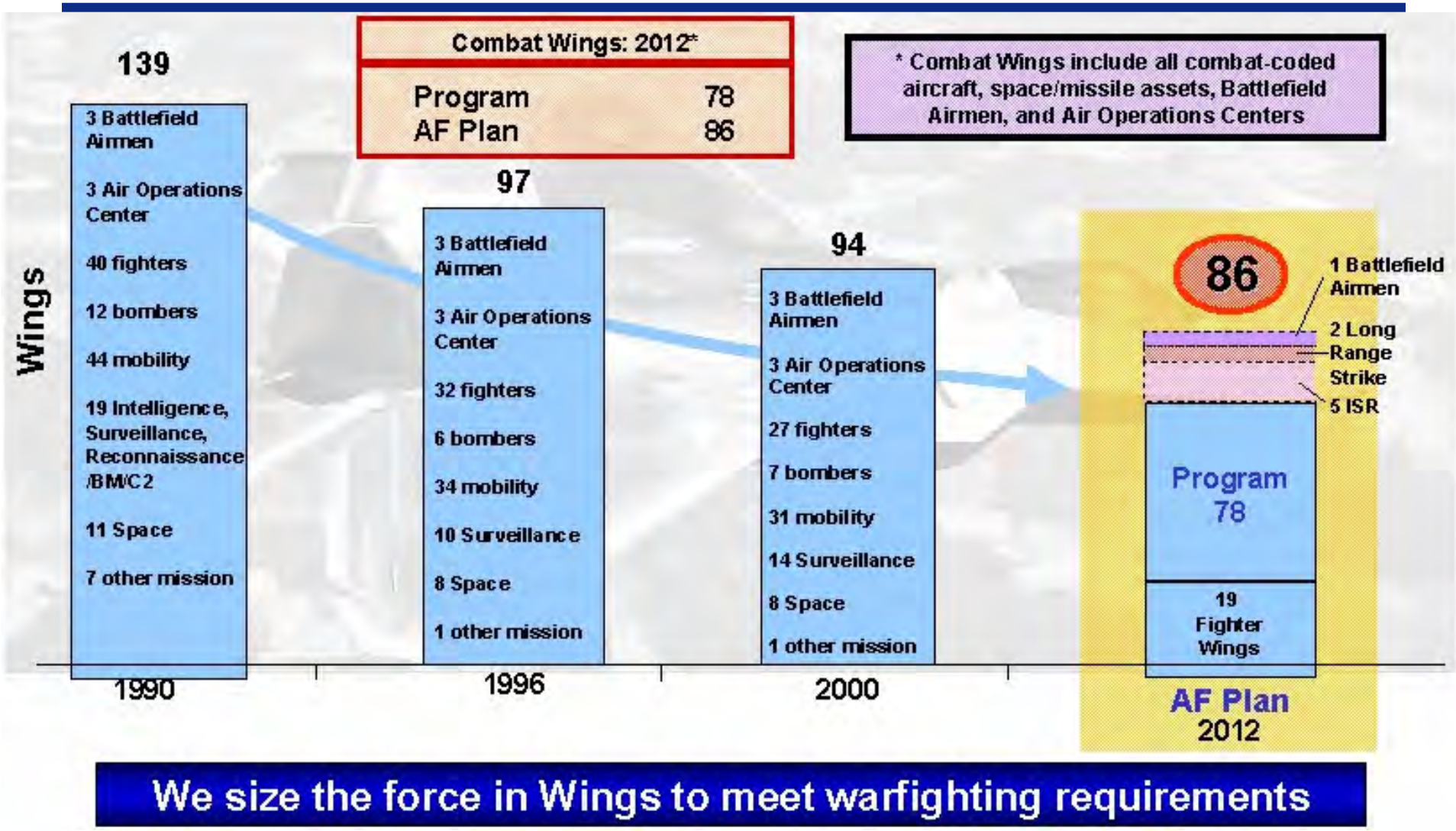


- **Mission: Plan, command, control and execute air, space and information capabilities across full range of military operations**
- **Provide Operational-level C2 Supporting geographic and functional CC's**

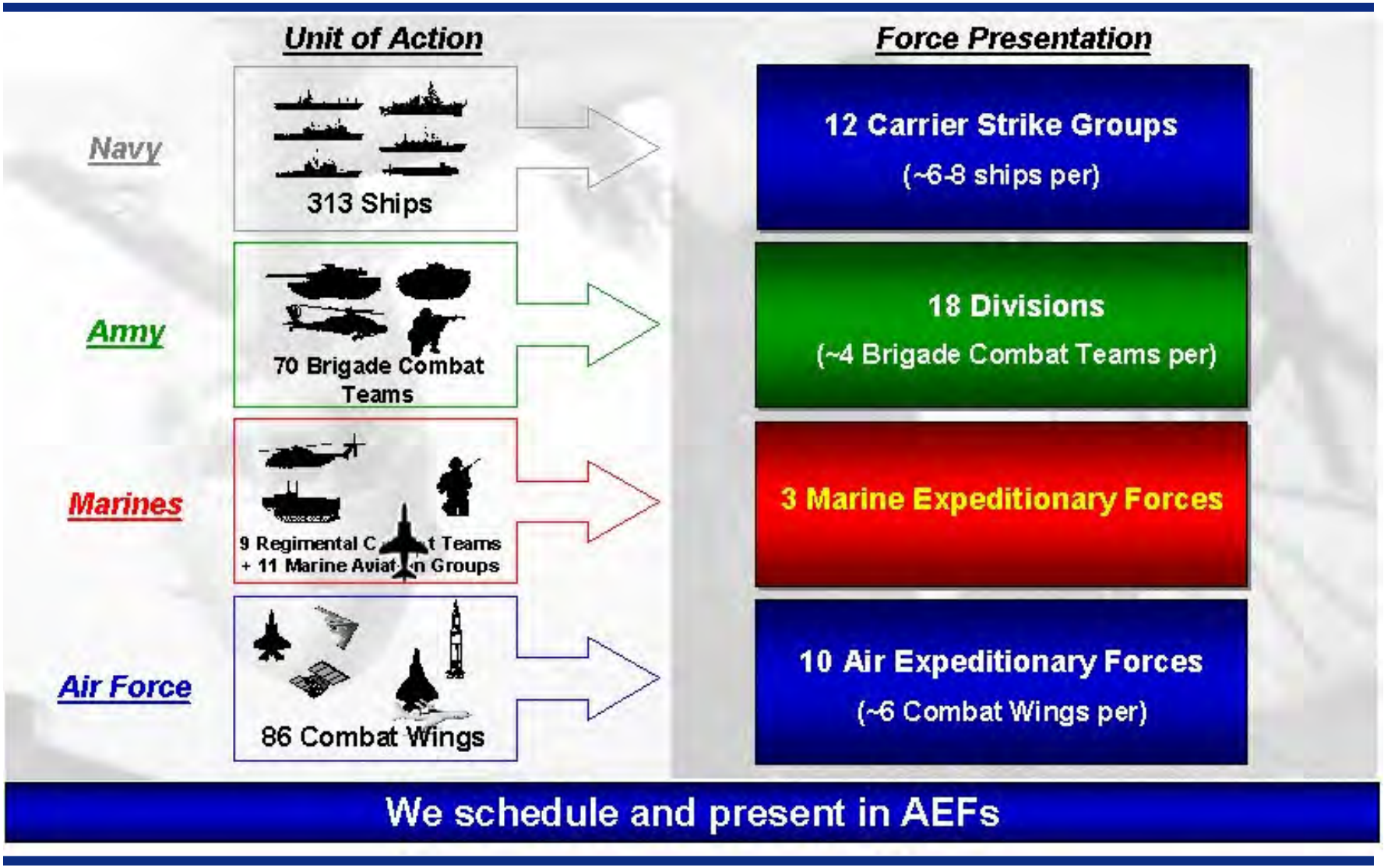
- **A-Staff re-organization**
- **Capability to immediately transition from Day-to-day to major operations**
- **In-place COMAFFOR of assigned or attached forces**



The Combat Wing Transformation



Force Presentation



The Air Expeditionary Force

- **Provides predictability and stability to our Airmen during normal battle rhythm … with a planned and orderly transition to surge using an equitable, consistent and methodical approach, transparent to all commanders**

- **Stresses in certain career fields (LD/HD) will make their battle rhythm less predictable (i.e. extended tour lengths, more frequent deployment rotations, etc)**

- **The AEF Cycle is based on forces aligned in five "pairs"**
  - **Each "pair" equates to a four-month deployment window**
  - **Five AEF "pairs" make up one 20-month AEF "cycle"**

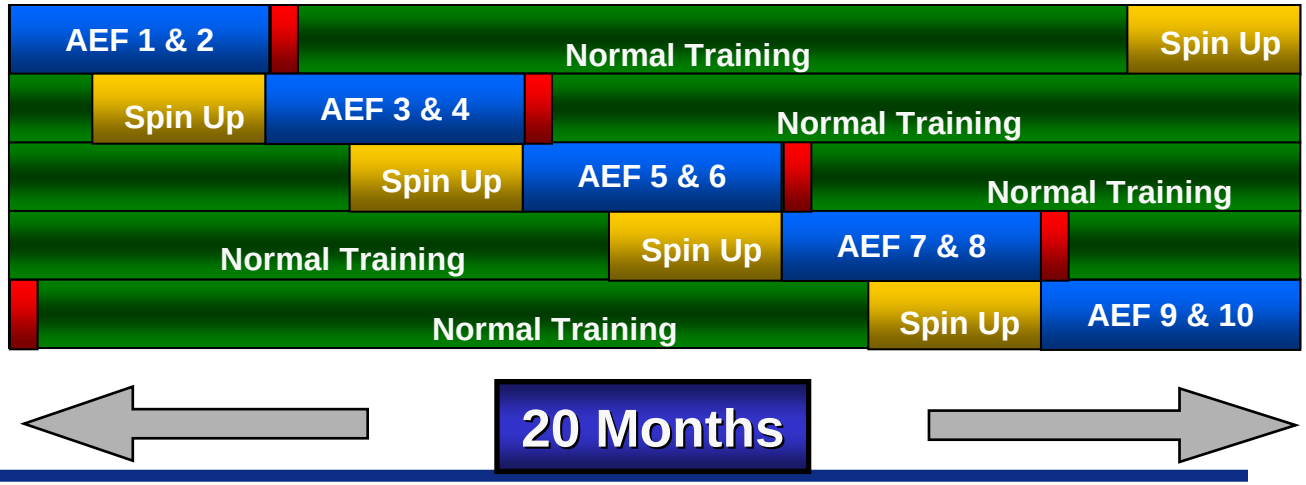
- **The AEF is the Air Force's system for presenting forces to COCOM's**

How the AEF Works

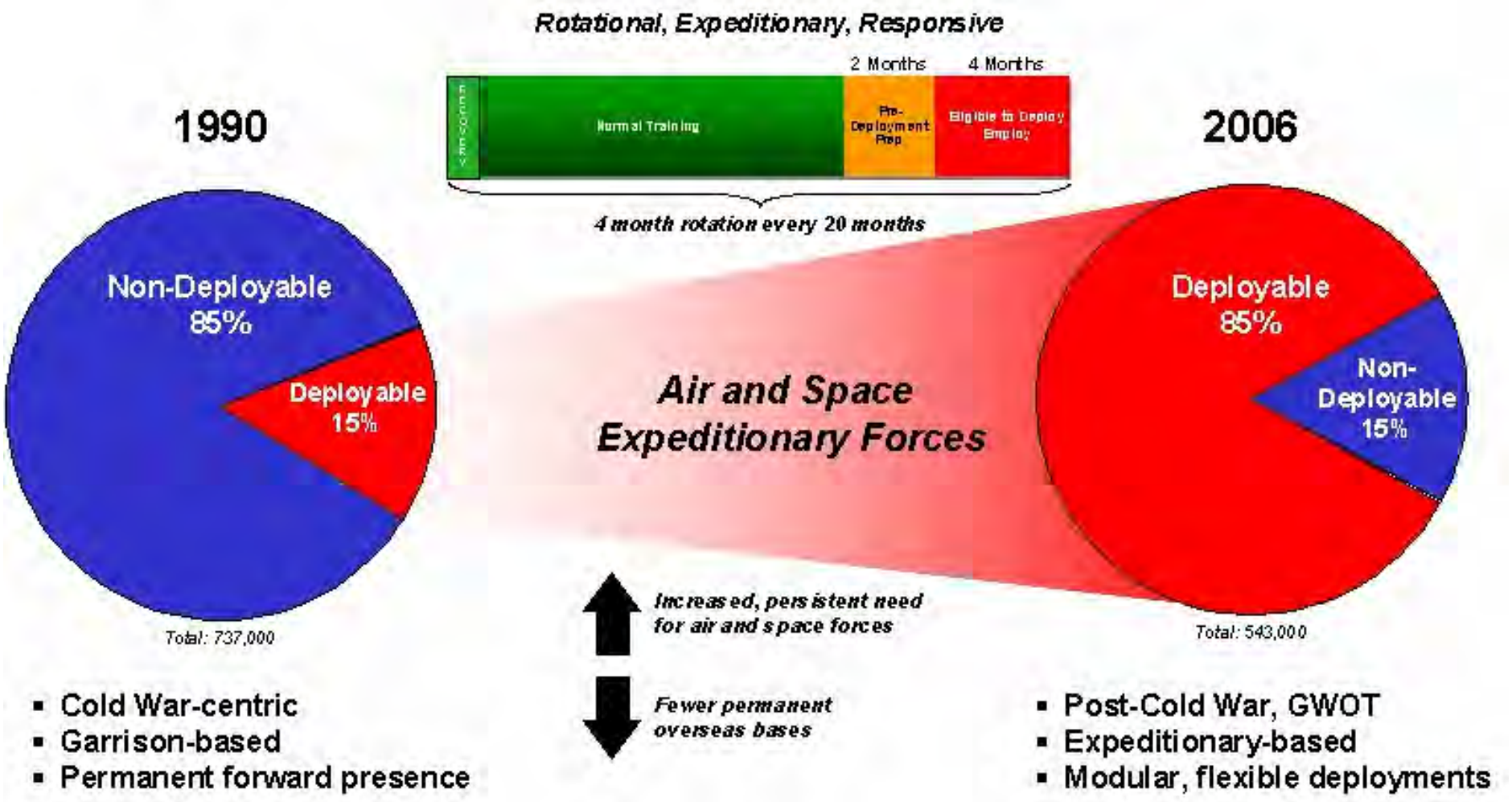
- 2-3 Combat Wings (Shooters)
- 2 Mobility Wings (Tankers/Airlift)
- 1-2 Mobility Squadrons (C-130)
- 1-2 Recon Squadrons
- 1 Bomber Squadron
- 3-4 Austere Locations
- AF Special Ops Base

A "Typical" AEF

AEF Deployment Timeline



"Every Airman Deployable"



Air Force Engagement in Expeditionary Warfare

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  - **Global Mobility**
  - **Persistent C4ISR**
  - **Agile Combat Support**

Global Strike . . .
Preserving Sovereign Options

- **Global Strike –** Ensure continuous 5th Generation fighter industrial base, and develop next generation LRS capability (increased range, payload, with rapid response
  - **F-22A: Air dominance** – integrated avionics & sensors, advanced stealth, and super cruise insure a lethal, survivable, and unrivaled A/A capability
  - **F-35: Precision strike –** multi-role stealth fighter meeting the future needs of the AF, Navy, USMC, and our Coalition Allies
  - **Long Range Strike:** Modernize the legacy fleet (B-1, B-2, & B-52) & field a next generation bomber capability by 2018 (enhanced speed, range, payload, connectivity, & survivability)









Enhancing Joint Warfare –
Global Strike (CAS)



- **A-10C – Upgrade the A-10 to "precision engagement" configuration – new cockpit avionics/flight controls and the ability to drop any bomb in Air Force inventory will enhance the CAS kill chain in irregular operations.**



- **Gunship: Increase AC-130 fire control accuracy, improved multi-spectral sensor for enhanced target ID, and ROVER feeds (from Predator/Warrior); begin study for next generation gunship**

Enhancing Joint Warfare –
Global Strike (Special Ops)

- **Special Ops – CV-22 acquisition (50 aircraft) will provide a revolutionary capability to our special ops forces**



- **CSAR-X: 141 CSAR-X to replace HH-60G. Combat Search And Rescue is a core AF competency that must be recapitalized — leave no one behind on the battlefield.**



Enhancing Joint Fires and Effects

- **Increasing terminal attack controllers by 1,000 and adding 120 Combat Aviation Advisors**
- **Joint Fires Integration and Interoperability team started at Eglin in Feb 2005 (JFCOM)**
- **Equipping Theater Airborne Reconnaissance System (TARS) with SAR for all weather, night, and real-time CAS**
- **Activating AFSOC Predator sqdn**
- **Small Diameter Bomb (SDB) fielded & deployed in combat operations this month**

Close Air Support is a key Air Force capability for expeditionary operations

Global Mobility
"Get There the Fastest With the Mostest"

- **Global Mobility – We have an urgent need to replace 45-year old tankers, modernize legacy airlift aircraft, and procure a Joint Cargo Aircraft (JCA)**
  - **KC-X: AF must start recapitalizing aging tanker fleet now, and most cost-effective option is a fleet of new, medium-to-large commercial derivative tankers**
  - **JCA: AF is DoD's airlift provider, and JCA will provide a niche capability to support joint warfighters at home and in the field**
  - **C-17: A modernized C-5 fleet combined with a 190 aircraft C-17 fleet enables the Air Force to manage risk effectively now and in the future (defined by the QDR-validated Mobility Capabilities Study)**






Global Mobility
Keeping Expeditionary Operations Sustained

From Ramstein AB, Germany, direct delivery of over 2M HDRs



3,000 miles to Ramstein AB

Resupply of Northern Alliance



Deployment of two MEUs to Camp Rhino





5,500 tanker sorties, supported 80% of USN tanking requirements

CVBGs: 1,500 miles round trip

Diego Garcia: 5,000 miles round trip

USAF Mobility Assets are critical to deployment & sustainment in anti-access environments

Flying and Fighting in Cyberspace

- **Persistent C4ISR – Expand global ISR capabilities in air and space, and increase our focus on Cyberspace**
  - **Space situational awareness: Keystone to dominance of space, and we will provide transformational space surveillance and modernized legacy capabilities**
  - **MQ-1/RQ-4: To meet joint warfighting requirements, fulfill QDR commitment to 21 MQ-1 orbits and TFI commitment to 5 ANG MQ-1 units, and ensure seamless transition from U-2 to RQ-4**
  - **DCGS: Expanded weapon system capabilities and integrated Total Force with two new ANG sites and ARC manpower**
  - **AEHF / WGS / TSAT: Recapitalized MILSATCOM fleet to deliver more bandwidth to the joint warfighters**
  - **Objective Gateway: Funded airborne data relay platform to allow robust netcentric operations to support the joint warfighters**

Expeditionary Reachback …Moving Data…Not People

- **OEF and OIF clearly demonstrated the practical application and advances the Air Force has made in "reachback" using systems like Predator and Global Hawk coupled with advances in C4ISR**
  - **Stateside AF units sent over 30,000 reports and identified over 1,000 targets for forward deployed units**
  - **Instead of deploying 2,000 airmen, only 90 were needed to move forward**
  - **The Air Force saved between $6-15 million dollars by not deploying two intelligence ground stations and eliminated 34 C-5 airlift missions**
  - **Reachback also reduced the kill chain timeline in OIF to minutes**
- **Future conflicts will feature on demand space sensors, shared battlefield picture via UAVs, & persistent near-space surveillance**

Persistent C4ISR uses "Reachback" to Support Forward Presence

Agile Combat Support

- **Agile Combat Support – Become more efficient and effective to free up resources to support COCOM warfighting needs and transformation**
  - **Manpower/Contractor Redux: We must resize and reshape the force to live within allotted resources while meeting our obligations as an integral part of the interdependent, joint force**
    - **Remaining focused on supporting joint warfighters and OPLANS**
  - **Operational Risk: Assumed additional operational risk to balance GWOT with recapitalization and modernization requirements**
    - **Reduced flying hours, DPEM, MILPERS, & infrastructure**
  - **Infrastructure: Funded critical new mission requirements while limiting investment in Cold War infrastructure**

Agile Combat Support Forces Will Enhance Joint Basing at Guam

- **The Air Force plans for rotating/basing bombers, fighters, Global Hawks, and KC-135s at Anderson AFB**
  - **554th Red Horse Sqdn began move (Korea to Guam) last week**
  - **36th WG Contingency Response Group**
    - **Mobility Response Squadron**
    - **Security Forces Squadron**
    - **Medical Squadron**
    - **Intelligence Division**
    - **Logistics Planning Division**
    - **Combat Support Trng Squadron**
- **Starting in 2008, the III MEF HQ and 8,000 marines move to Guam**
- **USN wants ability to service CVNs and will add SSGNs to Guam basing**
- **This summer, the Valiant Shield exercise at Guam involved 30 warships, 280 aircraft, and 22,000 personnel**
- **Agile Combat Support and Guam Joint Basing play a vital role in our Pacific Strategy**







Summary
The Air Force in Expeditionary Operations

- **U.S. national security and defense strategy stresses the need for the U.S. military to be expeditionary**
- **The USAF has been expeditionary since the end of the Cold War**
- **AEFs are the Air Force's way to organize and present its forces to the COCOMs**
- **The Air Force is a part of the joint, interdependent warfighting team with distinctive capabilities in:**
  - **Global Strike – The ability to provide Strategic Attack, Interdiction, or immediate CAS to those fighting the enemy "danger close"**
  - **Global Mobility – Getting forces to the fight and supplying our main operating bases and forward operating locations**
  - **Persistent C4ISR – Provide an "unblinking eye" from the national command authority down to the soldier on point**
  - **Agile Combat Support – Providing responsive support to the expeditionary warfighter**


Today's Air Force is Fighting
an Expeditionary War…"
- General Moseley, CSAF
www.af.mil

The Interdependent Fight



Questions?


