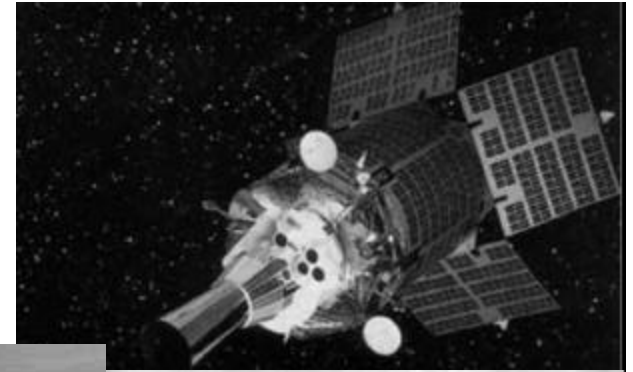


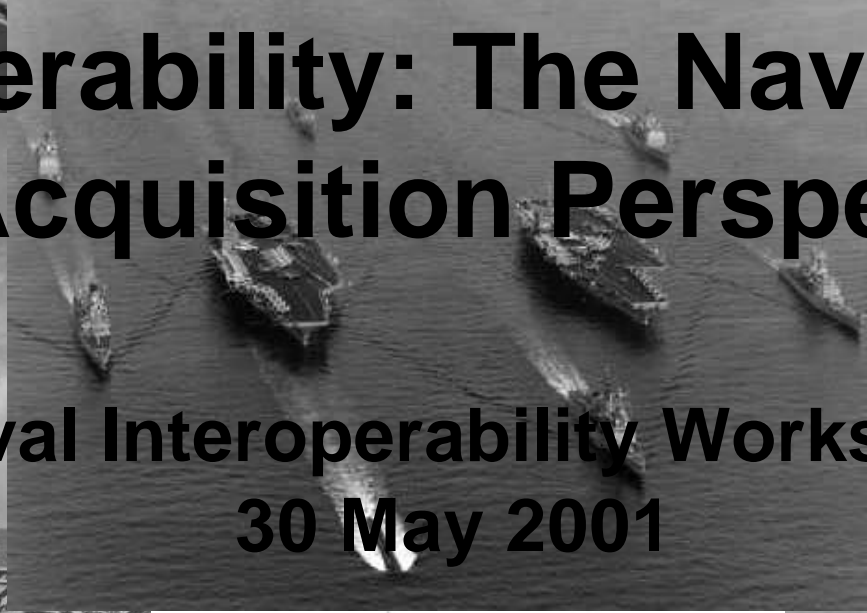
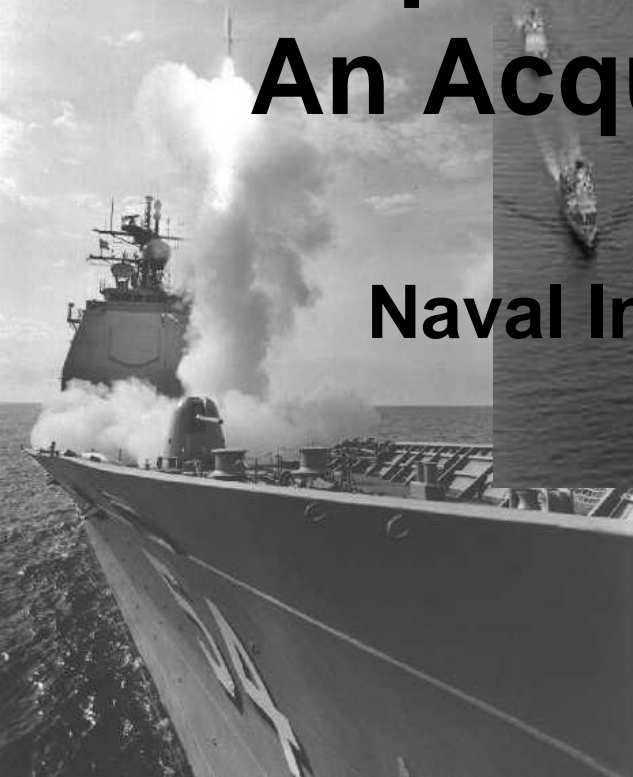