60TH
ANNIVERSARY
USAF
1947 - 2007
Heritage to Horizons...
Commemorating 60 years of
Air and Space Power



Unmanned Aircraft Systems (UAS)

USMC NDIA EWC Conference

LTC Jennifer Jensen
Product Director,
Common Systems Integration

Topics

- **Army UAS Operations**
- **Interoperability, Commonality, Standardization**
- **Path Ahead**

Beer for Horses

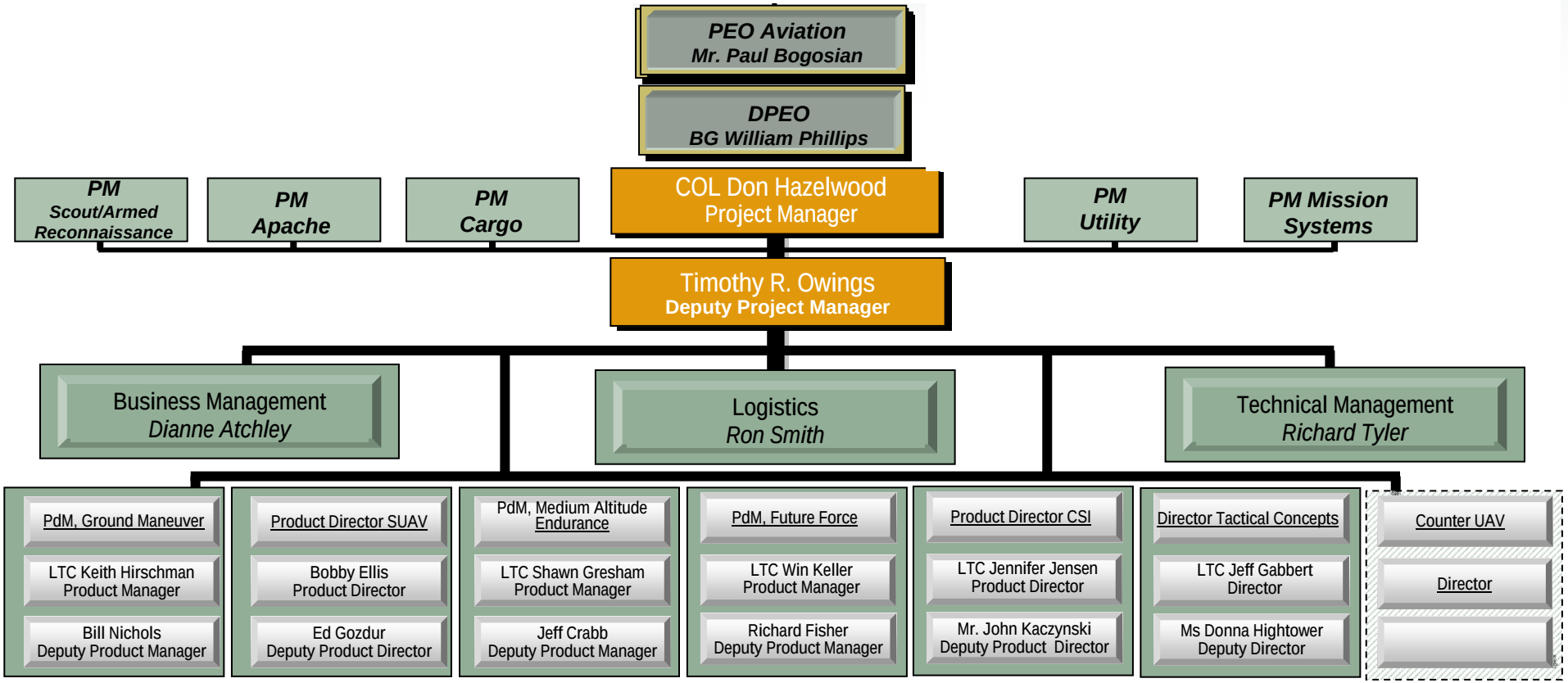
Organization and Vision

Vision

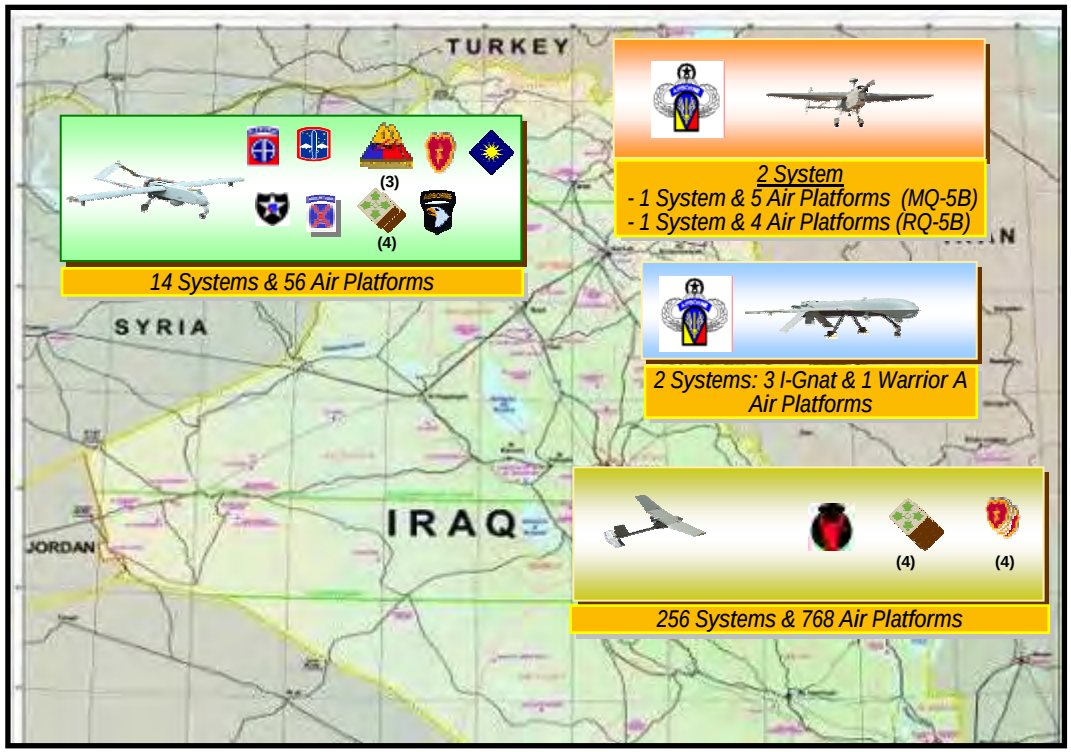
Become the Department of Defense "Materiel" Center of Excellence for all Unmanned Systems

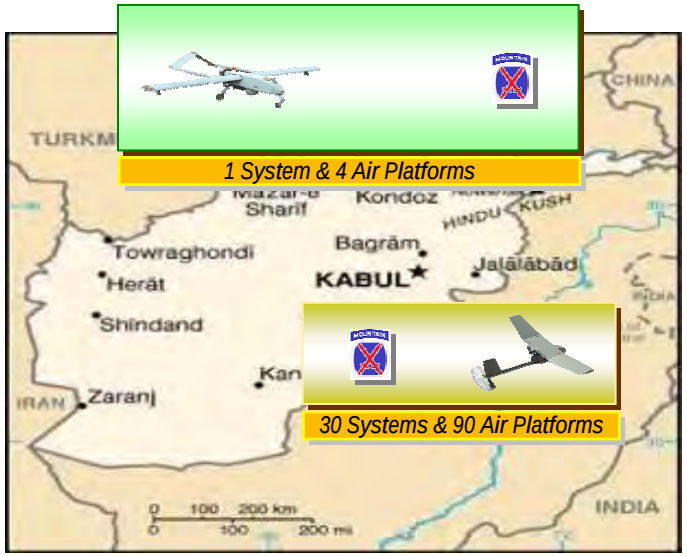
Mission

Provide the Department of Defense with World Class Unmanned Systems that are interoperable with joint and coalition partners, common with other Army systems and affordable through excellence in program management



Supporting the Warfighter
Current Situation





Field Support Representatives in Country

Total Hours Flown : 215,391

OIF/OEF Hours Flown: 162,071

75% Combat Hours Flown

UAV	Sorties Hours
IGNAT	889 12,900
HUNTER	10,982 44,771
SHADOW	33,830 128,952
RAVEN	30,119 28,768

FY05

81% of UAV Hours Flown on 11% of DoD Unmanned A/C Budget

FY06

90% + of UAV Hours Flown on 15% of DoD Unmanned A/C Budget

"This technology is changing the way we fight and we will not go without."

Task Force Commander in Theater

UAS Capability Over Time

HUNTER
RAVEN
SHADOW
ERMP
FCS CLASS UAVS

FY 06



9-11

Hunter

3 Units
(~ 3 Systems)
(~19 Air Platforms)

FY 08

Hunter
Shadow
Shadow
Shadow
Raven

77 Units
(~ 610 Systems)
(~ 1,869 Air Platforms)

System Improvements

FY 11

ERMP
Hunter
Shadow
Shadow
Shadow
Shadow
Shadow
Raven

ERMP
Hunter
Shadow
IGNAT
Raven

122 Units
(~ 1,373 Systems)
(~ 4,190 Air Platforms)

System Improvements

Future Force Spirals

230 Units
(~2,331 Systems)
(~7,085 Air Platforms)

Increasing UAVS Capability Across Echelons

One System Ground Control and Remote Video Transceiver

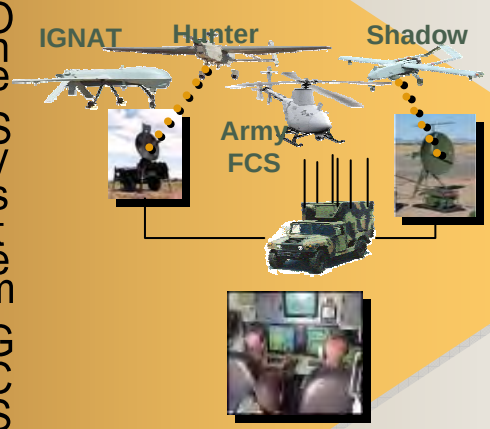
1996 - 2005

Ground Station



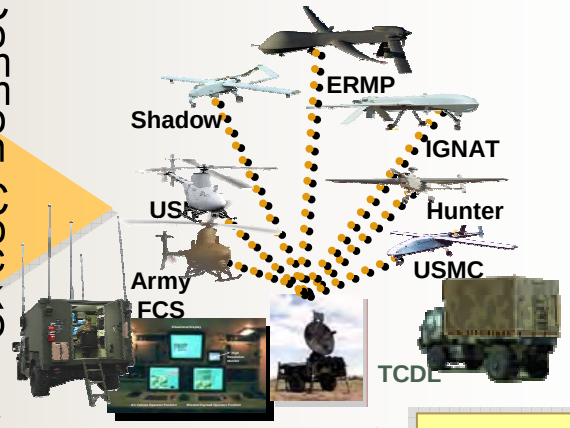
2006-7
Block I

One System GCS



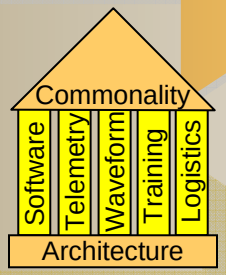
2008 – 2010
Block II

Common Cockpit



7 Configurations

- **Logistical requirements**
  (Manuals, Software Maintenance, PLL)
- **Multiple Training requirements**
- **Limited Situational Awareness**



Commonality

- **Common Cockpit Philosophy leads to:**
  - **Reduced logistical requirements**
  - **Common Training/Standardization**
- **Open ended architecture (accepts FCS)**
- **Maximizes situational awareness technology**

Increased Operational Effectiveness

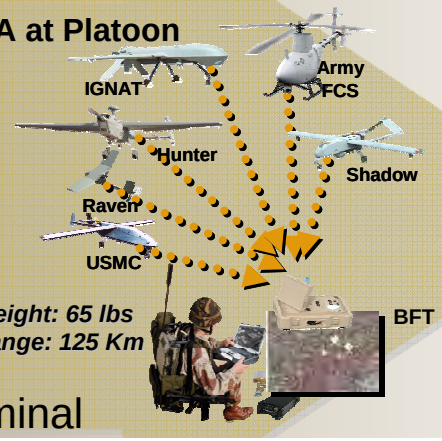
Cost Avoidance

Remote Video



Weight: 350 lbs
Range: 40 Km

One System RV Terminal



Weight: 65 lbs
Range: 125 Km

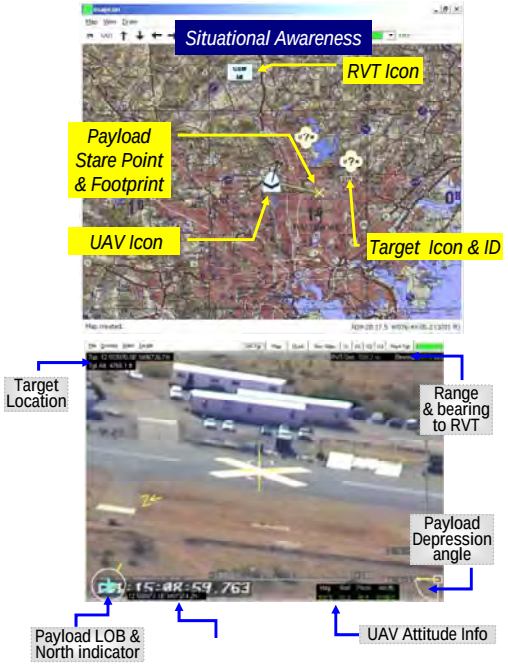
One System RV Transceiver



03-01-2006

One System Remote Video Terminal





DESCRIPTION

OSRVT is a kit that is integrated onto the ROVER III System that provides enhanced situational awareness with near Real Time Video and Telemetry Data from multiple manned and unmanned platforms: Hunter, Shadow, Predator, Pioneer, IGNAT, other UAS and manned Litening Pod platforms.

The OSRVT kit consists of UHF Modem, cables, software and an optional extended range antenna. Software supports decoding Telemetry and META Data from multiple UAS, links data onto FalconView maps, and supports Off Target Calculations.

CAPABILITIES

- Auto Detection
- Telemeter Data Linked to FalconView With 2525 Symbology
- JPEG Files With Embedded Metadata
- Off Target Calculations
- "John Madden" Functionality
- Tri-Band (C/L/Ku) Extended Range Antenna, up to 80km (Optional)
- S-Band Planned for 2 QTR FY 07

E-ROVER III

- $35K, 2-6 Month Lead Time
- 6 Month Warranty

OSRVT

- $20K, 2 Week Integration Time
- $45K for Extended Range Antenna (Optional)

SYSTEM DELIVERIES

- 20 systems in Nov, 10 systems in Dec – TF Odin
- 20+ Systems, 1st QTR FY 07 – Various Units
- 14 Systems, 1st QTR FY07 – 82nd Airborne
- 45 Systems, 2nd QTR FY07 – TUAV (Shadow)

CONTACT INFORMATION

OSRVT Contact:
LTC Jennifer Jensen
Product Director, Common Systems Integration
(256) 895-3377
jennifer.jensen@us.army.mil

OSRVT Contact:
MAJ Scott Hamann
OSRVT Lead, Deputy PD CSI
(256) 895-3367
scott.hamann@us.army.mil

ROVER Contact:
MAJ Dan Walter
PM ROVER
(937) 255-8016
daniel.walter@wpafb.af.mil

CSI Vision, Mission, Goals

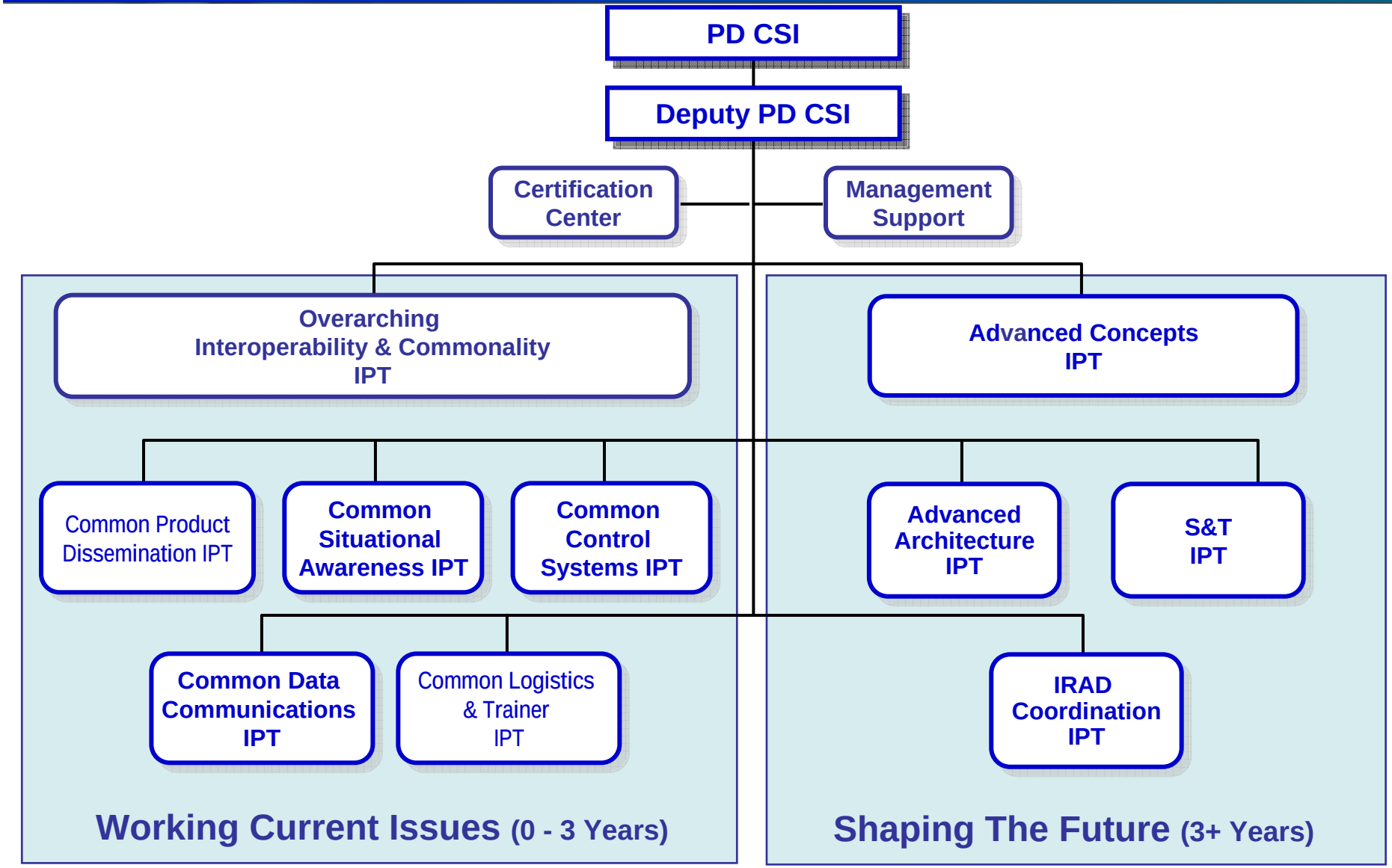
Vision: Become the US Government & Worldwide leader in Excellence for Joint Interoperability and Commonality of All Unmanned Aircraft Systems.

Mission: Develop Common Solutions to Support Unmanned Systems through Horizontal Integration, which Reduce Life-cycle Costs and Increase System Interoperability through the Joint Battlespace.

Goals:

- To provide the necessary guidance to UAS Product Managers and their Prime Contractors to Improve Deficiencies and Achieve Interoperability & Commonality Compliance…by Providing Documented Requirements & Performance Specifications
- Develop Horizontal Integration of Interoperability & Commonality Across Army UAS
- Develop Interoperability with Manned Aviation Platforms
- Provide Situational Awareness Domination to the Army & Joint Forces through Standard Dissemination Develop Common Airspace Integration Solutions
- Horizontal Integration of Technology Across Army UAS
- Bridge the Gap Between Current Modular Force and Future Force
- Develop Common & Cost Effective Supportability & Logistics

How We Are Structured To Meet Goals

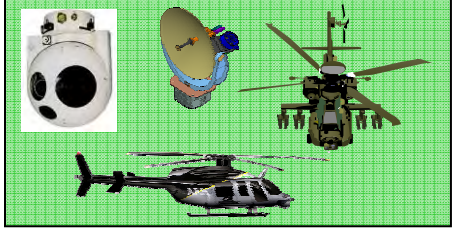


Common Systems Integration Methodology

Joint Programs



External Army Programs



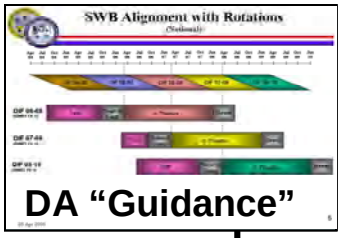
Internal UAS Programs



Advanced Concepts

Advanced Architecture

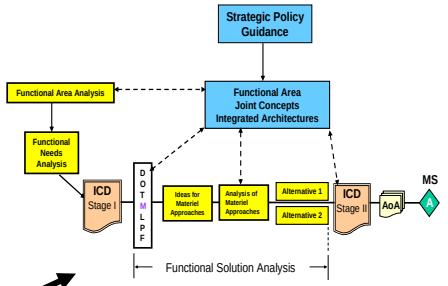
S&T



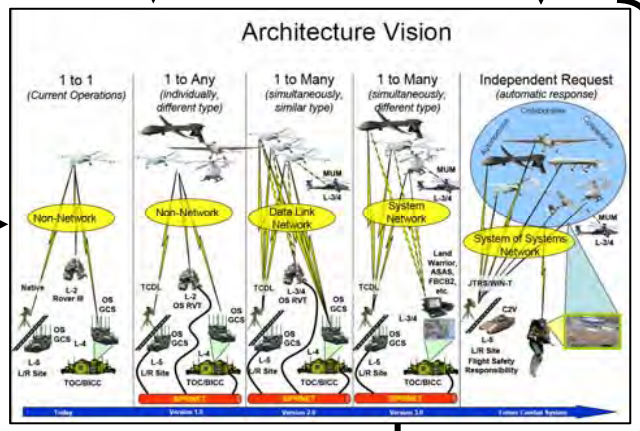
DA "Guidance"

Other "Guidance"





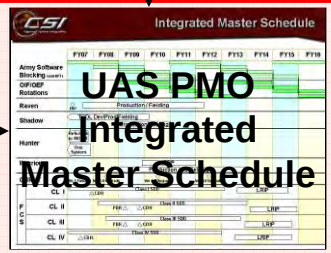
JCIDS



CSI I&C Profiles

TRADOC System Manager Unmanned Aircraft Systems

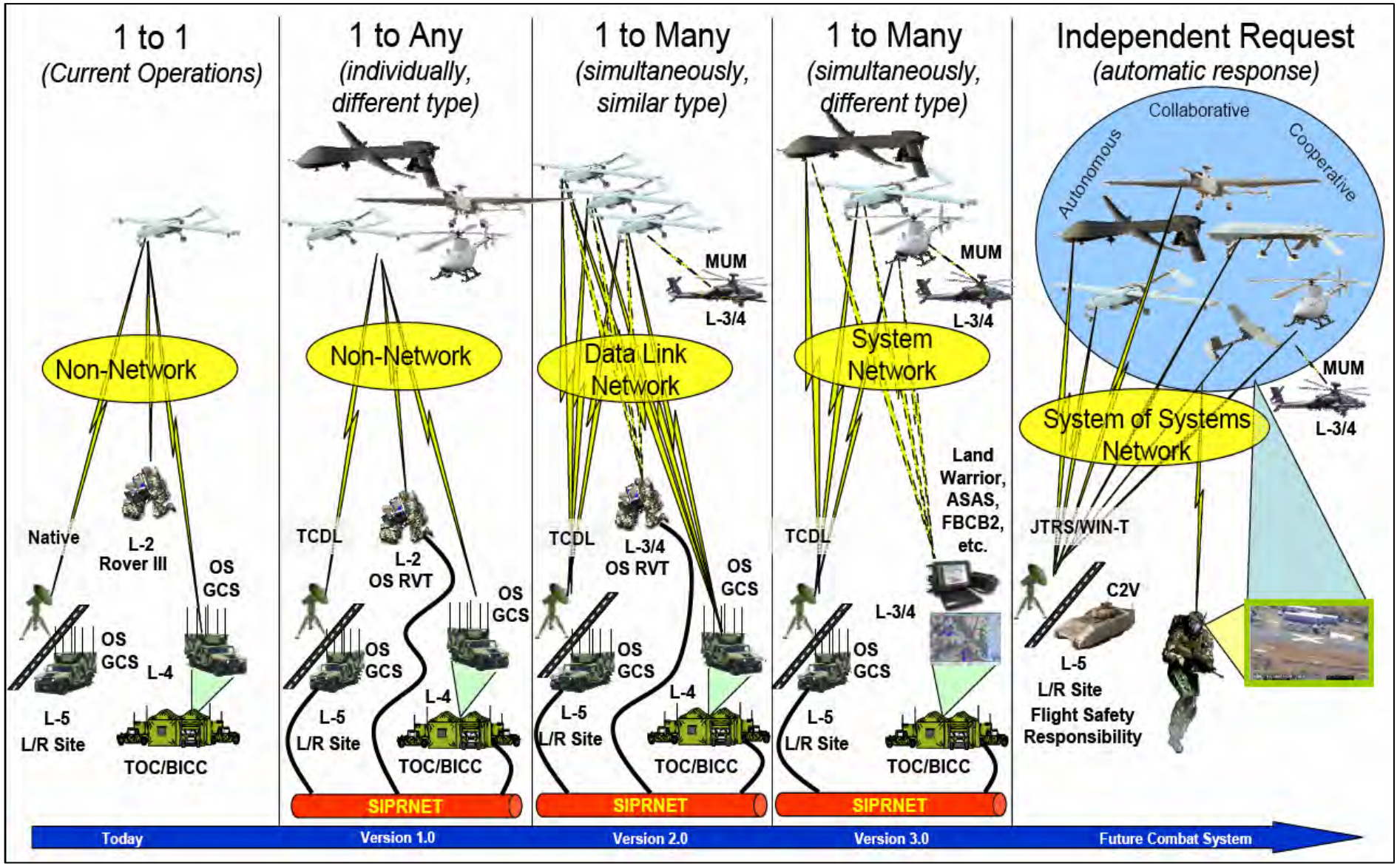
UAS Interoperability Capabilities Road Map (Defined Capabilities)



UAS PMO Integrated Master Schedule

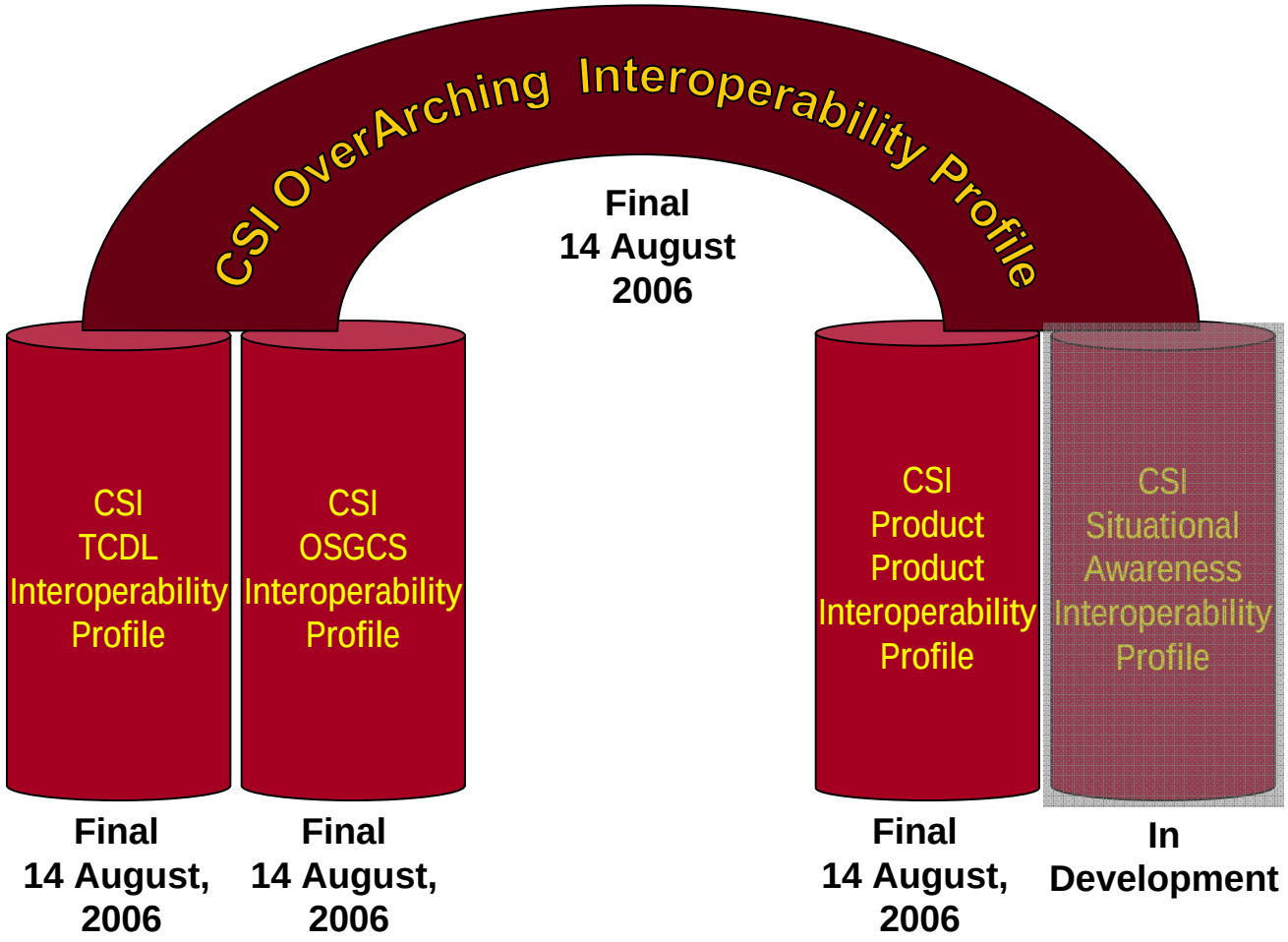
Do Not Yet Exist!