**ASN (RDA)  
CHIEF ENGINEER**



# **Interoperability: The Navy View - An Acquisition Perspective**

**Naval Interoperability Workshop  
30 May 2001**



**Unclassified**

**RADM Kate Paige  
RDA CHENG**

## Report Documentation Page

<b>Report Date</b> 30052001	<b>Report Type</b> N/A	<b>Dates Covered (from... to)</b> -
<b>Title and Subtitle</b> Interoperability: The Navy View - An Acquisition Perspective	<b>Contract Number</b>	
	<b>Grant Number</b>	
	<b>Program Element Number</b>	
<b>Author(s)</b> Paige, Kate	<b>Project Number</b>	
	<b>Task Number</b>	
	<b>Work Unit Number</b>	
<b>Performing Organization Name(s) and Address(es)</b> RDA CHENG	<b>Performing Organization Report Number</b>	
<b>Sponsoring/Monitoring Agency Name(s) and Address(es)</b> NDIA (National Defense Industrial Association 2111 Wilson Blvd., Ste. 400 Arlington, VA 22201-3061	<b>Sponsor/Monitor's Acronym(s)</b>	
	<b>Sponsor/Monitor's Report Number(s)</b>	
<b>Distribution/Availability Statement</b> Approved for public release, distribution unlimited		
<b>Supplementary Notes</b> Proceedings from Armaments for the Navy Interoperability Workshop, 30-31 May 2001 sponsored by NDIA.		
<b>Abstract</b>		
<b>Subject Terms</b>		
<b>Report Classification</b> unclassified	<b>Classification of this page</b> unclassified	
<b>Classification of Abstract</b> unclassified	<b>Limitation of Abstract</b> UU	
<b>Number of Pages</b> 25		

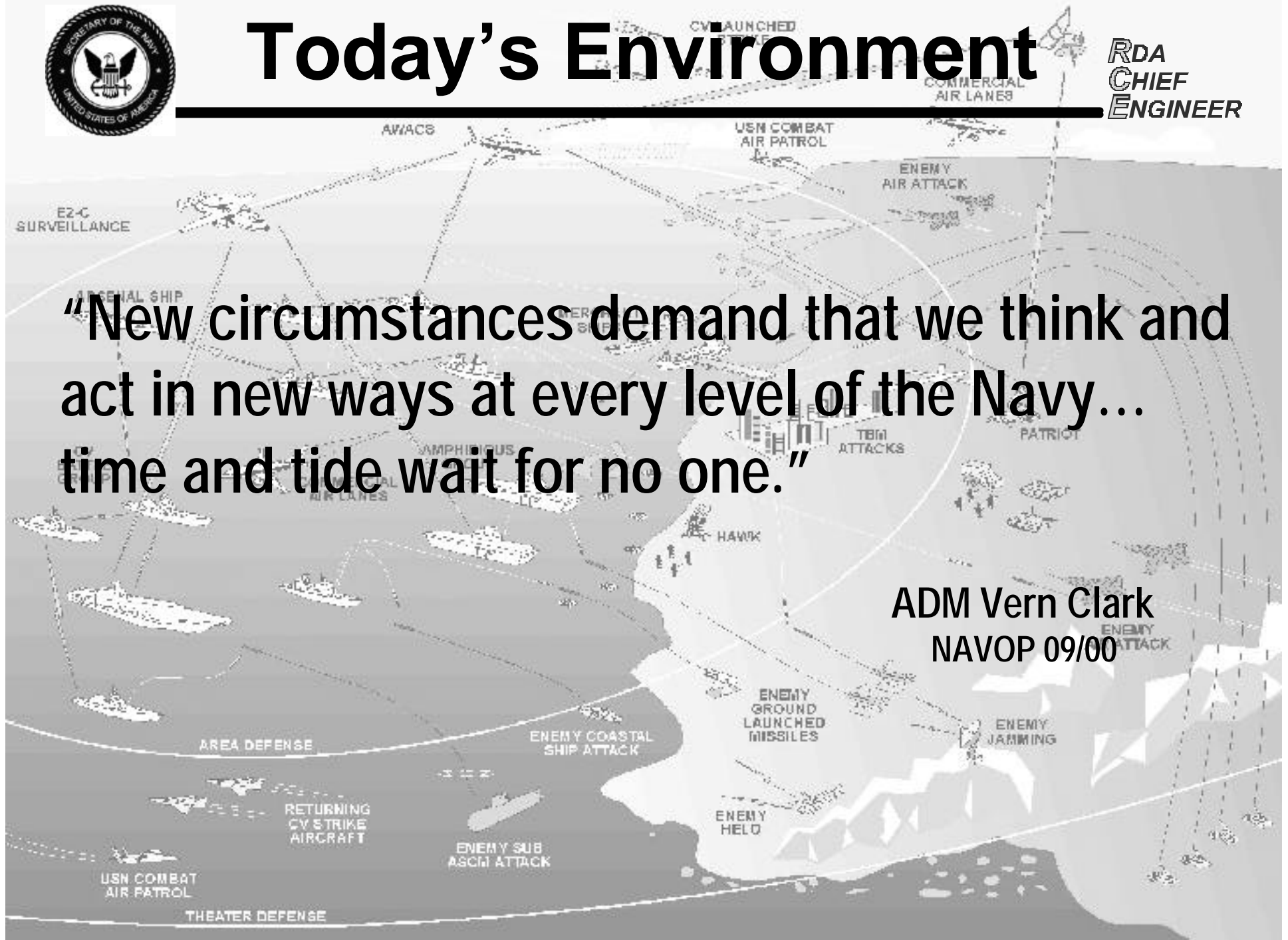


# Today's Environment

RDA  
CHIEF  
ENGINEER

“New circumstances demand that we think and act in new ways at every level of the Navy... time and tide wait for no one.”