Architecture Vision



Army UAS Version 1.0 Interoperability Profiles

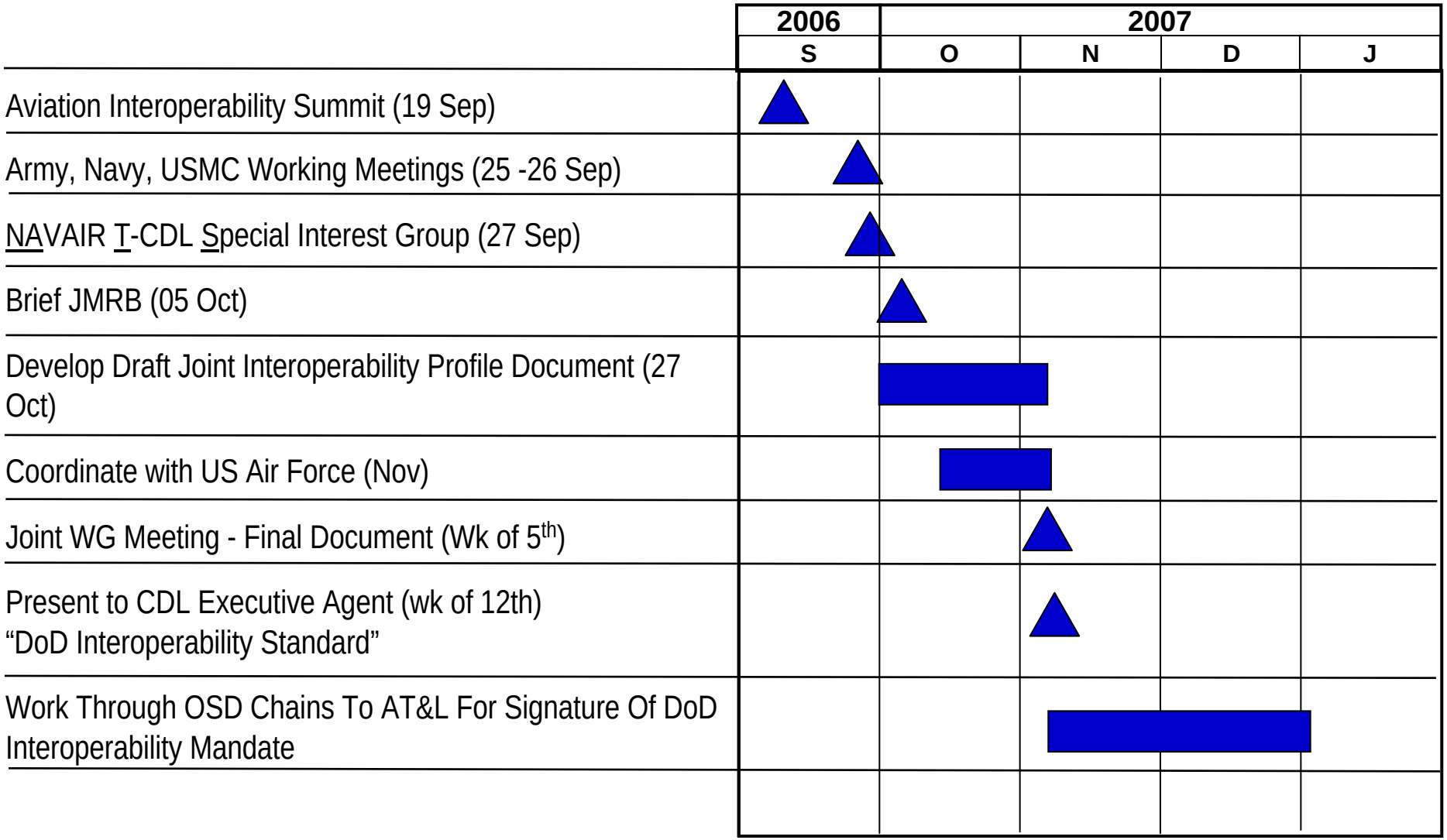
Describes End-to-End Interoperability from the Sensor to the Warfighter, Hot Swap Interoperability between Shadow and Warrior Platforms, and Growth to other Platforms. Includes Common Mission Planning, Training, and Warfighter Machine Interfaces.



Interoperability Profile Documentation

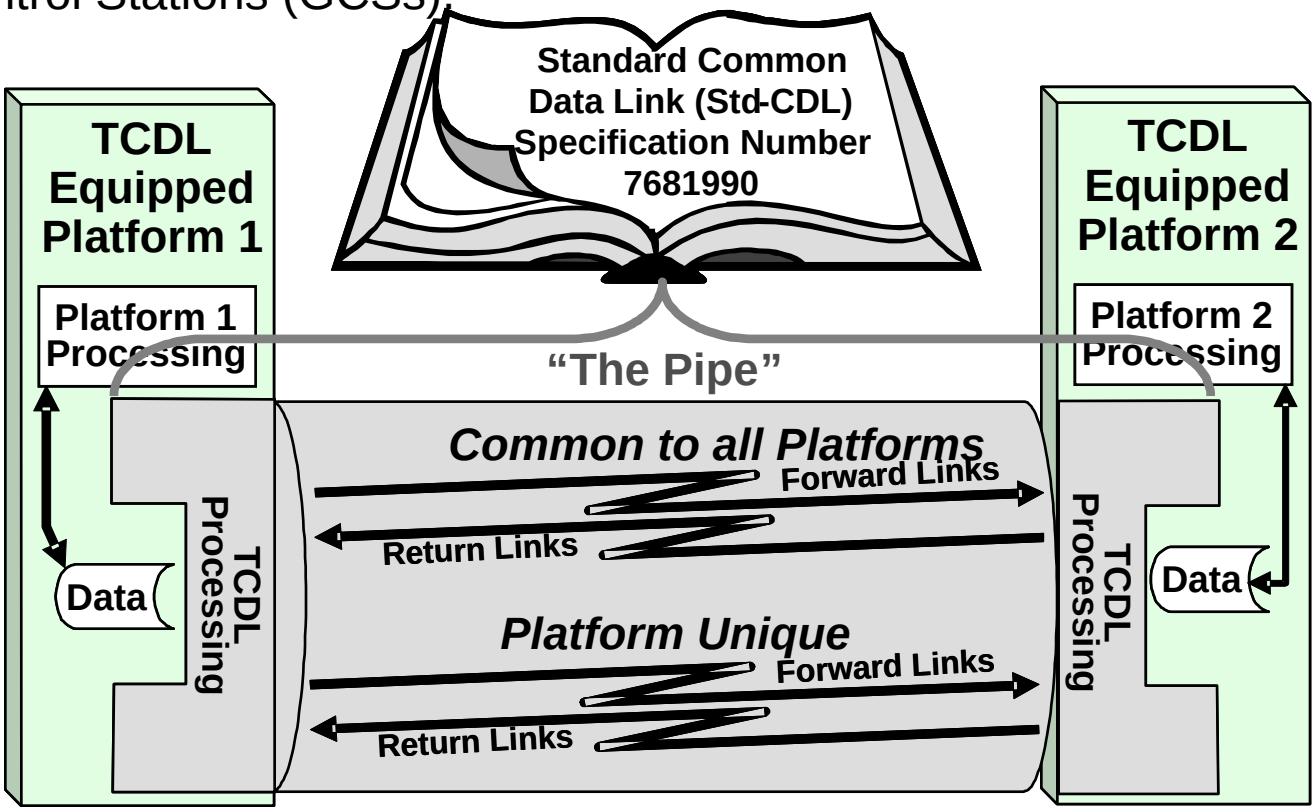
- Version 1.0 Interoperability Profiles
  - Draft Released Comments (05 May 2006)
  - Final Release (14 August 2006)
- Overarching Guidance
  - Compliance of Standards No Later than 4QFY08 or the Systems' IOT&E
  - Product Managers are Encouraged to Assess the Cost and Schedule Impacts of all CSI Guidance
  - If Cost and Schedule Impacts are too Onerous, Apply to Product Manager CSI for a Waiver
  - Burdens of Implementation are upon the Products, Compliance with CSI Guidance is to become a Required Aspect of the Assembly of a PM UAS Pprogram Management Acquisition Strategy
  - Compliance of standards is not Required for PM UAS' FCS Systems
- Core "Common" Document - Does/Does Not
  - Does Provide Interoperability Requirements across Platforms
  - Does Not Dictate Design Solution
  - Does Allow for Design Space
- Annexes – Platform's Exception to Common Core Document

Joint Interoperability Path Ahead



TCDL Interoperability Profile

- Purpose**:** Define the Common and System Specific Operating Parameters/Profiles, as Specified in the Waveform Specification for the Standard Common Data Link (Std-CDL) Specification Number 7681990, for Tactical Common Data Link (TCDL) waveforms used by US Army Unmanned Aircraft Systems (UASs) and Associated Ground Control Stations (GCSs)



FY 07
Integrated Product Teams Migration

Overarching Interoperability & Commonality IPT

OSRVT	Blue Force Tracker	OSGCS	TCDL	Common Trainer
Common Product Dissemination IPT	Common Situational Awareness IPT	Common Control Systems IPT	Common Data Communications IPT	Common Logistics & Trainer IPT
1. One Systems Remote Video Terminal (OSRVT)	1. Blue Force Tracker (BFT) /FBCB2	1. STANAG/ Vehicle Specific Module (VSM)	1. TCDL/Digital Data Links	1. IMS (Trainers)
2. KLV/Meta Data	2. Link -16	2. Core UAV Control System (CUCS)	2. WiFi/WiMax	2. MUSE
3. C4I	3. Airspace Integration/ TAIS	3. Payloads / Weapons C2	3. Networks	3. IETM
4. Video Storage & Dissemination (PICTE Like)	4. Sense & Avoid / Collision Avoidance	4. Mission Planning / PFPS		4. Health & Usage Monitoring Systems (HUMS)
5. SmartCam		5. Vehicle Control Software (VCS)		5. Readiness Reporting
6. MPEG-2/H.264 Compression		6. Air Worthiness (Ground Implementation)		
7. Encryption		7. Common Takeoff & Landing System		
		8. GATM/CNS/ATM		

UAS Support



What you See……

Is the tip of the Iceberg……

Conclusion

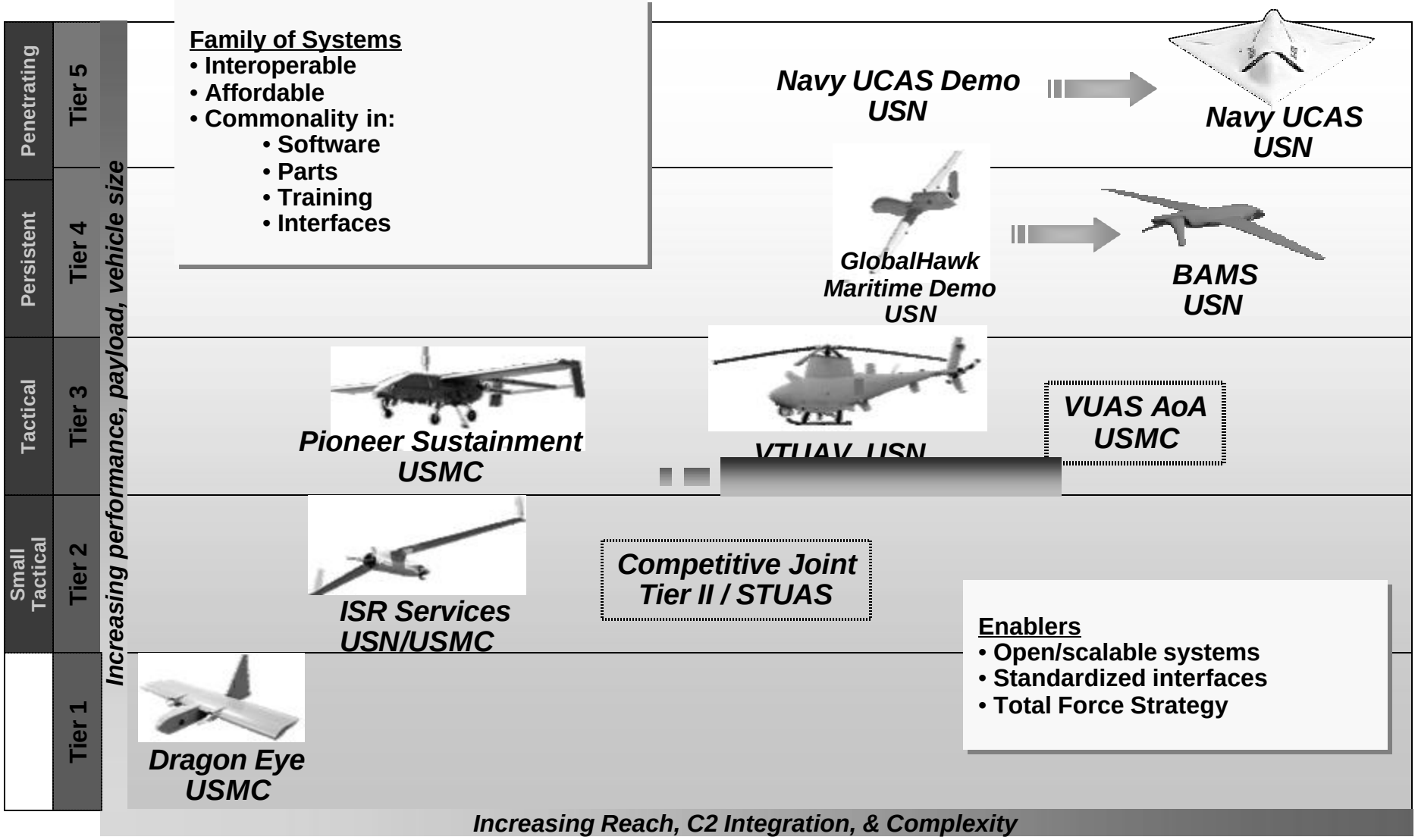
Support The Warfighter

- 970 Army unmanned aircraft vehicles deployed
- Highest OR Rate and OPTEMPO in Theater
- Establish Interoperability Standards
- Improve horizontal integration across manned and unmanned systems

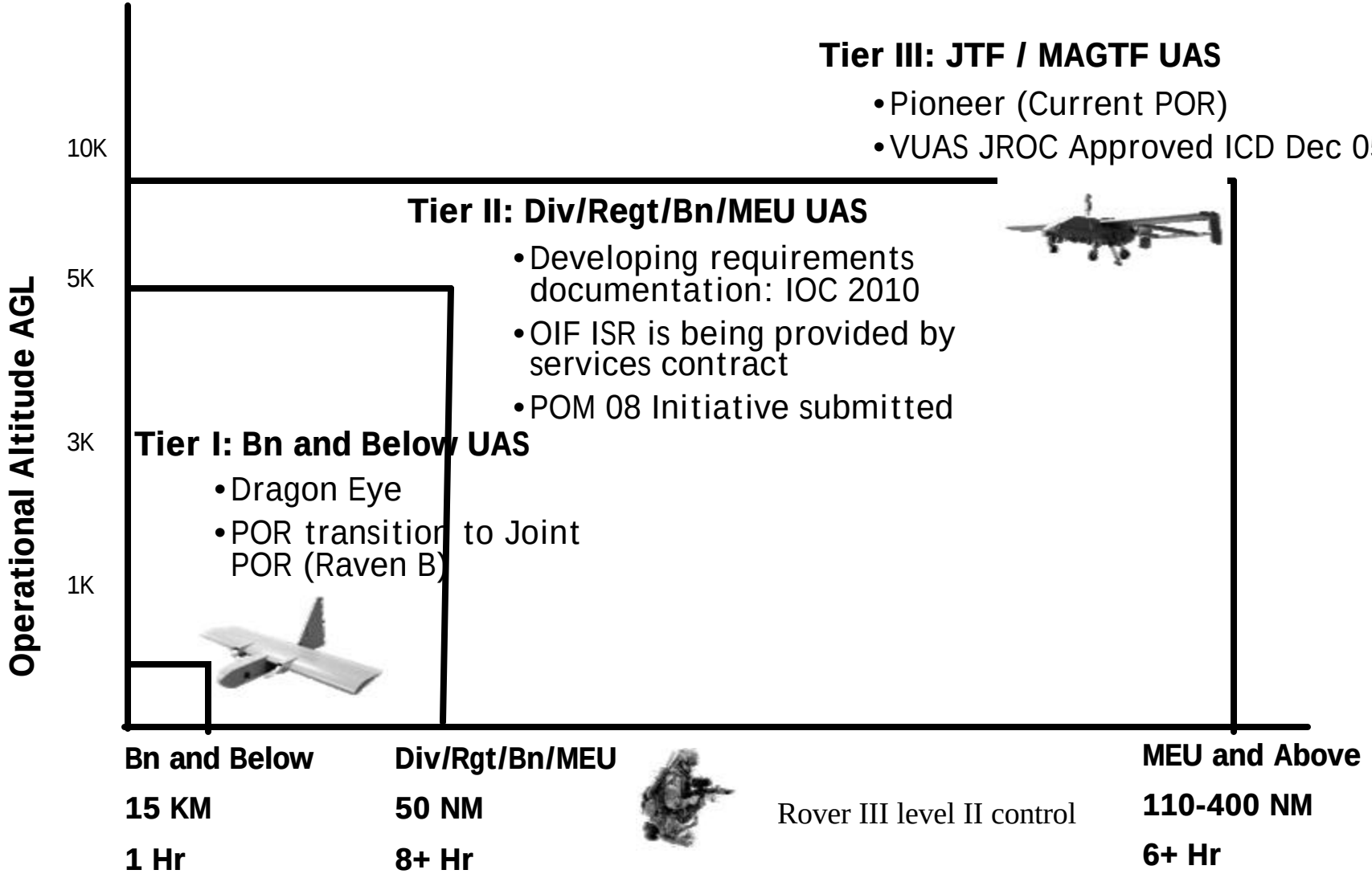
Last to Leave Theater

…on the fringe of interoperability

Naval UAS Family of Systems



USMC Three-Tier UAS Strategy



UAS Efforts

- Tier-I
  - Dragon Eye
  - Raven-B
- Tier-II
- Tier-III
  - Pioneer
  - VUAS
- RVT
  - ROVER

Tier-II

- ISR Services
- MCWL Concept Demonstrator
- ISR Services Competition



Workhorse







Focus, Shift, Align

- MCSC & PEO(W) MOA
  - MDA
  - ERB
- ASN-RDA Memorandum
  - GWOT
  - USMC Support
  - Program Migration
  - TIER-II Program of record

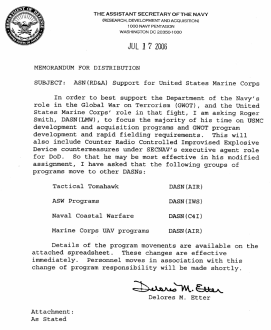












THE ASSISTANT SECRETARY OF THE NAVY
(RESEARCH, DEVELOPMENT AND ACQUISITION)
1000 NAVY PENTAGON
WASHINGTON DC 20350-1000

JUL 17 2006

MEMORANDUM FOR DISTRIBUTION

SUBJECT: ASN(RD&A) Support for United States Marine Corps

In order to best support the Department of the Navy's role in the Global War on Terrorism (GWOT), and the United States Marine Corps' role in that fight, I am asking Roger Smith, DASN(LMW), to focus the majority of his time on USMC development and acquisition programs and GWOT program development and rapid fielding requirements. This will also include Counter Radio Controlled Improvised Explosive Device countermeasures under SECNAV's executive agent role for DoD. So that he may be most effective in his modified assignment, I have asked that the following groups of programs move to other DASNs:

Tactical Tomahawk	DASN(AIR)
ASW Programs	DASN(IWS)
Naval Coastal Warfare	DASN(C4I)
Marine Corps UAV programs	DASN(AIR)

Details of the program movements are available on the attached spreadsheet. These changes are effective immediately. Personnel moves in association with this change of program responsibility will be made shortly.

Delores M. Etter

Attachment:
As Stated

Tier-II POR

- ICD development and leadership: DC CD&I
- Program management: PMA-263
- MDA: PEO(W)
- Resource Sponsor: N-86

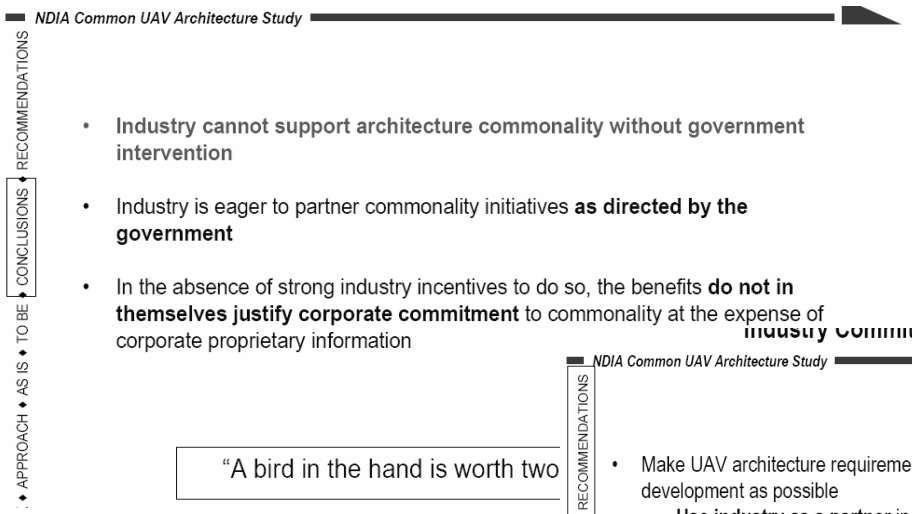
NDIA Study

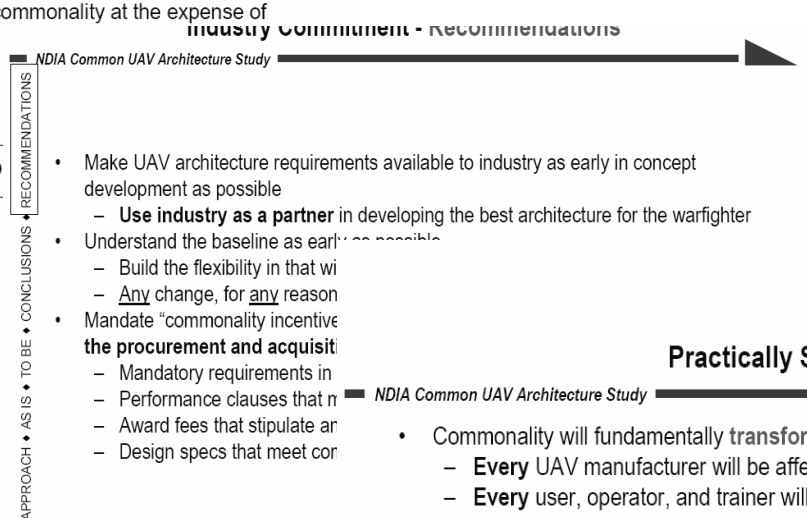
1. UAV stovepipes…biggest barrier
2. …no one in Industry moving toward architecture commonality
3. …compliance with [standards] is not being mandated
4. Organizational resistance to change is easily the most intractable obstacle
5. The group recommended that the Defense Department designate a single office to be in charge of mandating commonality within the UAV programs, as well as the budget authority to enforce standards

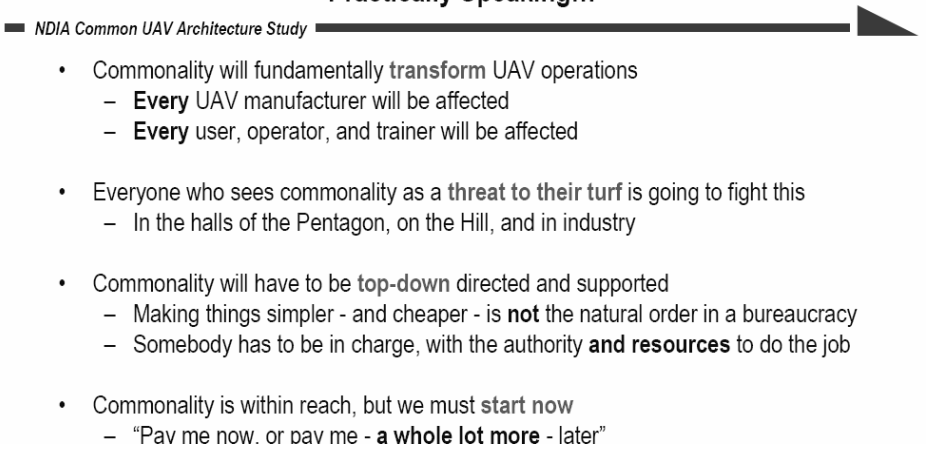
NDIA Study (con't)

6. A top level architecture can be common, but must fit within a concept of operations.
7. …UAV concepts of operations are inconsistent in their approach to C2 interfaces
8. …A similar problem exists to the data that UAVs collect and disseminate

…man in the mirror







Impediments to interoperability

- UUNS & Proprietary data
- Selective Interpretation & Selective Implementation
- Acquisition system Vs Technology refresh vs Operational context

The Six Phases of Every Project

1. Enthusiasm
2. Disillusionment
3. Panic
4. Search for the Guilty
5. Punishment of the Innocent
6. Praise and Honors for the Non-Participants

Lexicon

- Interoperability Vs.
  - Interdependence
  - Commonality
  - Compatibility
  - Integrated



- Standard definitions
  - TIERS
  - Elements
  - Enablers
  - CLASS
  - C2
  - Architecture
  - Standards
  - Interfaces

Types of Interoperability

- Technical- Standards (STANAG)
- Operational-CONOPS (NOC)
- Programmatic- Design, Structure
- Industrial-Cooperation
- Leadership-Policy “Hammer”
- Emergent-von oech

- D
- O
- T
- E
- M
- I
- L
- P
- F





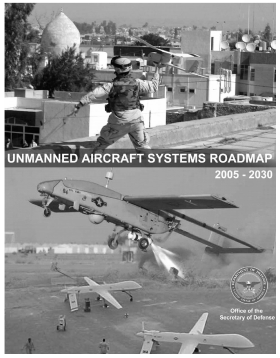
Expanding our Concept of Interoperability

- HP Hospital Monitor
- Lego factory
- iTunes
- FSR



Recipe for success

- Boundaries and constraints
  - Article 142
- Guides and Sherpas
  - JROCM 136-05
    - JCOE
    - JUAS-MRB
- Play Book
  - UAS road map
- Orientation
  - The individual warfighter





THE JOINT STAFF
WASHINGTON, D.C. 20318-0909

JOINT REQUIREMENTS OVERSIGHT COUNCIL

JROCM 136-05
5 July 2005

MEMORANDUM FOR: Vice Chief of Staff, US Army
Vice Chief of Naval Operations
Vice Chief of Staff, US Air Force
Assistant Commandant of the Marine Corps

Subject: Joint Unmanned Aerial Vehicle (UAV) Executive Agent

1. The Joint Requirements consider the issue of Joint UA JROC Memorandum (JROCM) the scope, charter, and requir

2. The JROC agreed to est Joint UAV Center of Excellenc

a. The JCOE shall be estal NV, with a goal of 1 October 2 focus on operational issues, s Specific responsibilities will b document.

b. The JCOE shall be com inter-Service rotational basis. Director. The Army shall pro provide the first deputy.

c. The JCOE shall be man billets, to include the commar creation of the billets.