ADM Vern Clark  
NAVOP 09/00





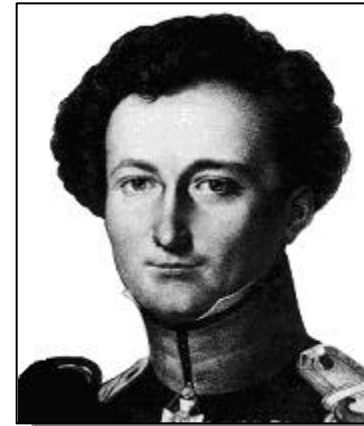
# Nothing New Under the Sun

RD&A  
CHIEF  
ENGINEER

*“... in war, more than in any other subject we must begin by looking at the nature of the whole; for here more than elsewhere the part and the whole must always be thought of together.”*



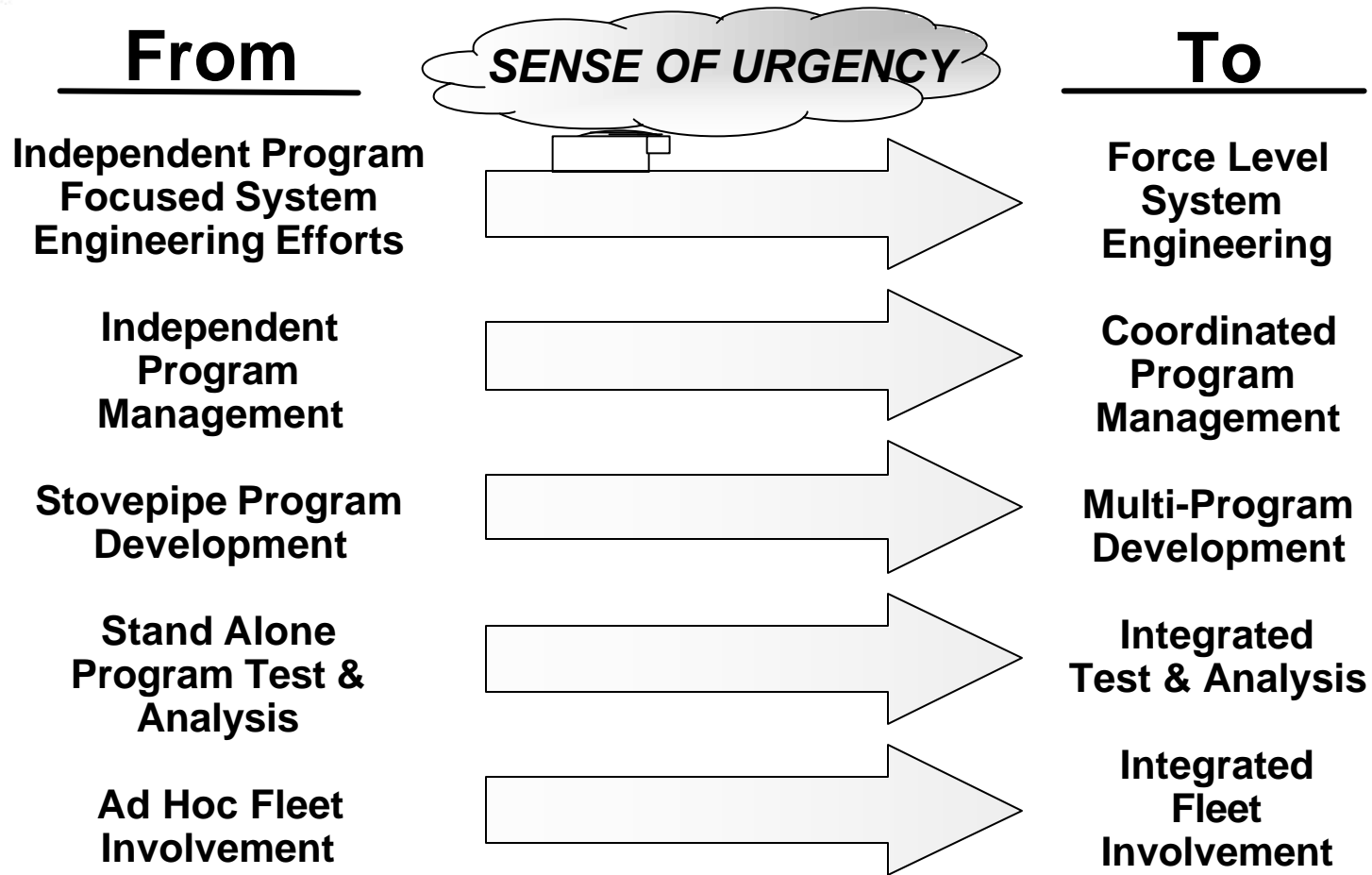
-- Carl von Clausewitz  
*On War*  
(1832)