3. The JROC requested the S Overarching Integrated Proce recommendations:

a. The JOIPT shall addres Specific responsibilities will b

b. The JOIPT shall be cha starting with the OIPT's curre recommendations shall be co

Integration and Development System (JCIDS). Therefore, the JOIPT's 3-star General Officer Steering Council shall be disbanded.

c. The JOIPT shall include representatives of all Services, Joint Staff, US Joint Forces Command, and OSD. Combatant commands will be represented when appropriate.

4. The enclosed diagram represents the intended relationship between the JCOE, the JOIPT, the Services, and the Joint Staff.

a. The JCOE and JOIPT will submit recommendations to the JCIDS via the appropriate Functional Capabilities Board and will serve as JCIDS' coordination source for Service-sponsored UAV submissions.

b. The JCOE and JOIPT will maintain formal liaison with the Services and each other. Formal charters will codify the relationships.

5. The JROC identified the following tasks:

a. Army and Air Force shall name the initial JCOE commander and deputy, respectively.

b. A Joint Site Activation Task Force (SATAF) and initial JCOE leadership shall finalize the JCOE mission, organizational construct, TOR and finalize JCOE reporting chain issues. The Joint Tiger Team shall support these initial actions. JCOE leadership shall report progress to the JROC within 60 days of the signing of this JROCM.

c. The JOIPT shall redraft its charter to reflect its revised mission, membership, and liaisons.

PETER PACE
General, United States Marine Corps

Date: 11 Oct 2005

Charter for the
Joint UAS Materiel Review Board (JUAS MRB)

Mission:
To provide an Unmanned Aircraft Systems (UAS) forum to identify or resolve requirements and corresponding materiel issues, regarding interoperability and commonality, prioritize potential solutions; assess the focus of current and future programs, and to seek strategies common to all services.

Goals:
- The primary goals of the JUAS MRB are:
- To facilitate the Joint Capabilities Integration Development System (JCIDS) process by coordinating with and making recommendations to the appropriate Functional Capabilities Board(s), Joint Capability Board and Joint Requirements Oversight Council (JROC).
- To improve commonality of payloads and ground control stations.
- To improve interoperability through adoption of common standards.
- To improve data dissemination through adoption of a common communication architecture.
- To provide a corporate body of knowledge composed of subject matter experts from all services and relevant defense agencies to facilitate the JCIDS process.

Objectives:
Standing objectives for the JUAS MRB are:
- Facilitate Service-level coordination of UAS capabilities and potential future systems.
- Identify, resolve, and/or mitigate materiel issues at the earliest opportunity in the JCIDS process.
- Coordinate Government and industry UAS issues.
- Coordinate UAS materiel initiatives with the Science & Technology Community.

Tasks:
Supporting tasks for the JUAS MRB include, but are not limited to:
- Bring Member's issues to the forum for discussion, action, and resolution.
- Rotate O-7 service lead chairmanship at 18-month intervals.
- Develop a Plan Action and Milestones (POA&M).
- Provide DoD-wide knowledge of current status of all UAS systems to the Capabilities Boards.
- Coordinate with the JUAS Center of Excellence (JCOE).
- Establish Working Groups to support JUAS MRB goals.
- Topics for the Working Groups will be decided by the JUAS MRB.
- Representation to the Working Groups will be based on the task it is intended to accomplish and may require representation from the requirements, acquisition, training, and test communities.

Organization	Name/Rank	Contact Info
Chair	Majgen William Catto	william.catto@ c.navy.mil; 703-432-1460
Core Voting Members		
USA	COL John Burke	John.burke1@us.army.mil 703-614-0871
USMC	Col Clarke Lethin	Clarke.lethin@usmc.mil 703-784-5733
USN	CAPT Steven Wright	steven.w.wright1@navy.mil; 703-614-2644
USAF	Col Robert Martin	robert.martin1@pentagon.af.mil 703-695-6241
Joint Staff	LT COL P. Mestadoras	peter.mestadoras@js.pentagon.mil; 703-614-6458
OSD	Mr. Dyke Weatherington Col Steven Crandall	dyke.weatherington@osd.mil; 703-695-8188 steven.Crandall@osd.mil 703-604-0421
JFCOM	LTC Stuart Morse	Stuart.Morse@jfcom.mil; 757-836-5766
SOCOM	Lt Col Randy Curtis	curtisr@socom.mil; 813-826-2210
STRATCOM	Mr. Bob Johanson	Robert.Johanson@js.pentagon.mil; 703-692-9702
Representatives		
JUAV COE	Col Larry Felder	larry.felder@usfk.af.mil; 703-453-8529
Coalition	As Required	

Meeting Frequency:
The designated lead will host meetings approximately four to six weeks and may call unscheduled sessions, as required. Meeting will be held at a time and location determine by the chairman.

Effective Date and Duration: Charter becomes effective upon date of ratification by the last signatory. The need for this body will be re-evaluated and ratified every 18 months, during the change in lead service.

: Chief of Naval Operations
: Chief of Staff, US Air Force
istant Commandant of the Marine Corps

Aircraft System Materiel Review Board

nts Oversight Council (JROC) approved the charter
:raft System Materiel Review Board. The JROC
unned Aircraft System Materiel Review Board to
ion with the Joint Unmanned Aircraft System
tters of unmanned aircraft system commonality and

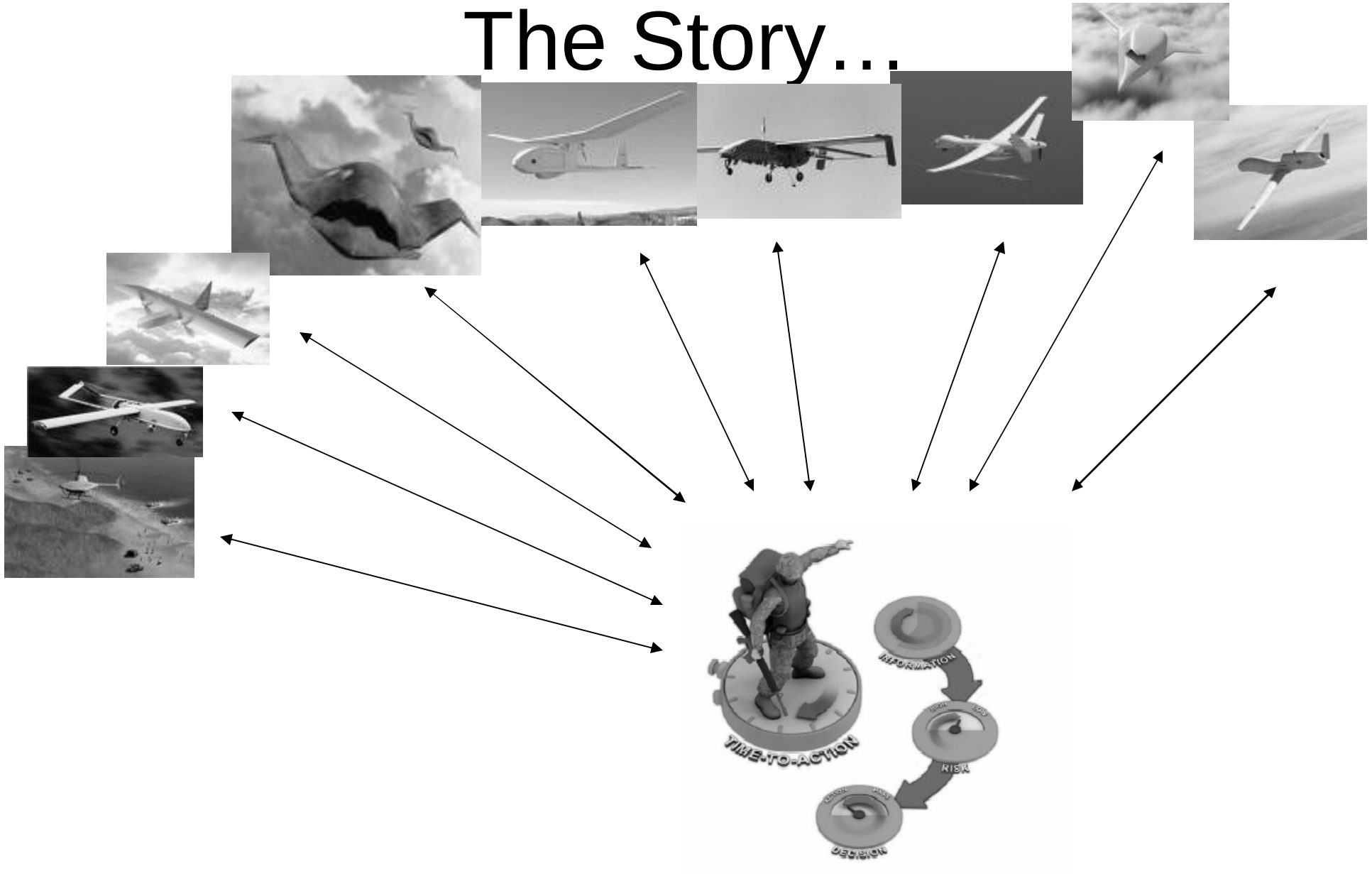
E. P. GIAMBASTIANI
Admiral, US Navy
Vice Chairman
of the Joint Chiefs of Staff

Copy to:
Commanding General, Marine Corps Systems Command
Commander, Joint Unmanned Aircraft System Center of Excellence

MRB Study Tasking

- Research Standards Related to UAS Data Flow
  - Data Link/Comms
  - Sensor Data/FMV
- Conduct Case Studies
  - Representative Set of UAS
- Perform Analysis
  - Data Flow Assessment / Standards Compliance/Value/Risk
- Make Recommendations
  - Standards-related interoperability improvements

The Story…



Interoperability

- Technology makes it possible

- Warriors make it happen

People targets

- DC CD&I, LtCol Jay Mullin 703-784-6604
- N-88, LtCol Ralph McCReary (703) 614-2639
- HQMC, Major “Muddy” Kerr 703-693-2525
- MCSC, Major George Ehlers 703-432-4041 & Mr. Larry Bochenek 703-432-4031
- PMA-263, Major Ben Stinson 301-757-5866



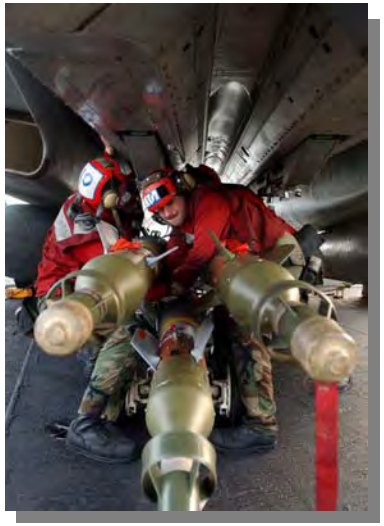


11th Annual NDIA Expeditionary Warfare Conference

Rear Admiral William Landay III

October 23, 2006

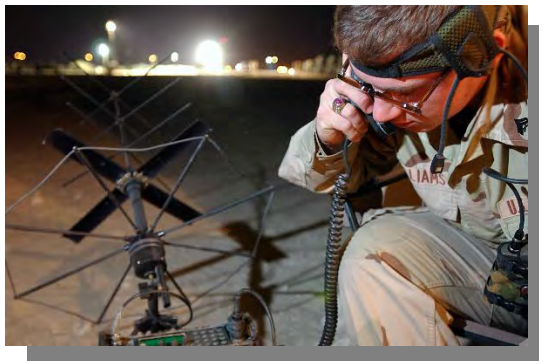
Technological Dominance



Laser-Guided Munitions

Today, Marines and Sailors have at their disposal the world's most sophisticated military technology





Mobile Communications



GPS Navigation and Targeting



Network-Centricity, Information Warfare, and Intelligence

Technological "Democratization"



Internet—Information Warfare and Intelligence

In the global war on terror and in Iraq, our adversaries are leveraging sophisticated technology that is now easily available anywhere in the world—and at a modest cost.





Cell Phones—Mobile Comms



Commercial Laser Rangefinder—Precise Targeting



Handheld GPS—Location with Extreme Accuracy

A Technological "Perfect Storm"?

For decades, Western militaries have held a decisive technological advantage…



"It is by devising new weapons, and above all by scientific leadership, that we shall best cope with the enemy's superior strength."

--Winston Churchill

Today, enemies are able to acquire weapons and technology quickly and cheaply…



"Acquiring weapons for the defense of Muslims is a religious duty. If I have indeed acquired these weapons, then I thank God for enabling me to do so. And if I seek to acquire these weapons, I am carrying out a duty. It would be a sin for Muslims not to try to possess the weapons that would prevent the infidels from inflicting harm on Muslims."

--Osama bin Laden

And there also are adversaries willing to invest significantly in new technology

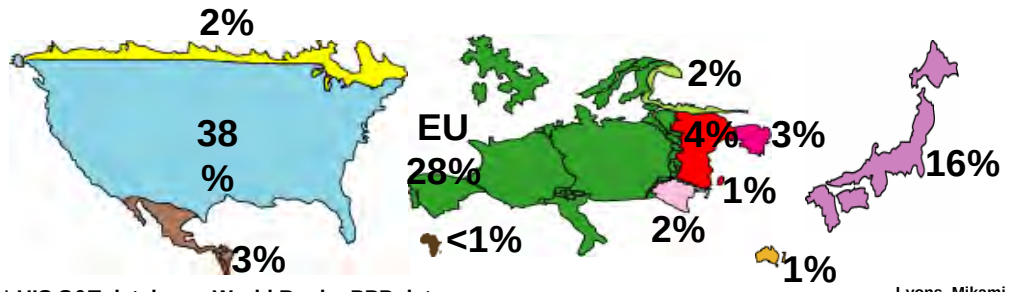


The 21st Century is also going to be an age of scientific change, with certain cutting-edge technologies likely to be applied to naval warfare...high-tech arms will make direct attacks on naval battlefields possible from outer space, remote altitudes and remote land bases...superconduction technology will bring superconductor ships to the naval order of battle, enabling ships to travel faster without noise...submarines will be able to go faster and deeper, with the seabed being the ideal place to build military bases."

--Chinese Naval Officers at the Navy Research Institute in Beijing

World Science and Technology Investment

1996*



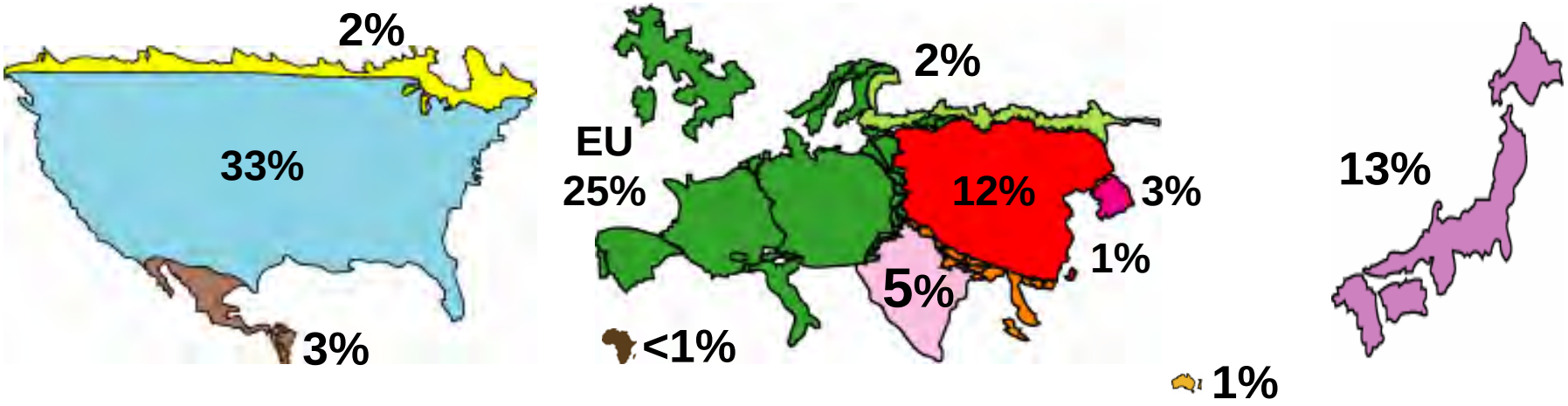
Asia Share
1996: 26%
2004: 35%

* UIS S&T database; World Bank - PPP data

Lyons, Mikami 2005, AOARD

+78%

2004**

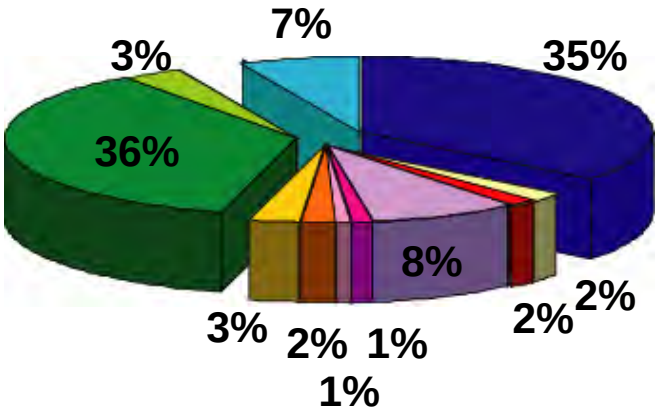


Lyons, Mikami 2006, AOARD

** OECD 2005 PPP; Global S&T Report (Batelle) - PPP data

World Science and Technology Publications

1996



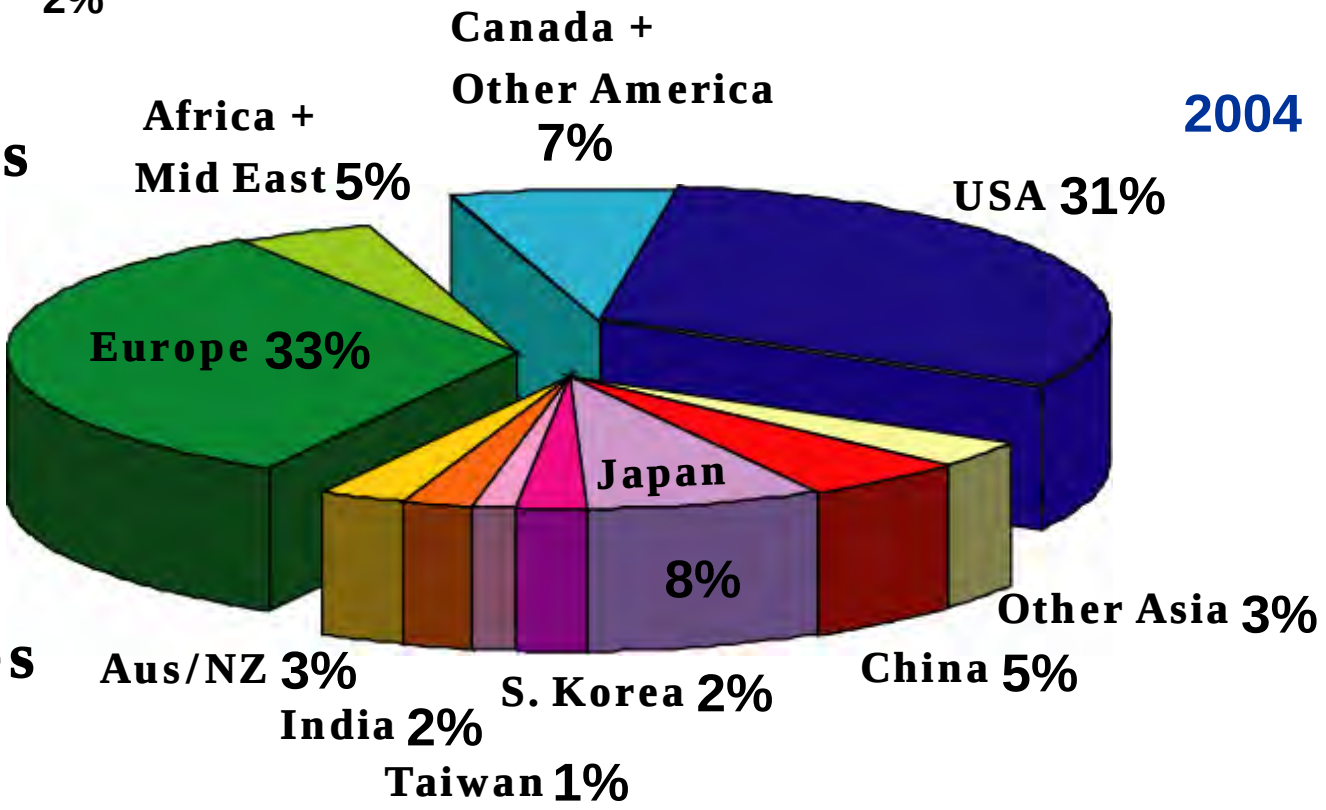
851,764 articles

Asia Share
1996: 19%
2004: 24%

+28%

1,094,017 articles

2004

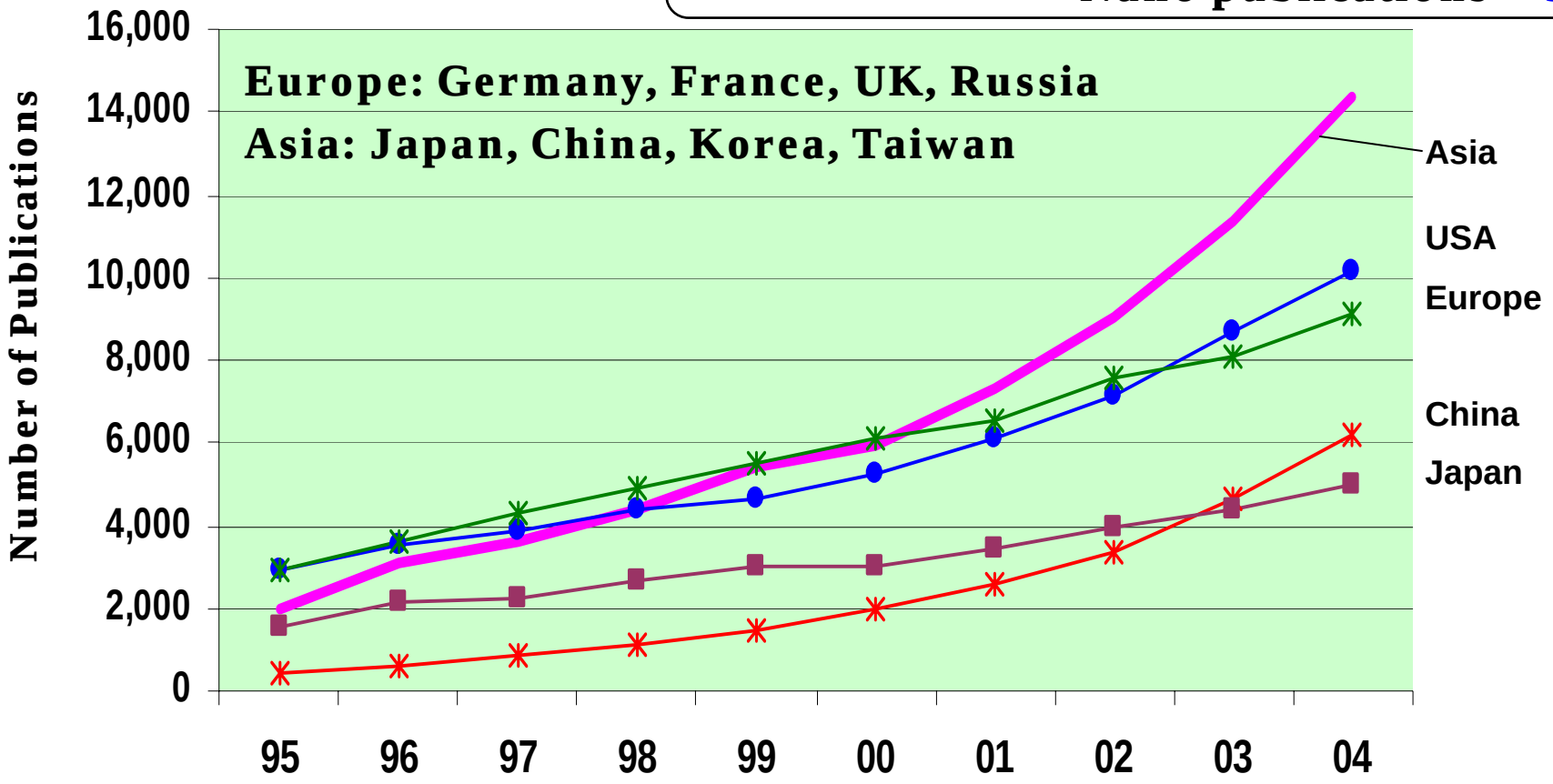


* Data from Science Citation Index, Web of Science, Thomson Scientific; November 2005 (Lyons, Wegener, Hubbard)

Nanotechnology Publications (1995-2004*)

N-E Asia Share: Overall publication = 16%

Nano publications = 38%



Japan: MEMS, materials & electronics, CNTs, quantum dots/wires, photocatalysis

U.S.: biomaterials, drug design, environmental catalysis, quantum computing

* Data from Science Citation Index, Web of Science, Thomson Scientific; November 2005 (Lyons, Wegener, Hubbard)

"Tech Transfer"

What are the key discriminators of U.S. technology?

- Fast movers
- Innovative
- Leading-edge scientists
- Flexible
- Focused on quality

What are the top U.S. technology companies?

HP, IBM, GE, Microsoft, Dell, and Google?

We see these companies operating today in India, China, Russia, and elsewhere in the "developing" world…







A Swiftly Changing Planet



• In an era of increasing globalization, new technology is more readily available—and more quickly—than ever before

• The natures of "combatant" and "weapon" are changing, and new challenges can come from anywhere in the world

• We must accept the fact that adversaries will use our technology against us

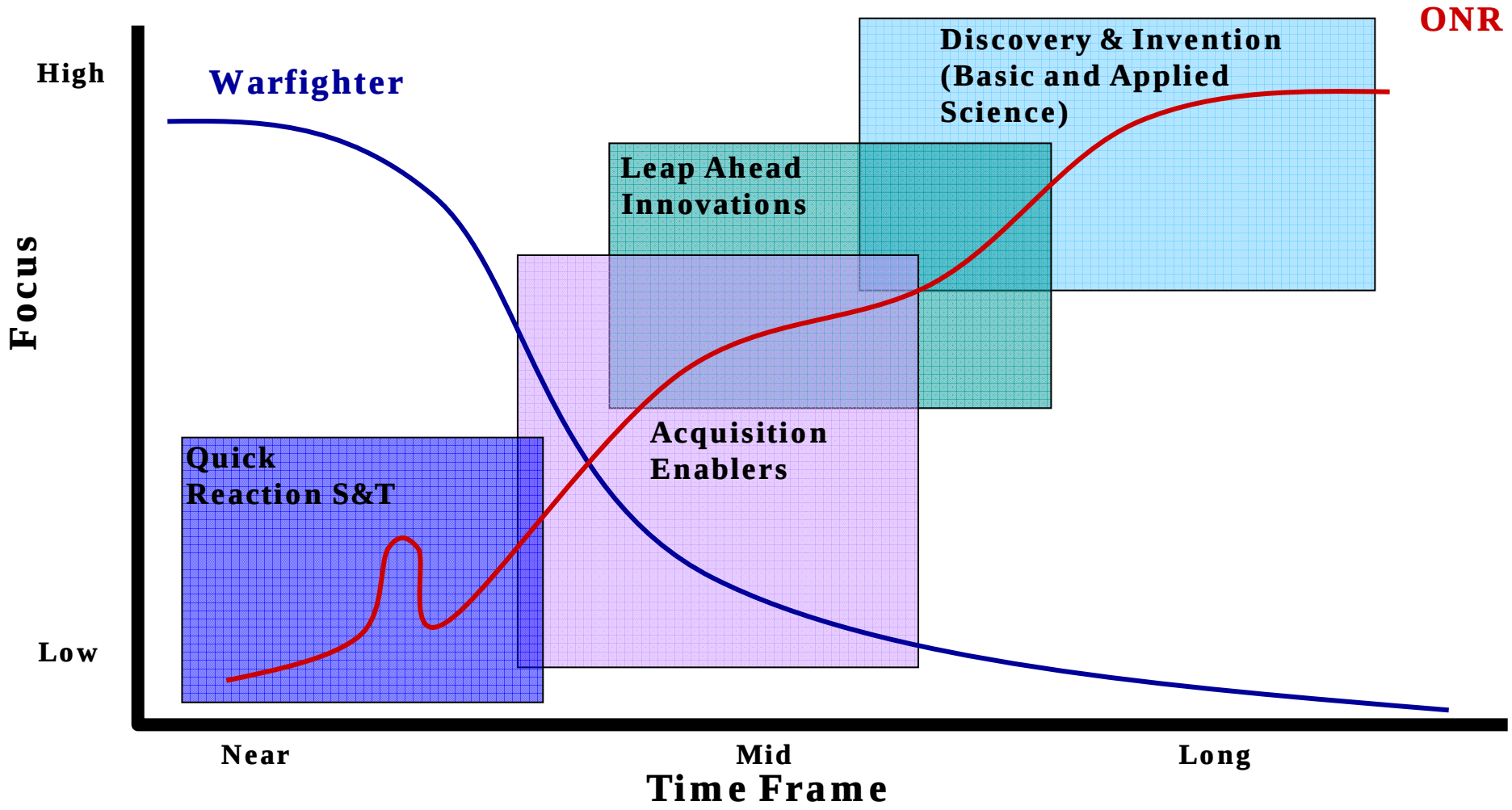
• To stay competitive on tomorrow's battlefields, we must:

- **Ensure** our people and research enterprises are more innovative

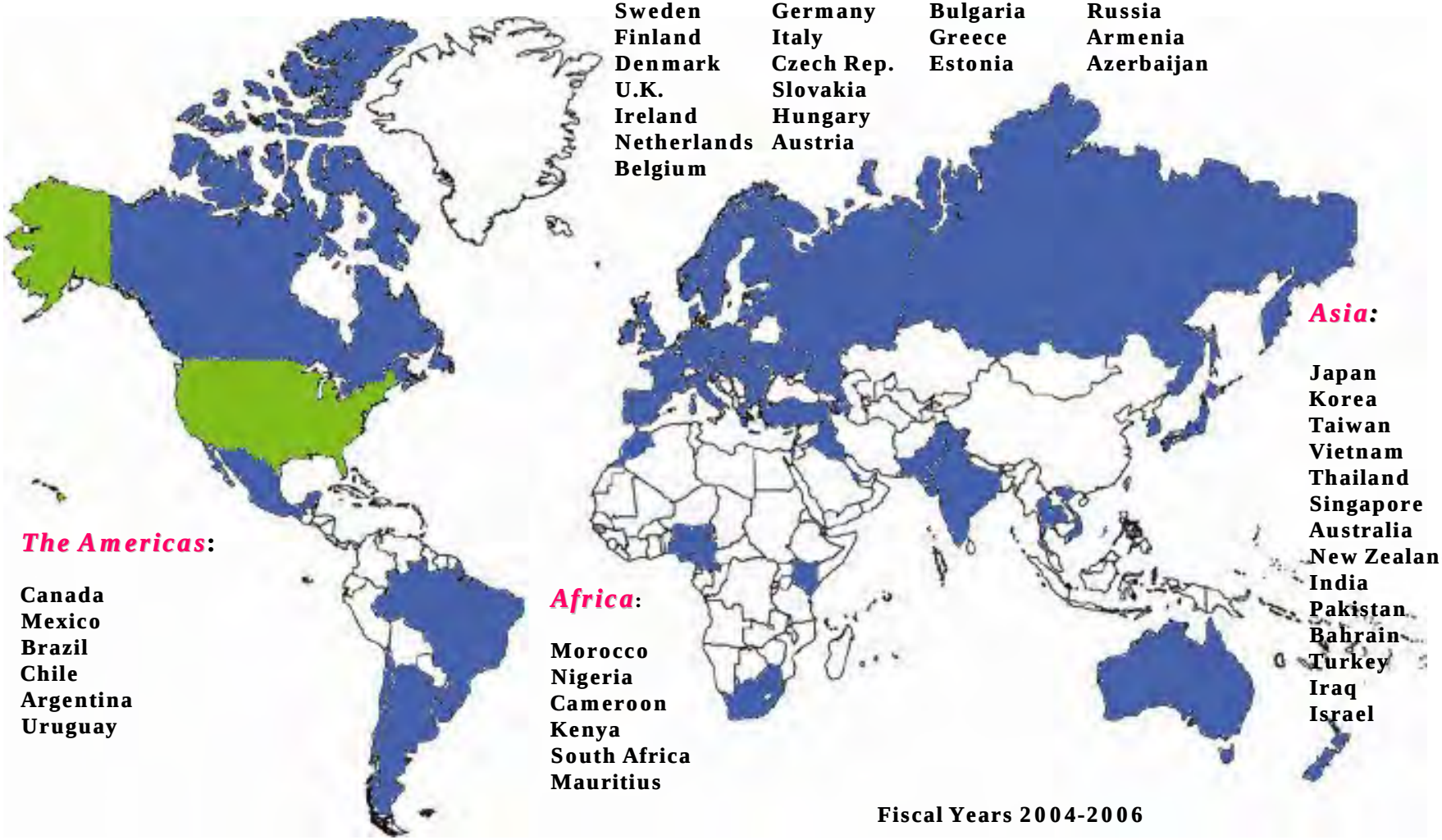
- **Maintain** our technological advantage



S&T Focus to Meet Naval Needs



ONR's International Engagement



***Europe*:**

Norway
Sweden
Finland
Denmark
U.K.
Ireland
Netherlands
Belgium
France
Spain
Portugal
Germany
Italy
Czech Rep.
Slovakia
Hungary
Austria
Slovenia
Poland
Romania
Bulgaria
Greece
Estonia
Latvia
Lithuania
Ukraine
Russia
Armenia
Azerbaijan

***The Americas*:**

Canada
Mexico
Brazil
Chile
Argentina
Uruguay

***Africa*:**

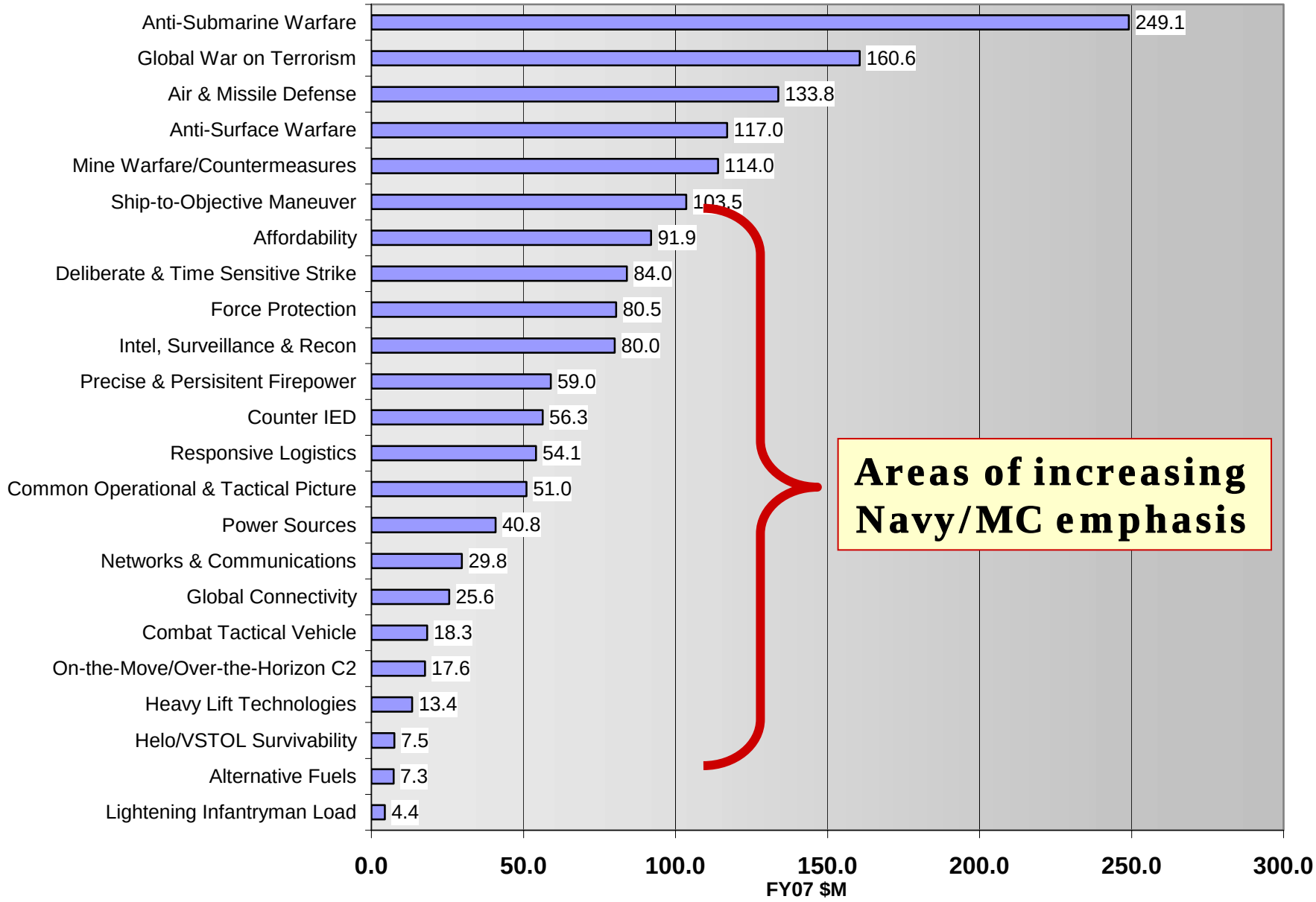
Morocco
Nigeria
Cameroon
Kenya
South Africa
Mauritius

***Asia*:**

Japan
Korea
Taiwan
Vietnam
Thailand
Singapore
Australia
New Zealand
India
Pakistan
Bahrain
Turkey
Iraq
Israel

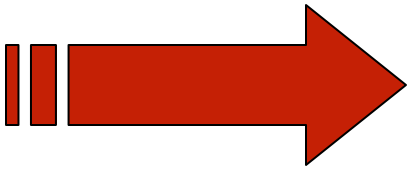
Fiscal Years 2004-2006

Science and Technology Investment by Current Capability Area



Resulting Focus Areas

Naval S&T Focus Areas
Maritime Domain Awareness
Information, Analysis & Communication
Operational Environments
Asymmetric & Irregular Warfare
Distributed Operations
Assure Access & Hold at Risk
Power Projection
Survivability & Self-Defense
Naval Warrior Performance & Protection
Platform Mobility
Fleet/Force Sustainment
Affordability, Maintainability, & Reliability
Power & Energy



Operational Concepts & Missions

Warfighting & Support Functions

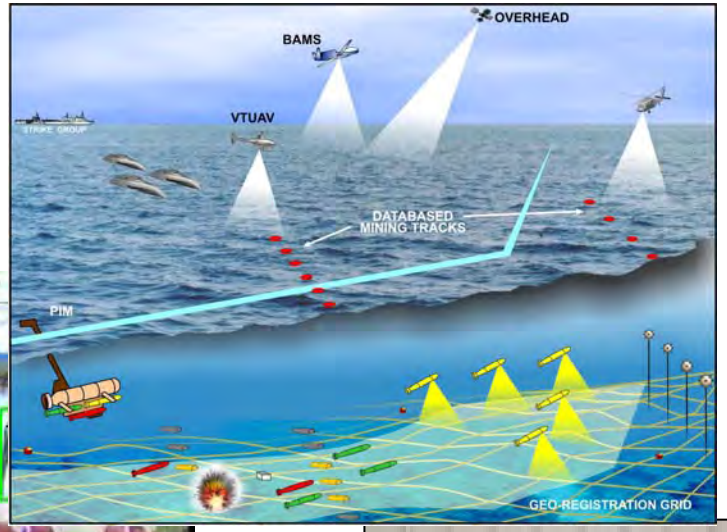
- **Functions that S&T would enable or enhance**
- **Include accepted and projected future functions**

ONR Technology for the Expeditionary Warfighter

Joint Light Tactical Vehicle: A family of survivable combat vehicles



Mine Warfare







Visual Understanding Research





SpeechGear: Bi-directional Free Speech Language Translation

QuadGuard: Arm and leg protection to protect against blast injuries

Video Understanding Research



ONR Technology for Expeditionary Warfighter Improvement



Dietary Performance Enhancement



VirtuSphere







Conclusions

- Rapidly changing global technology is creating challenges—as well as opportunities—for today's expeditionary warfighter
- ONR is flexible enough to solve today's critical challenges while focusing on tomorrow and the Navy and Marine Corps after Next
- Committed to maintaining our warfighter's superiority to ensure victory on today's as well as tomorrow's battlefields...



Questions?

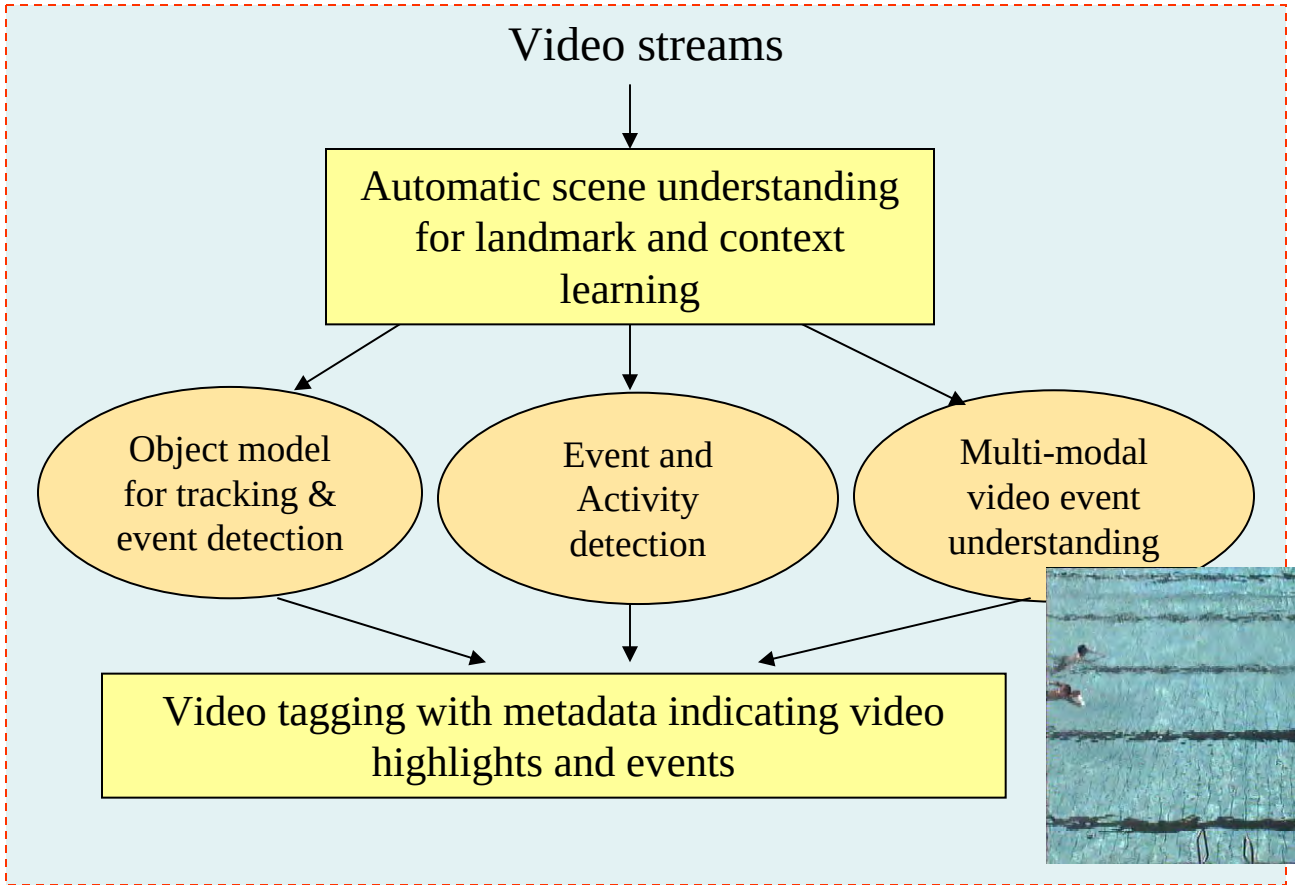


WWW.ONR.NAVY.MIL

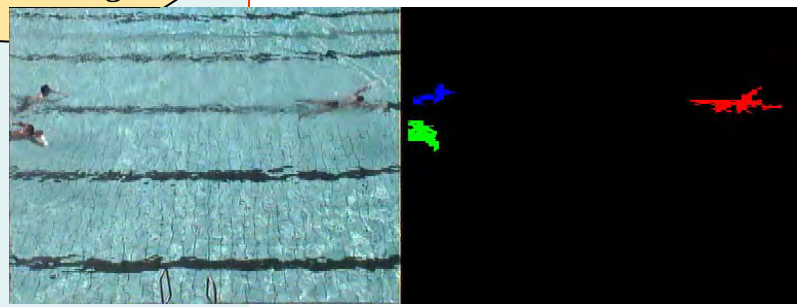
BACK UP

Visual Understanding Research

To develop video understanding technology for real time event detection and easy access of the massive video content by semantic scene understanding, video categorization and concept detection

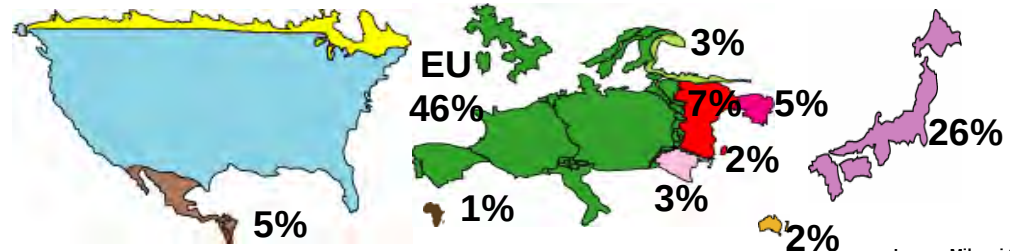






Non-North American S&T Investment

Normalized without US and Canada

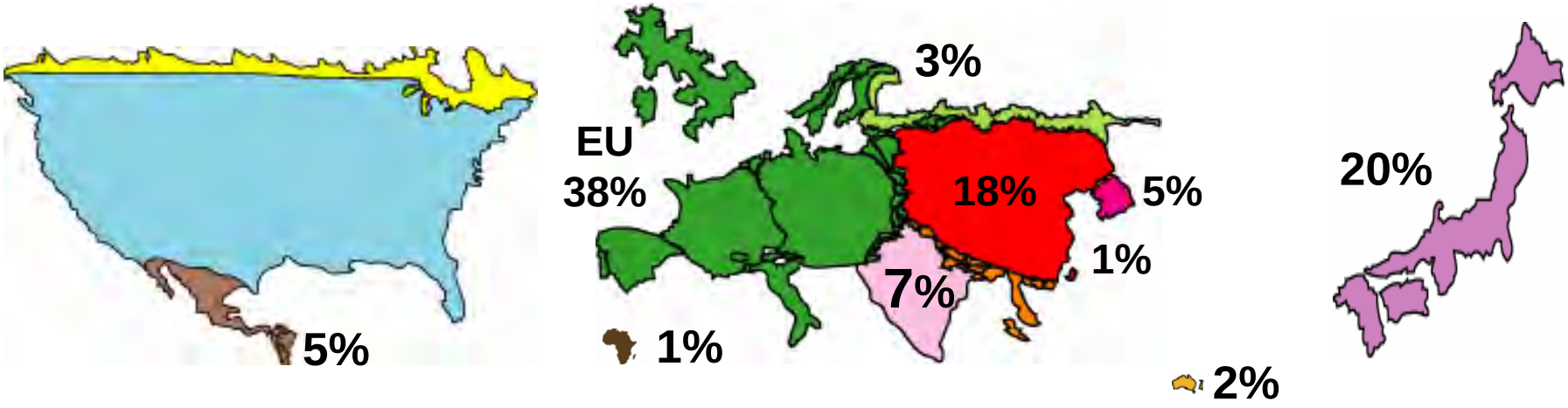


Asia Share
1996: 45%
2004: 53%

* UIS S&T database; World Bank - PPP data

Lyons, Mikami 2005, AOARD

+78%



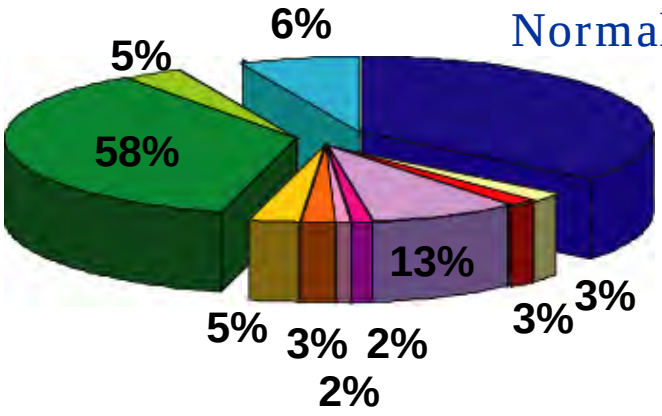
(1996* to 2004)**

** OECD 2005 PPP; Global S&T Report (Batelle) - PPP data

Non-US S+T Publications

(1996 to 2004*)

Normalized without US and Canada

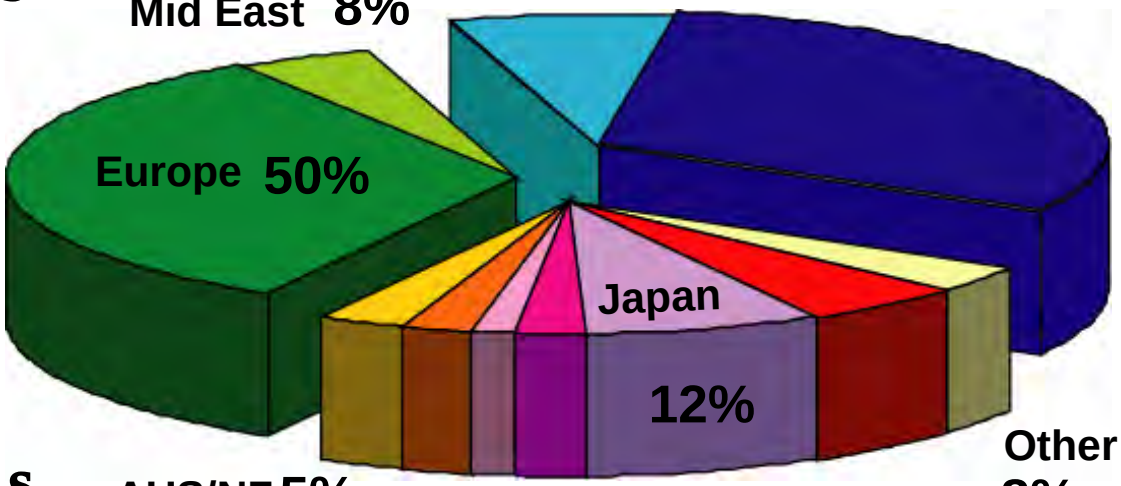


Asia Share
1996: 31%
2004: 36%

851,764 articles

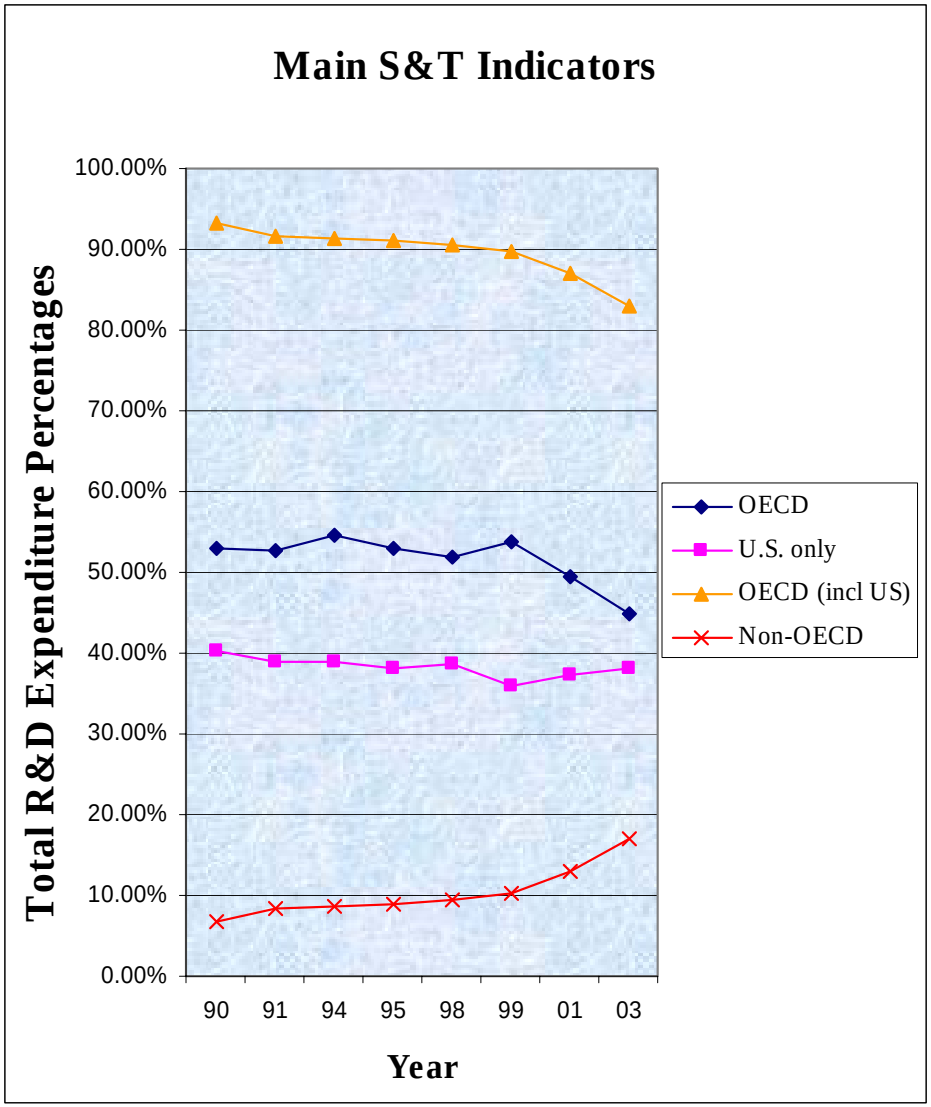
+28%

1,094,017 articles



* Data from Science Citation Index, Web of Science, Thomson Scientific; November 2005 (Lyons, Wegener, Hubbard)

Global R&D Funding



The developing world is making an increasingly significant contribution to the total global investment in R&D

Joint Light Tactical Vehicle

Trades, Concepts, Technology Demonstrator:
Conduct trade studies, design, build & test a combat science and technology demonstrator platform. Leverage simulation-based design tools.

Superior Mobility/Performance:

State of the art drive train & suspension technologies. Leverage hybrid electric systems from the RST-V, ECASS, and private sector.

Advanced Armor Design:

Leverage Army Research Lab ceramic composite and EM armor designs for medium vehicles.



Crew station:

Expand on lessons learned from ULTRA to design superior ergonomics, safety and "fightability" of platform.

Integrate Active RPG Defense:

Incorporate evolved active net system from current effort.

Advanced Automotive Safety:

Best available safety features to reduce roll-over, collisions and from AugCog platform (autonomous obstacle avoidance system, optical lane sensing, computer stability control).

Integrated Combat Systems:

A "plug & play" ready vehicle that can be quickly adapted to a variety of missions. Power, hard points and crew stations compatible with remote weapons and sensor systems. Leverage Gunslinger and AugCog programs.

Mine/ IED Survivability:

Cab floor and crew seats designed to mitigate shock loading from mines & IEDs.

Automated Object Recognition



SpeechGear: Bi-directional Free Speech Language Translation

Description

A hand held rugged device to allow dismounted troops to translate bi-directionally from Arabic to English and back

Benefits

- Uses commercial/government off-the-shelf equipment

- Lessens the need for trained translators in field

- Allows for translation of written, visual & spoken language

- Greater than 90% accuracy for in-field translation of free speech







QuadGuard: Arm and Leg Protection to Reduce Blast Injuries

Design philosophy

- Optimizes protection, mobility, weight and comfort
  - Protection against blast fragments and small arms
  - Designed to reduce likelihood of severe injuries
  - NIJ Level IIA protection (NIJ Level II option also available)

Design features

- Protection zones based on anatomical vulnerability
- Flexible joints for mobility
- Vented for comfort
- Integrates with Interceptor vest system
- Arm guard weights
  - 1.6 lbs per arm
- Leg guard weights (including suspenders)
  - 3.1 lbs per leg - open vented design
  - 3.5 lbs per leg - closed vented design
- Volume production cost less than $1000 per set

Program team

- Funding
  - Office of Naval Research "Tech Solutions" Program
- Design and production
  - Naval Research Laboratory
  - Army Research Laboratory
  - FS Technology
  - Oklahoma State University











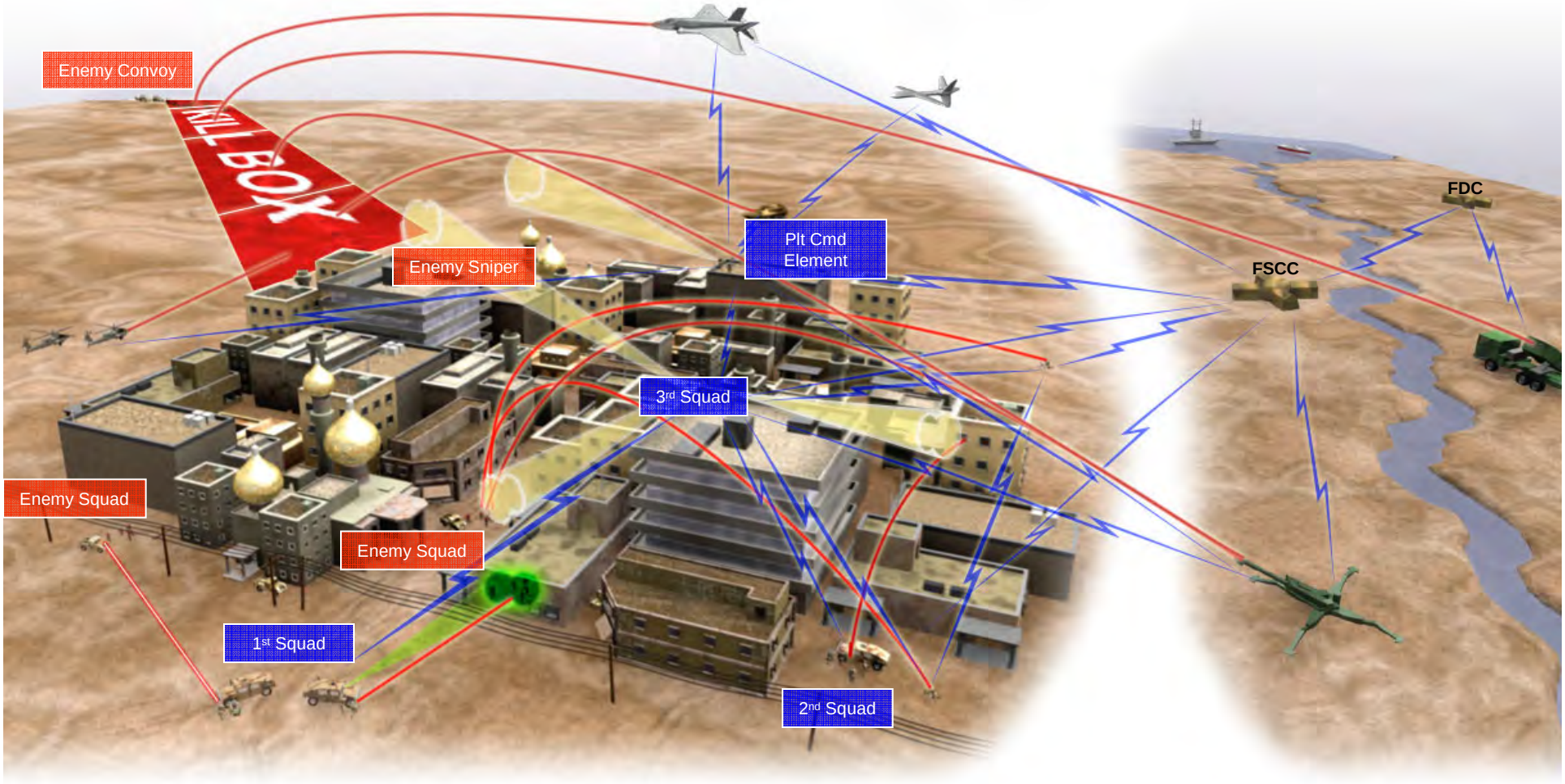
FST ARL OSU

Distributed Operations

DO Tenets

- Enhanced Fires Against Larger Forces
- Increased Unit Separation
- Small Unit Control of Integrated Fires
- Effective in Unique Battlefield Geometries
- Reduced Weight

Simultaneous Distributed Ops



DO Operational Environment

ONR Technology for Expeditionary Warfighter Improvement



Computer Training
Testing Combat Decision-Making Skills



VirtuSphere

Blue Screen Simulator
Virtual Reality Training for the Aviator





Dietary Performance Enhancement





Fatigue and Stress Management

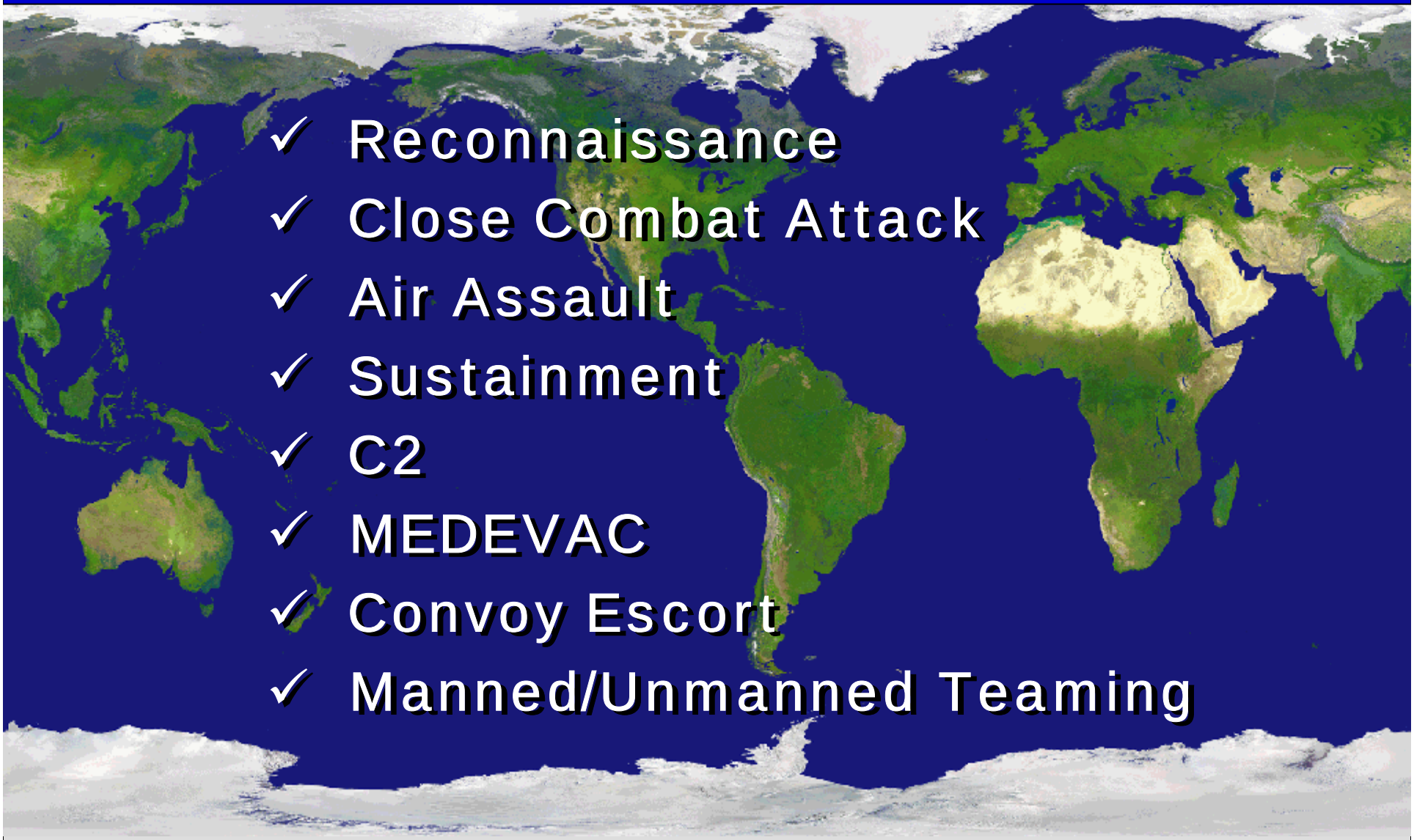
Aviation Update



MG Virgil L. Packett II
Commanding General
U.S. Army Aviation Warfighting Center


Agenda
• Core Missions
• Operational Tempo
• Bridging Strategies
➢ Simulations
➢ Unmanned Aircraft Systems
Army Aviation
Above the Best!

Continuing to Execute Our Core Missions



- ✓ Reconnaissance
- ✓ Close Combat Attack
- ✓ Air Assault
- ✓ Sustainment
- ✓ C2
- ✓ MEDEVAC
- ✓ Convoy Escort
- ✓ Manned/Unmanned Teaming

Joint/Combined Battlespace

Army Fleet in OEF

162,000+ Total Hours:
Feb 03 – Oct 06

AH-64 (24)

53,930 Hours
MC: 83%
OPTEMPO: 54.0

(50) UH-60

45,808 Hours
MC: 83%
OPTEMPO: 54.0

CH-47 (28)

44,911 Hours
MC: 72%
OPTEMPO: 52.3

(4) Fixed Wing

9,844 Hours
MC: 77%
OPTEMPO: 50.4

UAS (7 Raven – 1 Shadow)

1,107 Hours

*(0) OH-58**

3,413 Hours
MC: 83%
OPTEMPO: 48.3



*No OH-58 units in this rotation

High OPTEMPO and Modular Application

Units not reported this month:
UAS Ravens

Army Fleet in OIF

1.2 Million Total Hours:
Feb 03 – Oct 06



AH-64 (144)
238,793 Hours
MC: 84%
OPTEMPO: 39.0

(316) UH-60
396,359 Hours
MC: 87%
OPTEMPO: 48.4

CH-47 (38)
62,434 Hours
MC: 76%
OPTEMPO: 43.0

(28) Fixed Wing
63,641 Hours
MC: 89%
OPTEMPO: 49.4

OH-58 (60)
222,709 Hours
MC: 83%
OPTEMPO: 65.8

(216) UAS

(15) Shadow	102,440 hrs
(1) Hunter	15,580 hrs
(1) I-GNAT	11,820 hrs
(199) Raven	21,275 hrs
	151,115 Hours

High OPTEMPO and Modular Application

Units not reported this month: OH-58

Bridging Simulations









Aviation Warfighting Simulation Center

Aviation Training Exercise (ATX)

- Conducted 42 since 1997
- Seven (7) scheduled this FY
- 36th CAB Vignette



Simulations – More than it appears

Bridging
Unmanned Aircraft Systems (UAS)



- ✓ Training Mission
- ✓ UAS Center of Excellence
- ✓ New Systems/Skill Sets
- ✓ Integrating Aviation Discipline

Untapped Potential



Aviation Update



MG Virgil L. Packett II
Commanding General
U.S. Army Aviation Warfighting Center

Aviation Update--PCB



1



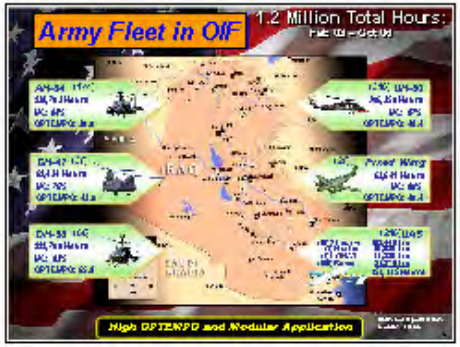
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8

Navy Expeditionary Combat Command

CAPT John Sturges
Commander Naval Coastal Warfare Group ONE
25 October 2006

NECC Value

- *Properly align:*
  - *Title 10 functions*
  - *Warfighting C2*
  - *Resource management*
- *Realigns current disparate force structure*
- *Creates process for irregular warfare development*
- *Capitalizes on synergies of current expeditionary force*
- *Integrates man, train, and equip functions of distributed expeditionary warfare capabilities*
- *Optimizes adaptive force packaging and force closure time*

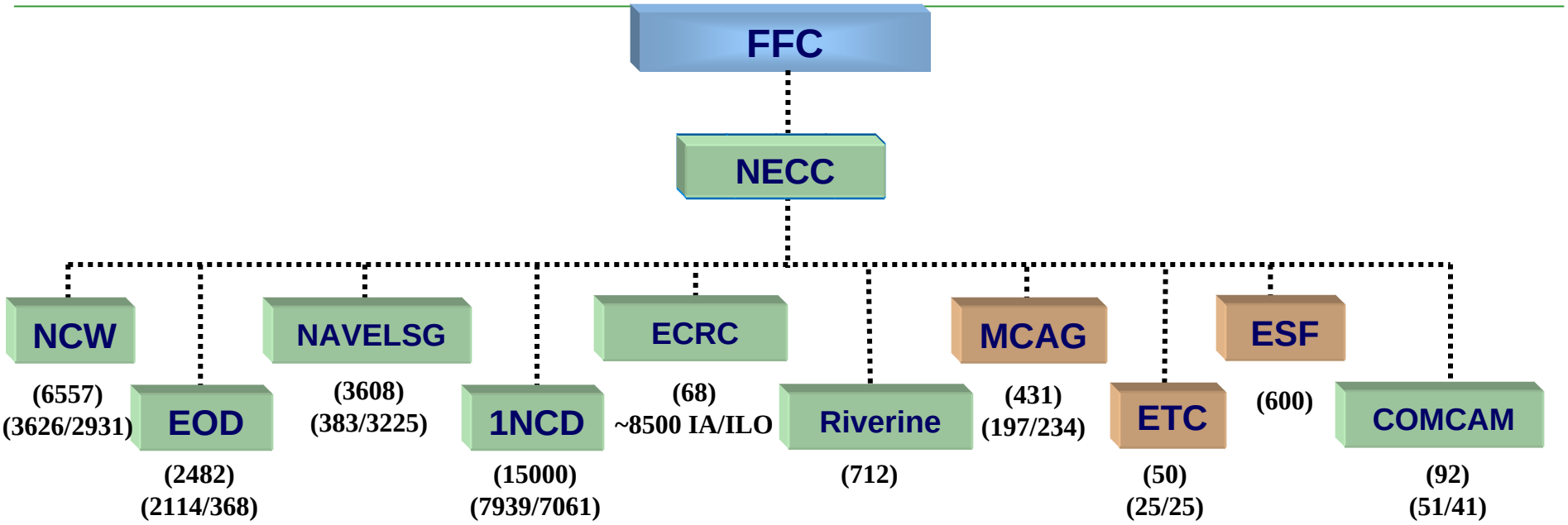
Enterprise Approach to Expeditionary Warfighter Readiness

Navy Expeditionary Combat Command

Vision

- *Prepare ready task organized combat support and combat service support force packages;*
- *Aligned to be effective, flexible, and responsive to COCOM demands;*
- *Ensuring expeditionary forces have sufficient capability and capacity to meet requirements for Major Combat Operations, the Global War on Terrorism and Home Land Defense; while*
- *Maintaining a solid foundation of core capabilities that can respond rapidly to evolving irregular warfare missions*

NECC Forces



Naval Coastal Warfare (NCW)

Explosive Ordnance Disposal (EOD)

- Weapon Exploitation (incl' IED & WMD)

Navy Expeditionary Logistics Support Group (NAVELSG)

FIRST Naval Construction Division(1NCD)

Current capabilities

Future capabilities

Expeditionary Combat Readiness Center (ECRC)

Maritime Civil Affairs Group (MCAG)

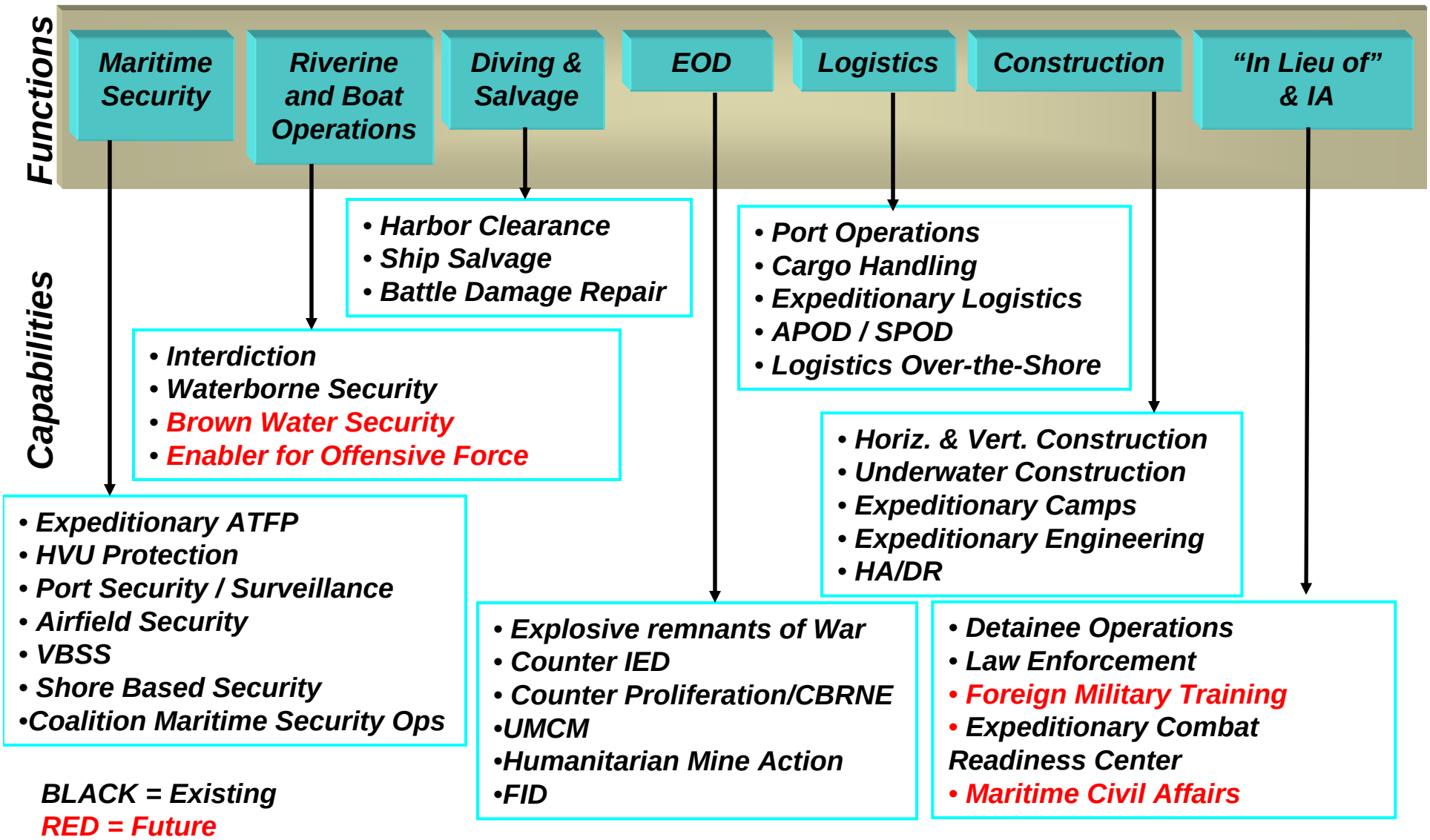
Expeditionary Training Command (ETC)

Expeditionary Security Force (ESF)

- Intelligence
- VBSS

NECC Combat Camera Det LANT (COMCAM)

Maritime Functions and Capabilities



NECC Battlespace

Adaptive, Expeditionary, Rheostat Capacity



NECC Challenges

- *Force Synergy…Operate in Joint/Combined environment*
- *Battlespace Command and Control*
- *Sensors*
- *Weapons…Non Lethal and Lethal*
- *Boats and Vehicles*
- *Countering Evolving Asymmetric Threat*

Questions

BACKUP SLIDES

Naval Coastal Warfare

- *Mission:*
  - *Seaward surveillance and security forces in amphibious objective areas, harbors, anchorages and other militarily significant inshore areas throughout the world.*
  - *C4I support to deployed operational commanders.*
- *Description: 6 RC + 2 AC Squadrons Fielding:*
  - *Naval Coastal Warfare Squadrons w/ embedded C4I Dets and Mobile Ashore Support Terminal C4I suite*
  - *Mobile Inshore Undersea Warfare Units with mobile surveillance and communications equipment*
  - *Inshore Boat Units with high speed craft, armed*
  - *World-wide deployable in response to emergent AT/FP requirements or OPLAN support*
  - *Force packages tailored to minimize footprint and provide specific operational capabilities*







Mobile Security Squadrons

- *Mission:*
  - *Provide light, MOBILE, INPORT SHORT-TERM POINT DEFENSE for US ships, aircraft, and other DoD high value assets (HVA) against terrorist attacks in locations where U.S. shore infrastructure does not exist or requires augmentation.*
  - *CONUS USN installation security augmentation or support for maritime homeland security (HLS) in non-Navy ports.*
  - *World-wide deployable in response to emergent AT/FP requirements or as pre-planned AT/FP measures*











Navy Expeditionary Logistics Support Group

Navy Cargo Handling Battalion

NCHB (1 AC / 10 RC)

- Offload MPS, MSC or commercial ships
- Discharge / load cargo, ammunition, HAZMAT pierside / instream
- Conduct port terminal operations, perform heavy lift crane operations
- Operate limited expeditionary ocean terminal
- Provide short-haul trucking



Navy Air Cargo Handling Battalion

NACHB (1 RC)

- Operate an Air Terminal Operations Center (ATOC)
- Load / offload air cargo, sort, prioritize and prepare documentation, certify HAZMAT for air shipment
- Monitor, report, and manifest passengers

Navy Ordnance Reporting and Handling Battalion

NORHB (1 RC)

- Receive, stage, issue and prepare ordnance for shipment
- Provide inventory management of ordnance via ROLMS



Navy Expeditionary Logistics Support Group

Navy Supply Support Battalion

NSSB (2 RC)

- *Receive, process, store and transship freight*
- *Process and distribute mail both bulk and retail*
- *Operate aircraft and ground support refueling and bulk fuels storage*
- *Provide non-tactical logistics information connectivity*
- *Provide messing / berthing assistance*
- *Provide maintenance of CESE, MHE and GSE*
- *Provide contingency acquisition contracting*
- *Receive, ship and track depot level repairables*



Navy Expeditionary Logistics Response Center

NELRC (1 RC)

- *Provide deployable logistics management cell to support Navy Component Commander*
- *Monitor theater logistics*
- *Coordinate support forces ashore and inter-theater logistics*
- *Support logistics planning and exercises*



FIRST Naval Construction Division



Naval Construction Division / Regiment

NCD (1 integrated AC-RC)

NCR (2 AC / 4 RC)

- *Command and control element*



Naval Mobile Construction Battalion

NMCB (8 AC / 12 RC)



- *Forward Operating Base / camp construction*
- *Defensive positions, tower, bunker, and entry control point construction*
- *Main Supply Route construction and maintenance*
- *Bridge construction*
- *Airfield construction*
- *Ammo supply point construction*
- *Enemy Prisoner of War camp construction*
- *Utilities construction/maintenance (electrical, plumbing, heating, air conditioning)*
- *Water well drilling*
- *Rapid runway/airfield damage repair*
- *Disaster recovery operations*
- *Building construction*







FIRST Naval Construction Division







Construction Battalion Maintenance Unit

- CBMU (2 integrated AC-RC)
- Fleet hospital set-up / operation / maintenance
- Forward Operating Base & camp operation/maintenance/limited construction

Underwater Construction Team

- UCT (2 AC)
- Construction and installation of fleet moorings
- Pier/wharf damage assessment / repair
- Underwater pipeline inspection / repair
- Underwater blasting/obstacle clearing
- Underwater cable laying
- Bathymetric surveying

Naval Construction Force Support Unit

- NCFSU (1 RC)
- Transport of construction materials
- Quarrying, rock crushing, asphalt / concrete production
- Electrical transmission line construction support

Seabee Readiness Group

- SRG (2 integrated AC-RC)
- Provide military and technical training for NCF units

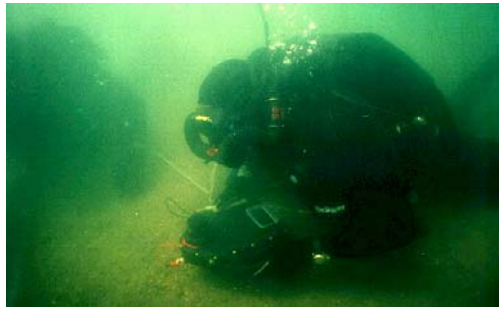






Explosive Ordnance Disposal







- Fleet Support
  - CSG, ESG, Shore Stations
- Force Protection
  - WMD, IED, UXO, Mines
  - U.S. Secret Service and DOS VIP protection
  - Contingency Swimmer Defense Marine Mammal Systems
- Mine Countermeasures
  - VSW, Organic, Dedicated UMCM
  - Contingency Marine Mammal Systems
- Special Operations
  - WMD (CBRNE), Booby Trap, IED, Mines
  - SOF integration/support





Mobile Diving and Salvage







Fleet Support

- Limited U/W Ships Husbandry
- Force Protection dive support of ships in port and piers.
- Area search unmanned underwater vehicle (UUV) program lead

Expeditionary Salvage

- Ashore/Afloat capability for search and recovery
- Surface supplied/SCUBA
- Fly-away mixed gas dive system for deep/long duration dive capability.

Harbor Clearance

- Full spectrum salvage/debeaching
- Underwater cutting/welding
- Limited demolition





Riverine Force

Riverine operations require forces organized to exploit the unique characteristics of river environments. They are conducted to:

- ***Establish and maintain control of rivers and other waterways for military and civil purposes***
- ***Deny use of rivers/waterways to waterborne and immediate shore sited hostile forces by:***
  - ***Surveillance operations***
  - ***Barrier operations***
  - ***Interdiction operations***
- ***Locate / destroy waterborne hostile forces***



Maritime Civil Affairs Group

- *USA/SOCOM mission has full CA*
  - *Acknowledges USA/SOCOM expanding CA force*
- *Focus on Civil Military Operations (CMO)*
  - *Augments USA/USMC/SOCOM capability*
- *Create small "bolt-on" tactical teams*
  - *Aligns well with COCOM demand signal*
- *Allows for near-immediate response capability*
- *Focus on JFMCC battle-space*
  - *Theater Security Cooperation Plan*
  - *Influence / Shaping Operations (Phase 0 Operations)*
  - *HA / DR Operations*
  - *GWOT Enablement*

Expeditionary Training Command

- *"Sea Shaping" concept for JFMCC portion of COCOM Theater Security Cooperation Plan(s)*
- *Provide capabilities-based/task-organized Adaptive Force Training packages*
- *NECC leads*
  - *Liaison with NCCs to identify/clarify COCOM requirement*
    - *Coordinate with Navy Education and Training Security Assistance Field Activity (NETSAFA)*
  - *Identify and build adaptive force packages*
    - *Assumes access Navy forces beyond Fleet (e.g. medical, legal, etc)*
  - *Operationalizes partner opportunities*
    - *USCG - International Training Division*
    - *USMC – Foreign Mission Training Unit*
    - *Others?*

Adaptive Capability to Deploy Expeditionary Training Teams

Expeditionary Security Force

- *Vision to align NECC security forces with NCW to create multi-mission, expeditionary-capable force*
- *Employ tailored/scalable force packages in JFMCC battle space*
  - *Point and area security across range of operational environments including: near coast, riparian, and fixed sites*
  - *Responsive and flexible to JFMCC and base commander needs*
  - *Embedded Intelligence Exploitation Teams and VBSS Level III Teams*
- *Foundational structure to attract, train/develop, retain Sailors within a recognizable warfare area*

Expeditionary Combat Readiness Center

- *Train, equip, certify, deploy, provide oversight, reach-back and redeploy Navy Individual Augmentees, in-Lieu-of individuals and provisional units deploying for non-traditional expeditionary missions in support of the Global War on Terrorism*

- *Align In-Lieu-of personnel into task organized combat support and combat service support force packages*

- *Increase individual and provisional unit combat readiness by ensuring Navy personnel receive ground combat skills training, and coordinating mission specific training where required*

Joint Unmanned Aircraft System Center of Excellence

NDIA CONFERENCE

26 Oct 06

Background

- **Jun 05 – JROC directs creation of two organizations: JUAV COE and JUAV MRB**
- **Sep 05 – JROC approves JUAS COE re-stated mission, charter, and manpower construct**
- **Oct 05 – JUAS COE reaches Initial Operational Capability**
- **Nov 05 – JUAS COE Charter formally approved by CJCS**
- **Dec 05 – PBD 704: Funding and Manpower Reprogramming**

Vision

- **Provide the first point of entry for UAS OPERATIONAL issues requiring joint consideration, analysis, and resolution.**

- **Harmonize / Optimize operational efforts of the Services, COCOMs, OSD, and agencies/entities.**

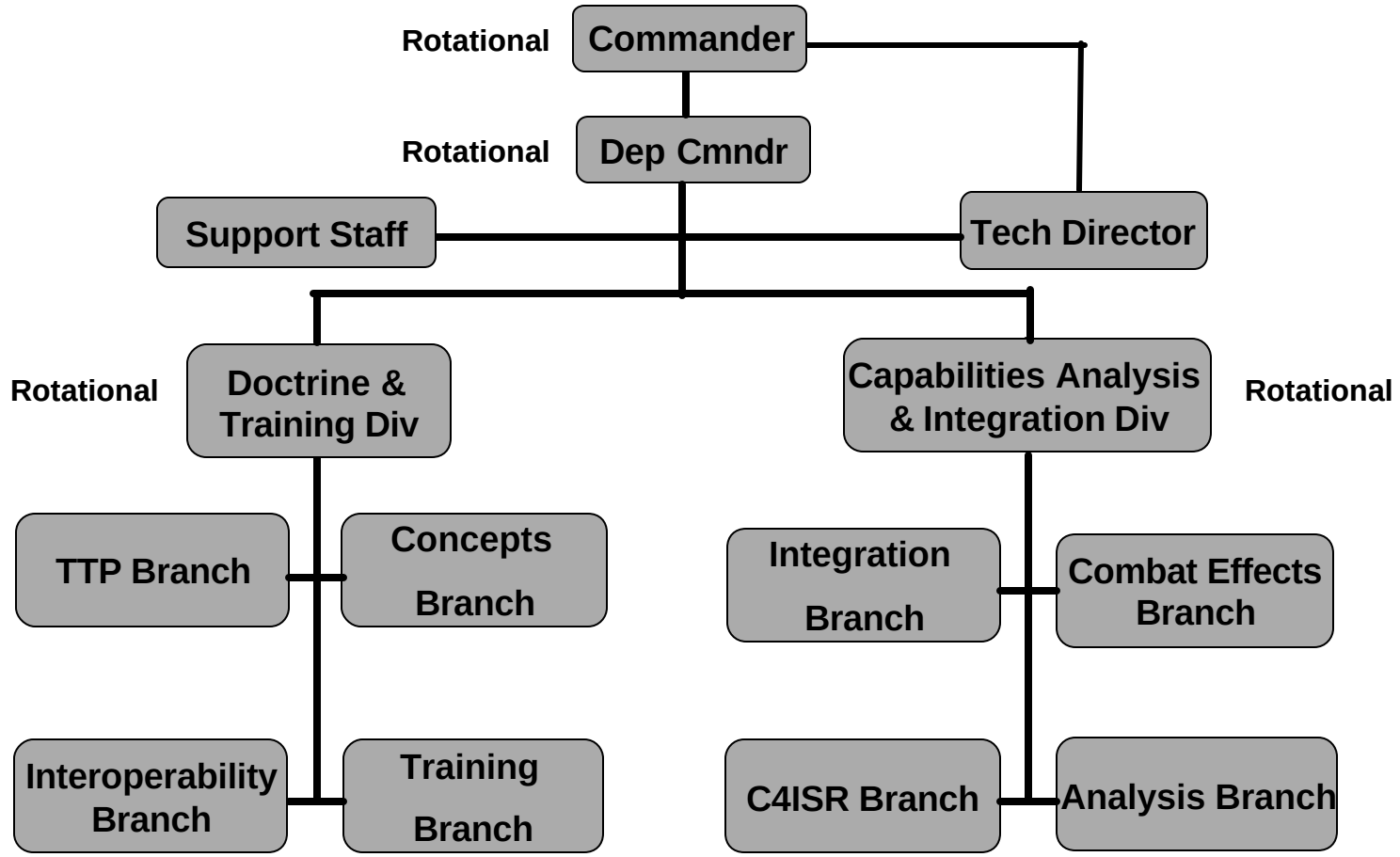
" Joint Lens " that promotes increased standardization, reduction of overlapping efforts, and resolution of interoperability challenges

Mission Statement

JUAS COE provides support to the Joint Operator and Services by facilitating the development and integration of common unmanned aircraft system operating standards, capabilities, concepts, technologies, doctrine, tactics, techniques, procedures and training.

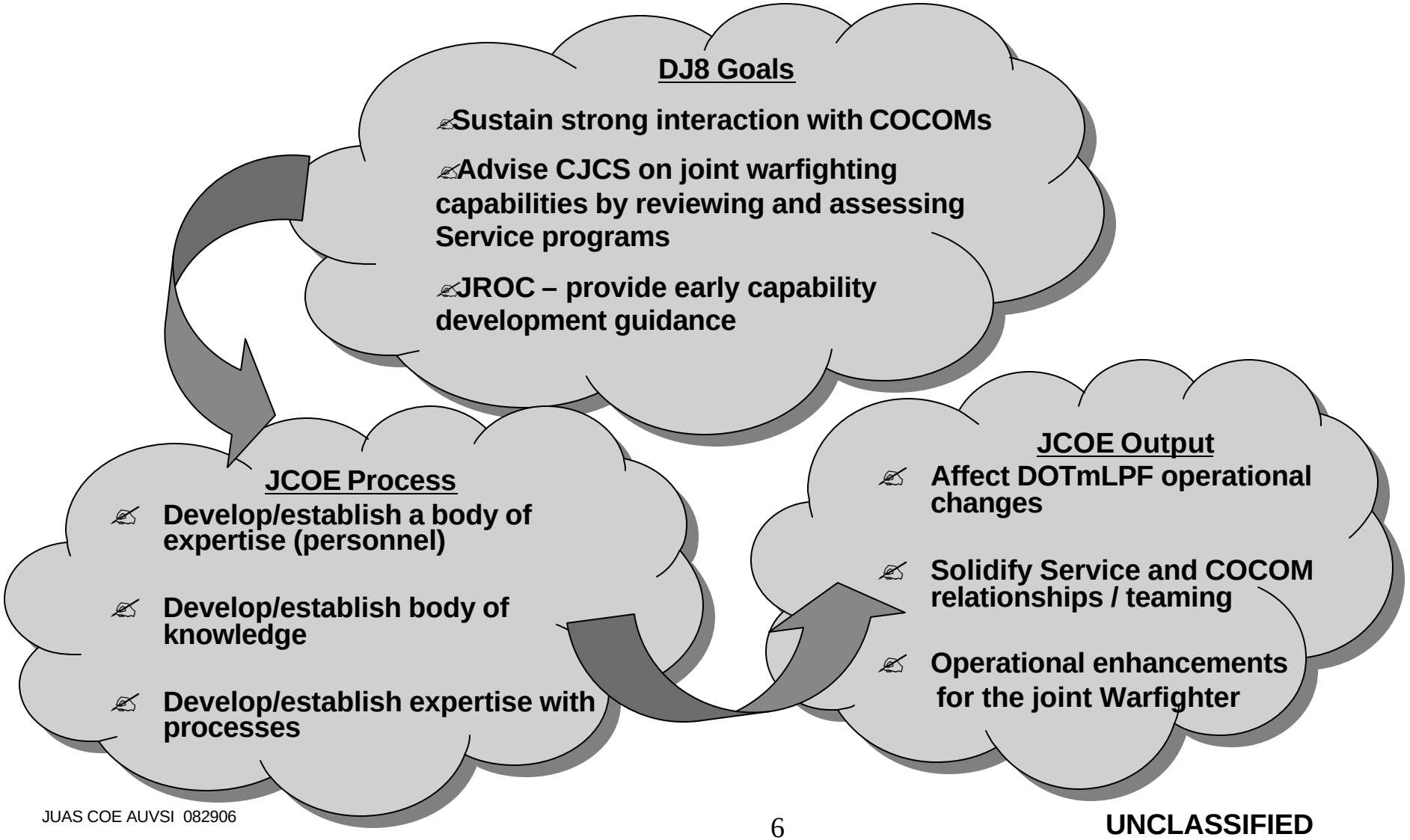
JUAS COE leverages existing Service initiatives and activities to provide joint integrated solutions and improved interoperability.

Organization Framework and Manning



Jointly Manned Activity – 38 Military / 6 CS / 20 Contractors (Core)
Currently in place – 12 Military / 20+ Contractors

Goals and Objectives

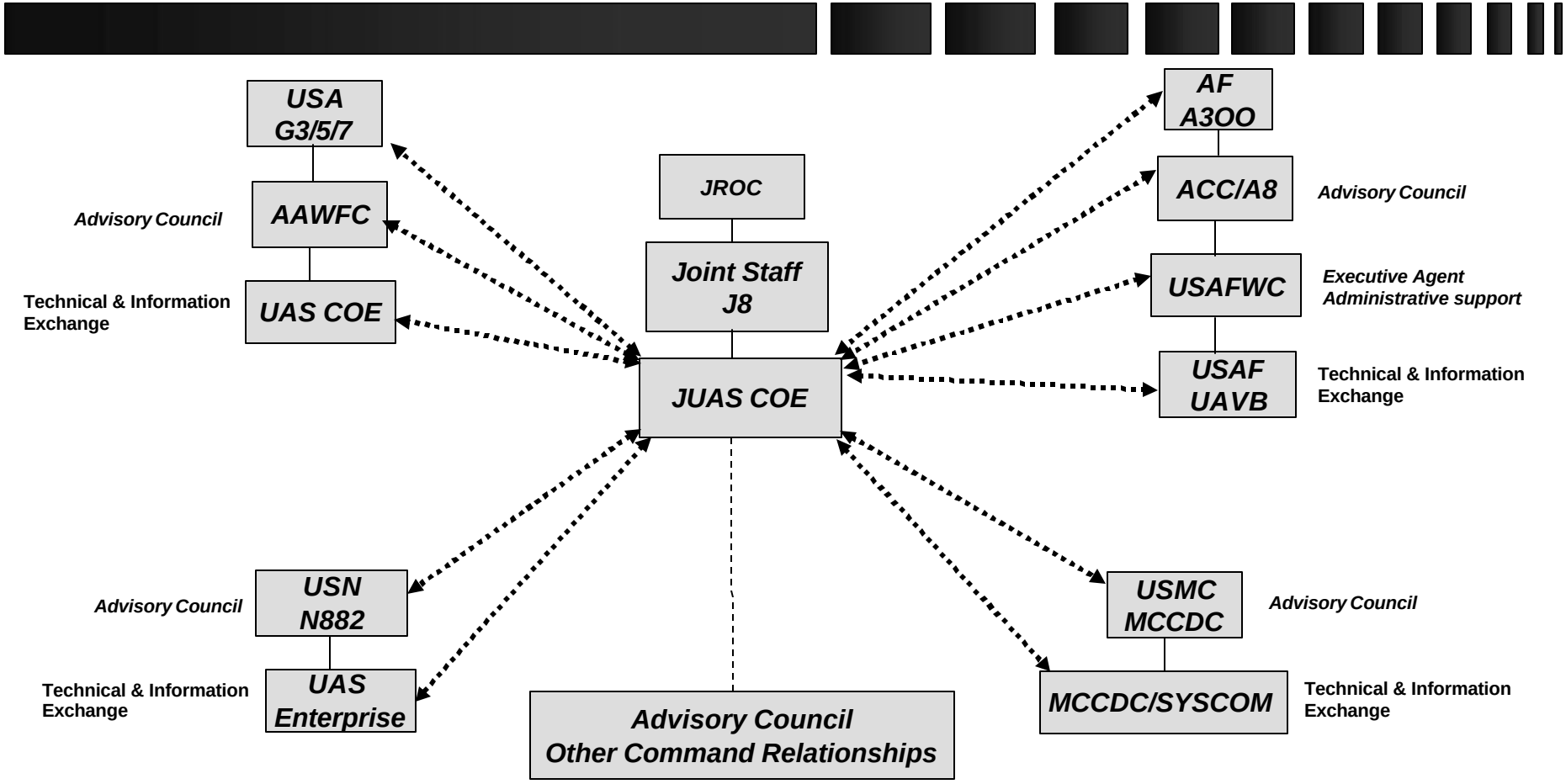


JUAS COE Charter

- ***Develop*** **Joint CONOPS, TTPs, and doctrine**
- ***Review*** **service and COCOM capabilities requirement submissions into Joint Capabilities Integration and Development System (JCIDS) process**
- ***Facilitate*** **integration of UAS capabilities into joint and component training and exercises**
- ***Address*** **airspace integration, joint command and control, and spectrum management issues**
- ***Coordinate*** **efforts with the Joint UAS Material Review Board (JUAS MRB)**
- ***Develop*** **and orchestrate experiments, exercises, and demonstrations**

COCOM and service UAS operational requirements and priorities determine JUAS COE work plan

Command Relationships

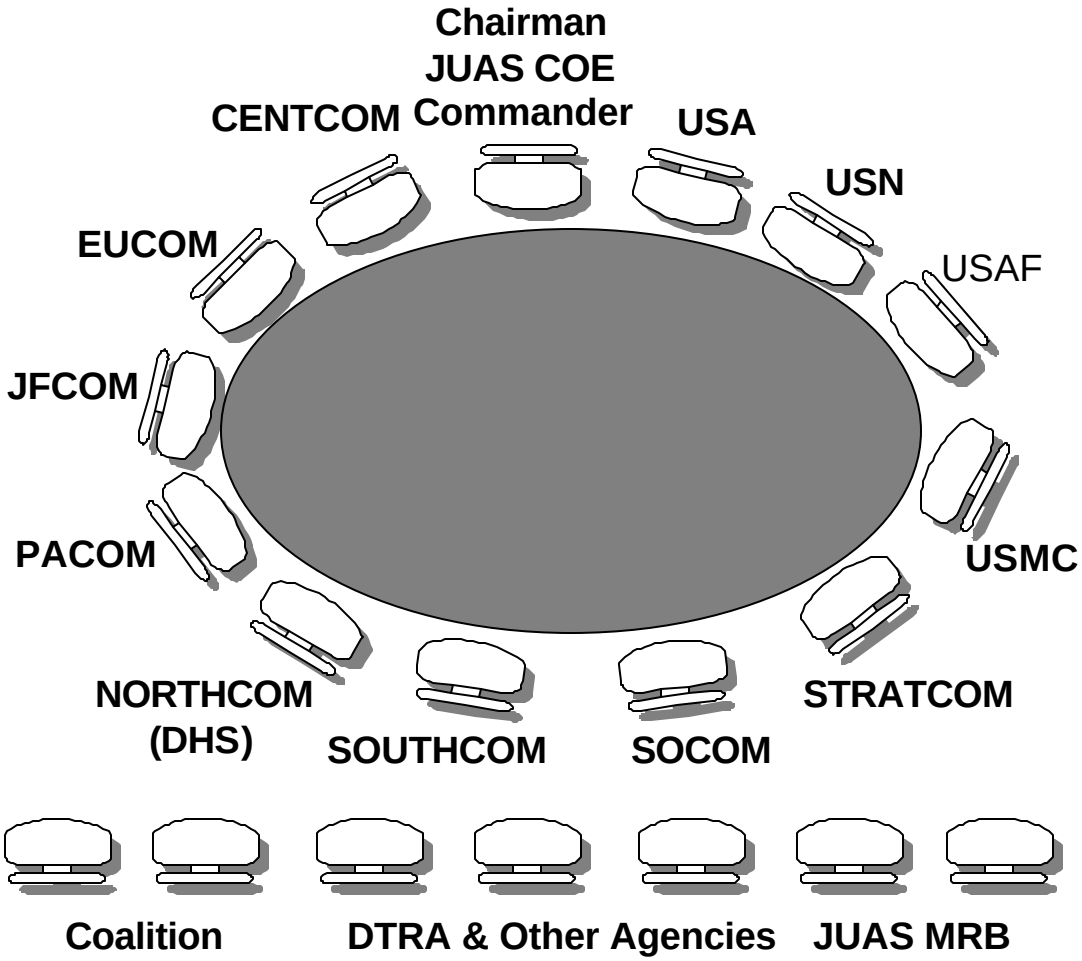


Advisory Council O-6 level representation from all services and COCOMS

Advisory Council

0-6 Advisory Council

- Needs
  - Bring operational issues to table
  - Set a Top 5 or Top 10 list of COCOM issues requiring Joint solutions
  - Identify Joint initiatives where the JUAS COE requires assistance or teaming with Service COE/Battlelabs
  - Identify Service issues with Joint implications requiring JUAS COE assistance
- Solutions
  - Identify ongoing activities working solutions to issues
  - Monitor progress of ongoing initiatives
  - Establish/update recommended list of initiatives for the JUAS COE
- Next Meeting
  - Nov 06 – SOCOM/CENTCOM - Tampa



Relationship with Material Review Board

MRB Mission

" Provide a forum to identify or resolve requirements and corresponding material issues....Regarding interoperability and commonality, prioritize potential solutions...."

MRB Goals

- **Facilitate JCIDS...coordinate with and make recommendations to the FCB, JCB, and JROC:**
- **Improve commonality of payloads/GCS**
- **Improve interoperability through adoption of common standards**

MRB Objectives

- **Identify/resolve and/or mitigate materiel issues at the earliest opportunity in the JCIDS process**
- **Coordinate UAS materiel initiatives with the support community**
- **Coordinate government/industry UAS issues**

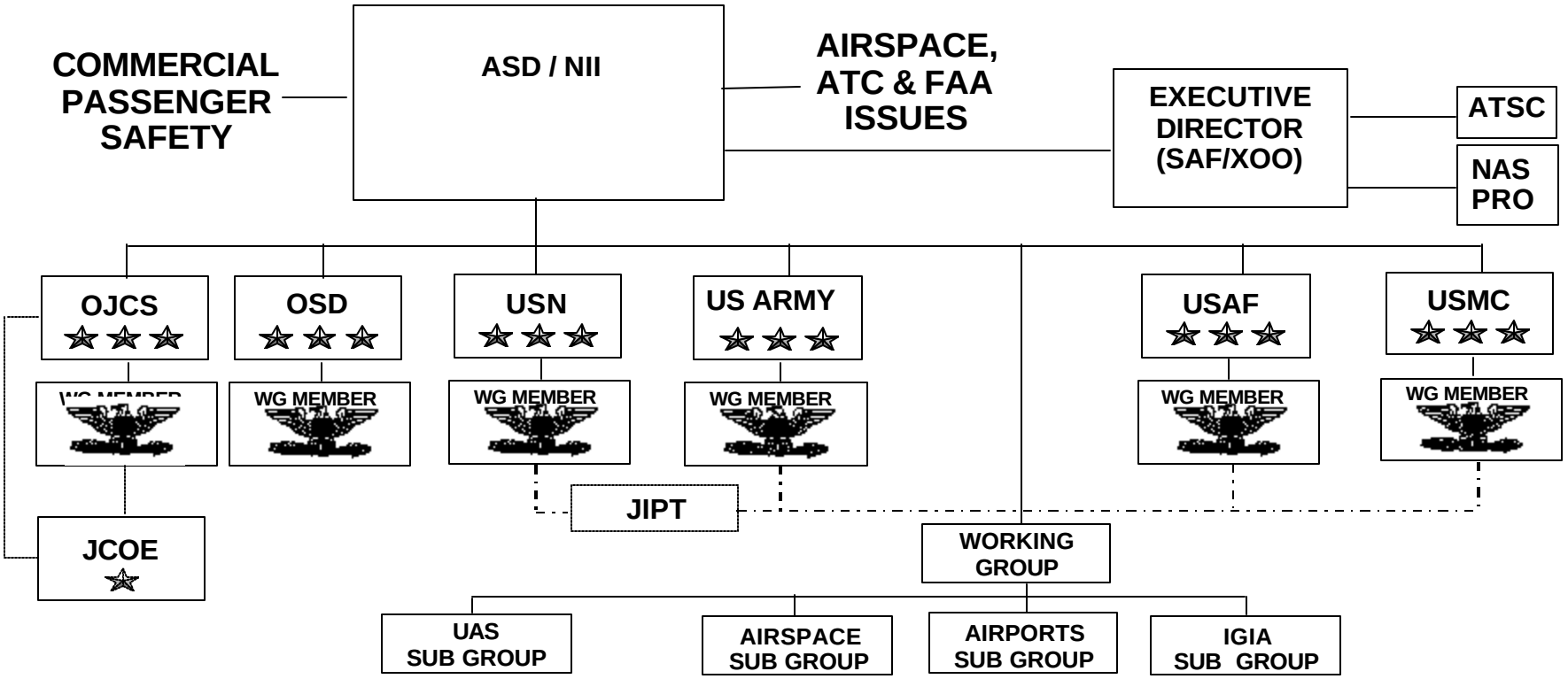
JUAS COE will provide a non-voting representative to the board and provide representatives to working groups as required

Capabilities, Analysis, Integration Div Update

- **JROCM 283-05: MQ-1 Orbits Demand**
  - **Methodology – Requirements / Analysis / Wargaming**
  - **Study complete / Briefing through JCIDS process**

- **Airspace Integration**
  - **FAA acknowledging importance of UAS integration by forming dedicated section at HQ in DC**
  - **PBFA tasked as lead agency for interface between DoD and FAA**
  - **JUAS COE unique position to promote efforts of all Services to leverage manpower, money and ideas for joint effort**
  - **Demonstrating an equivalent level of safety as manned aircraft will be the key**

DOD Policy Board on Federal Aviation (PBFA)



DRAFT PROPOSAL

Policy - PBFA

Technology – AT&L

Operational Issues - JCOE

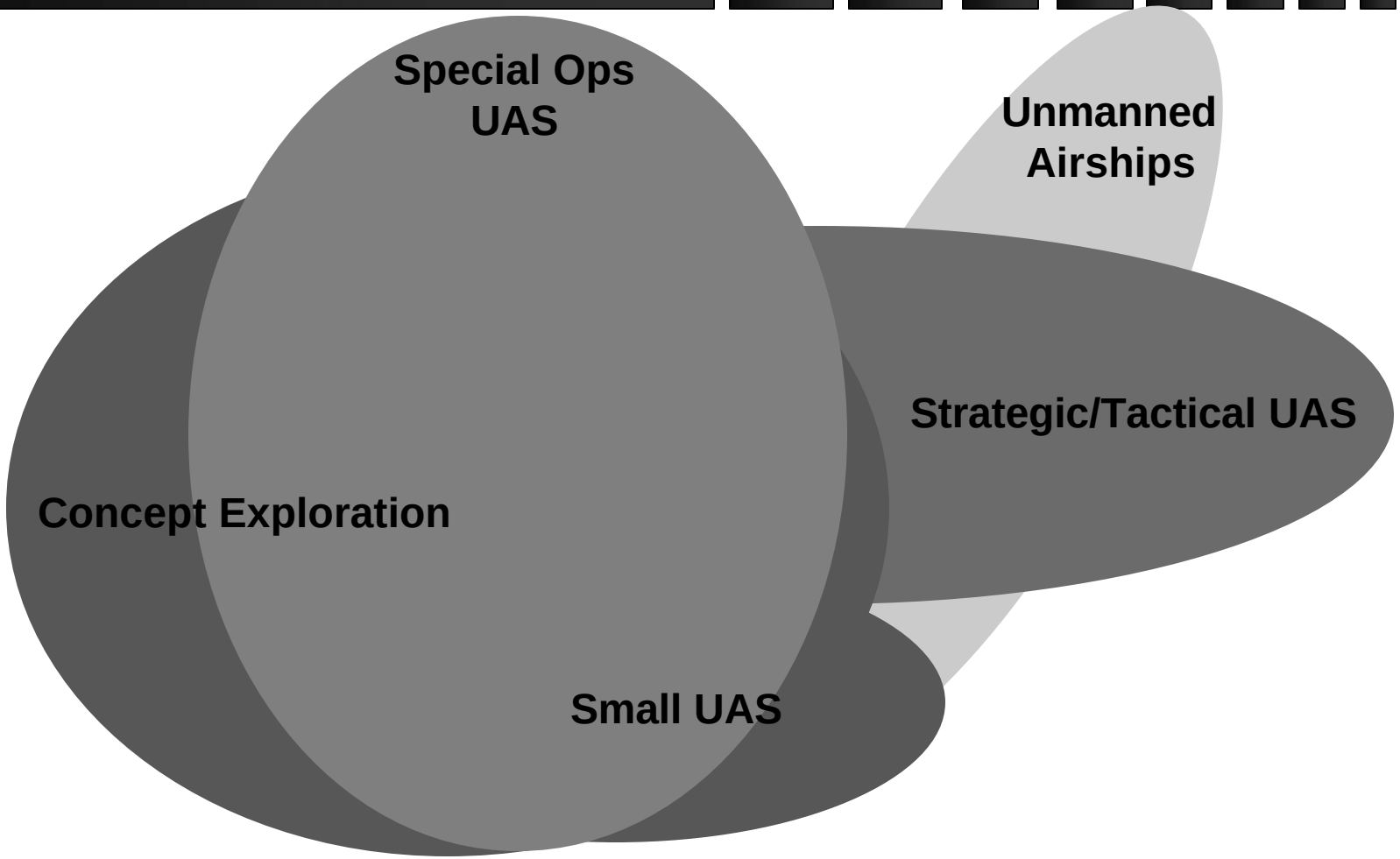
Doctrine and Training Division Update

- **Tactical Employment of UAS MTTP – ALSA Publication**
  - **Signature / Release – 18 Aug 06**
  - **Transition of document to JUAS/COE**

- **JCAS ESC Issue #9 – UAVs in JCAS Operations**
  - **Current: Adjudication of JTTP UAS Focus Group comments**
  - **Sep 06: Projected completion of JTTP UAS Working Paper and change of applicable Joint CAS publications**

- **JROCM 197-05: Joint Overarching CONOPS Development**
  - **Three CONOPS Working Groups Complete**
  - **Initial CONOPS document complete – 30 Sep 06**
  - **World-wide review / Adjudication of Comments – Oct - Dec 06**
  - **Submission for CJCS approval – 10 Jan 07**

UAS Relationships in DOD Schema



Proposed NAS UAS Levels

Category	Airspeed (Kts)	Weight (Lbs)	Operating Altitude (AGL)
L 0	< 250	< 2	<1,200 BATCAM
L 1	< 250	2 - 20	< 3,000 Raven / Pointer
L 2	< 250	21 – 1,320	< 18,000 Shadow / Scan Eagle
L 3	< 250	1,321 – 12,500	< 18,000 Hunter / Predator
L 4	> 250	< 12,500	< 18,000 Killer Bee
L 5	UNL	> 12,500	> 18,000 Global Hawk

Proposed DoD UAS Categories

TYPICAL USERS	JOINT CATEGORY	OPERATING ALTITUDE	LAUNCH METHOD
TACTICAL SOF/Small Unit	T 1	<1000	Hand Launched Raven
TACTICAL Batt / Brigade	T 2	< 5,000	Mobile Launched Scan Eagle
TACTICAL Division / Corps	T 3	< 10,000	Conventional / VTOL Hunter
OPERATIONAL JTF	O	< 40,000	Conventional Runway Predator
STRATEGIC National	S	> 40,000	Conventional Runway Global Hawk
AIRSHIP National	A	UNLIMITED	VTOL JLENS

DoD / NAS UAS Categories

<table>
<tr><th colspan="2">Joint
UAS Categories</th><th>Domestic Use
UAS Levels</th></tr>
<tr><td colspan="2" rowspan="2">Tactical 1</td><td>L 0</td></tr>
<tr><td>L 1</td></tr>
<tr><td colspan="2">Tactical II</td><td rowspan="2">L 2</td></tr>
<tr><td rowspan="3">Tactical III
Operational
Strategic</td><td rowspan="3">Airships</td></tr>
<tr><td>L 3</td></tr>
<tr><td>L 4</td></tr>
<tr><td></td><td></td><td>L 5</td></tr>
</table>

JUAS COE Priorities

- **Joint CONOPS Development**
- **Airspace**
  - **Access / Integration into NAS**
- **Spectrum Management / Bandwidth Availability**
- **C2 / Interoperability**
- **Other**
  - **Joint DoD UAS Operator Training Standards**
  - **Weaponization of UAS**

Questions?

NDIA
11th Annual
Expeditionary Warfare Conference
Force Structure Uncertainty
Panel Discussion

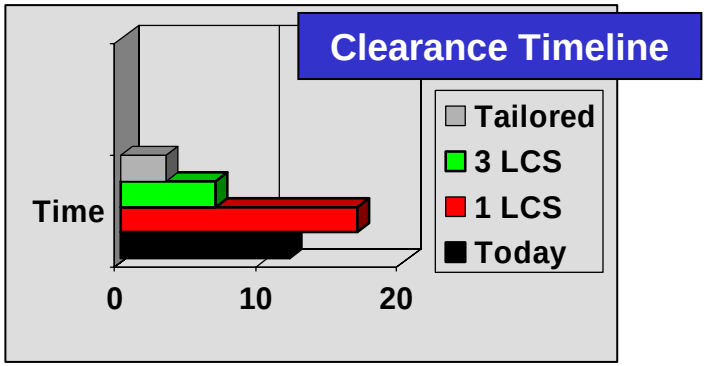
25 October 2006

Jim Thomsen
Program Executive Officer
Littoral & Mine Warfare

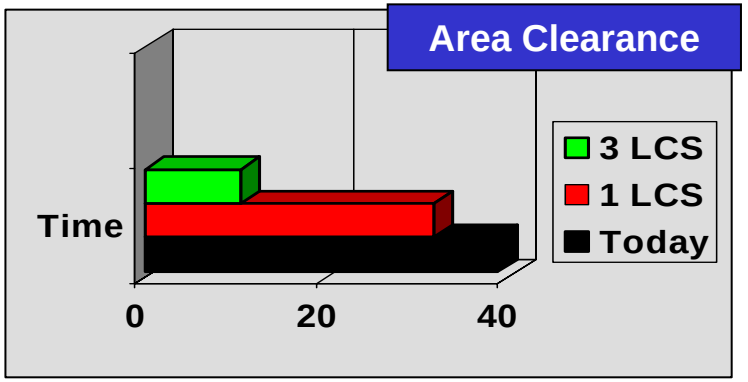
"Sustain combat readiness … with the right combat capabilities - access, speed, agility, adaptability, persistence, awareness and lethality - for the right cost."
Admiral Mike Mullen, CNO Guidance, 2006

Adaptive Force Packages and Force Structure -- an LCS example

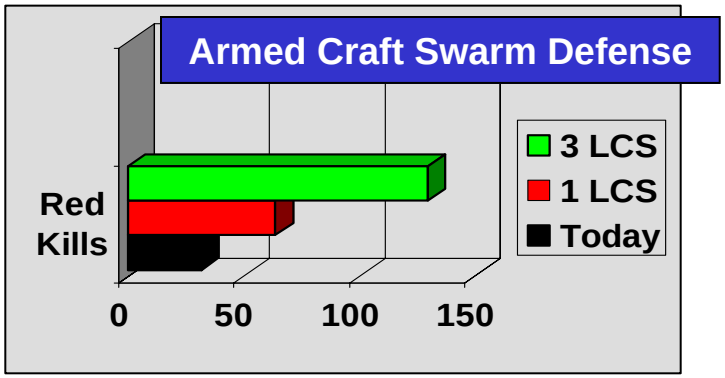
Mine Countermeasures

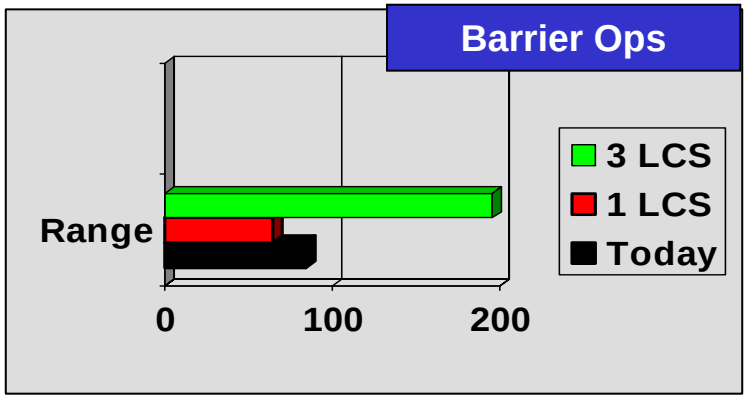


Anti-Submarine Warfare



Surface Warfare





"We will develop <u>Adaptive Force Packages</u> … in support of operations in blue, green, and brown water environments …" *Admiral Mike Mullen --- CNO Guidance, 2006*

Adaptive Force Packages, Mission Packages, and Modularity

Containerization / Transportation Level

ISO STDs





Mission Package Level



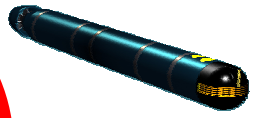




Published ICD

Modularity

Vehicle Level









MRUUV

RMS
MIW
ASW

USV
MIW
ASW
SUW

VTUAV
MIW
ASW
SUW

Sensor / System Level







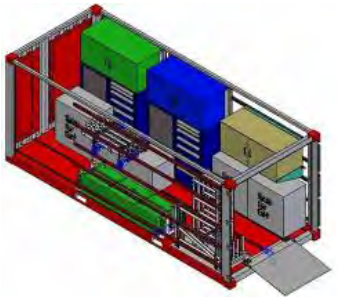
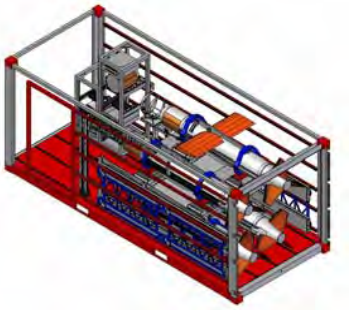
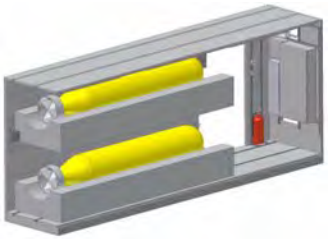
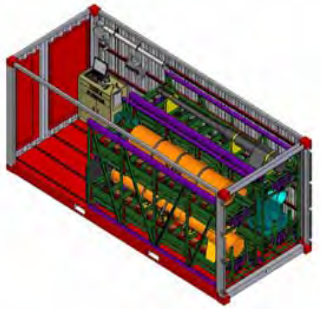
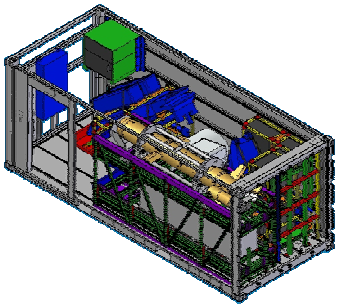
AQS-20A
Mine Hunting
Mine Identification

MPCE
Software

RTAS
Bi-Static ASW

The First LCS Mission Package Realized

RMS	AQS-20A	BPAUV	AMNS / ALMDS / RAMICS	OASIS & Helo Mod Kit







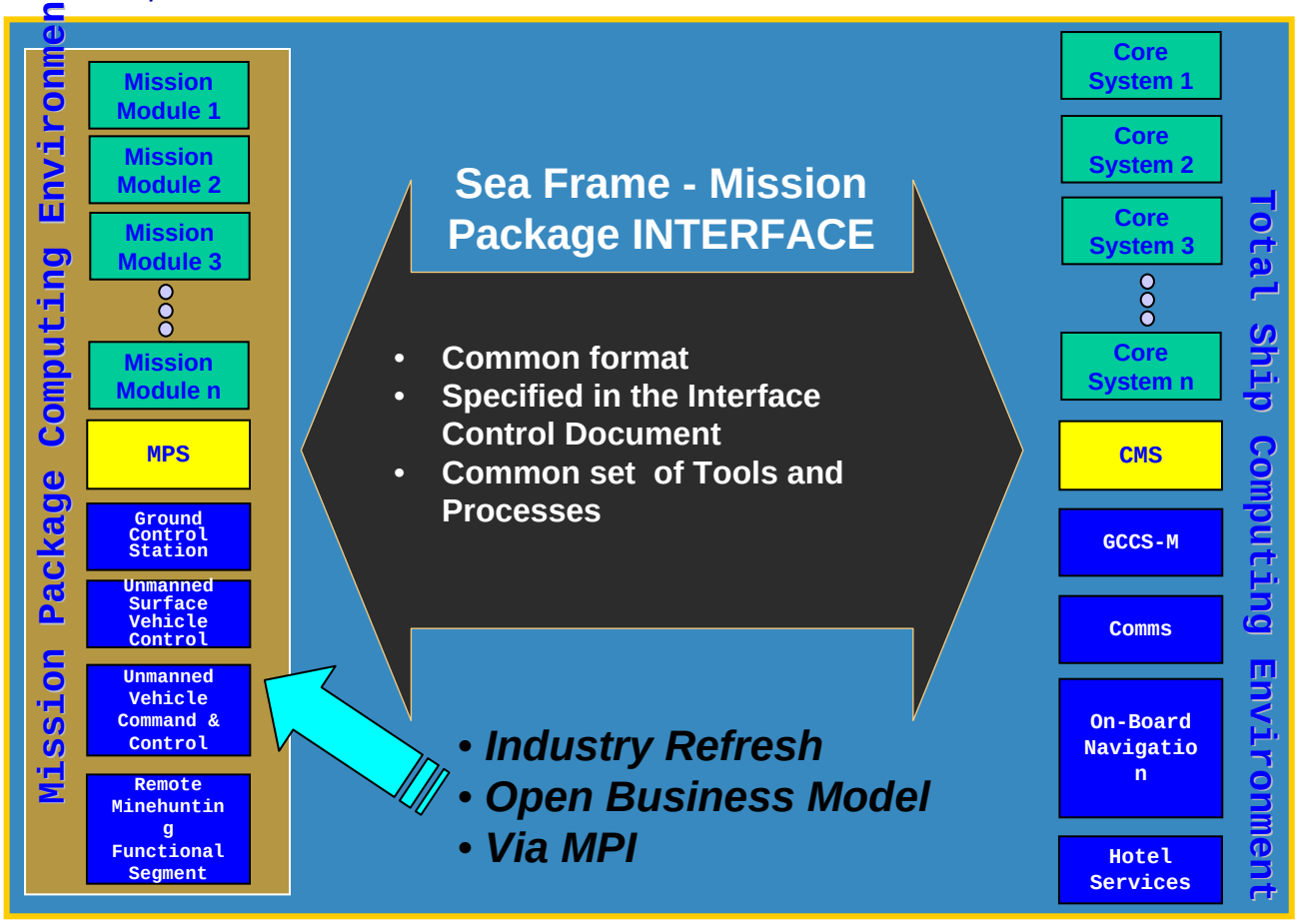


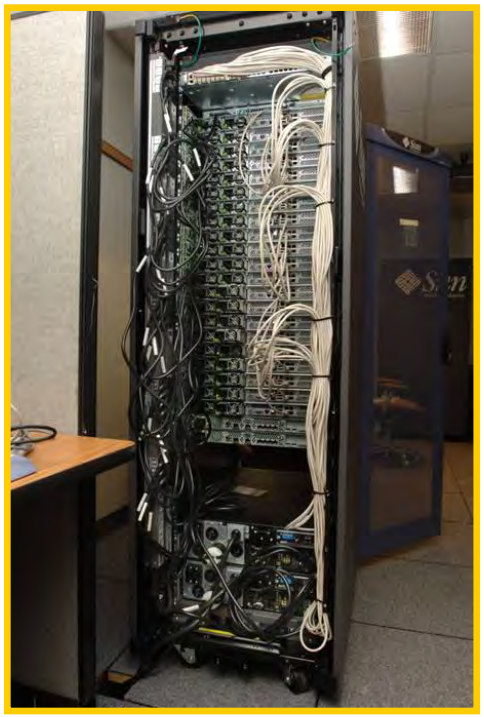



Mission Package

Open Computing Environment

- *Maximum use of existing S/W – Common S/W apps with Current Fleet platforms*
- *MPs interface with LCS Sea frame through documented ICD*
- *OA Level 3 COTS H/W allows Open System model for acquisition and development*







System Applications C2 Applications Common Applications or Services

Mission Package Open Business Model Approach

Mission Package Integrator

Hardware

Software

C3

In-Service Support Tools

Products

Mission Package Computing Environment

SUW MP

ASW MP

MIW MP

Defined Architecture & Interfaces









Transport-able

MP Support Facility







Staged

LCS-1



LCS-2



Deployed

Spiral Development