# The World is Changing

**RD&A  
CHIEF  
ENGINEER**



***Without Abandoning the Rigor of Engineering the Fighting Unit***

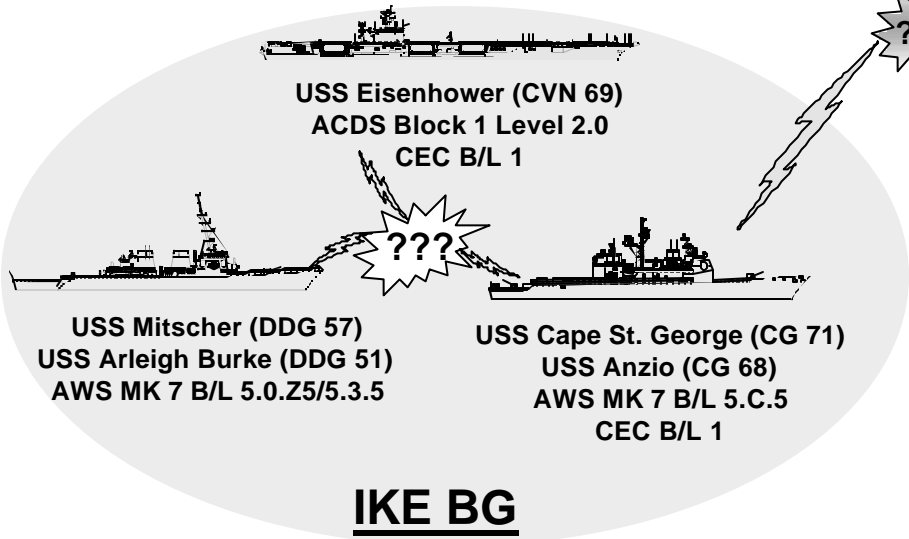
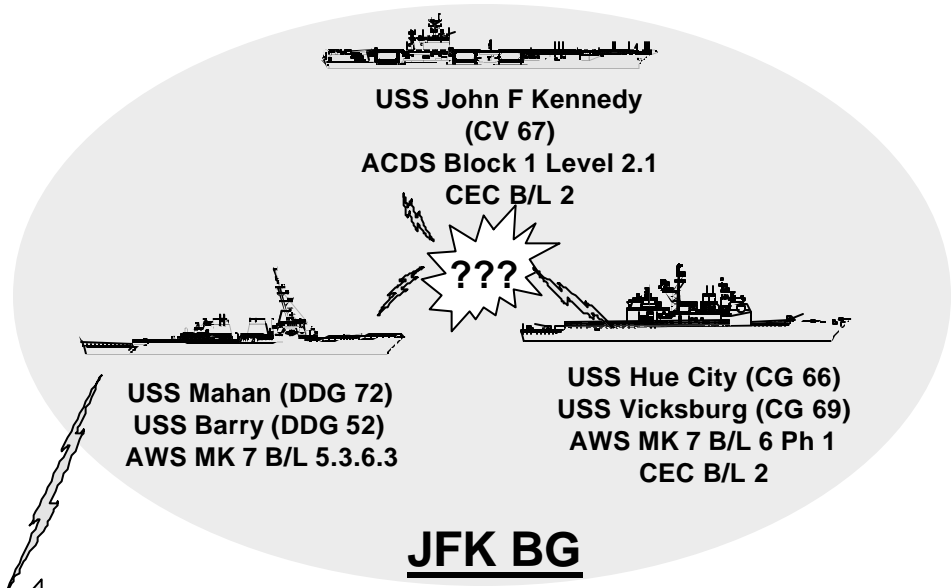


# Navy Battlegroup Operations: 1997-1998

RD&A  
CHIEF  
ENGINEER

CNO WASHINGTON DC 021648Z MAY 98

*“The introduction of increasingly complex warfighting capabilities into the fleet has resulted in significant battle group interoperability challenges.”*



CINCLANTFLT BGSIT 021731ZMAR98

**BGSIT Hot Wash-Up Message**

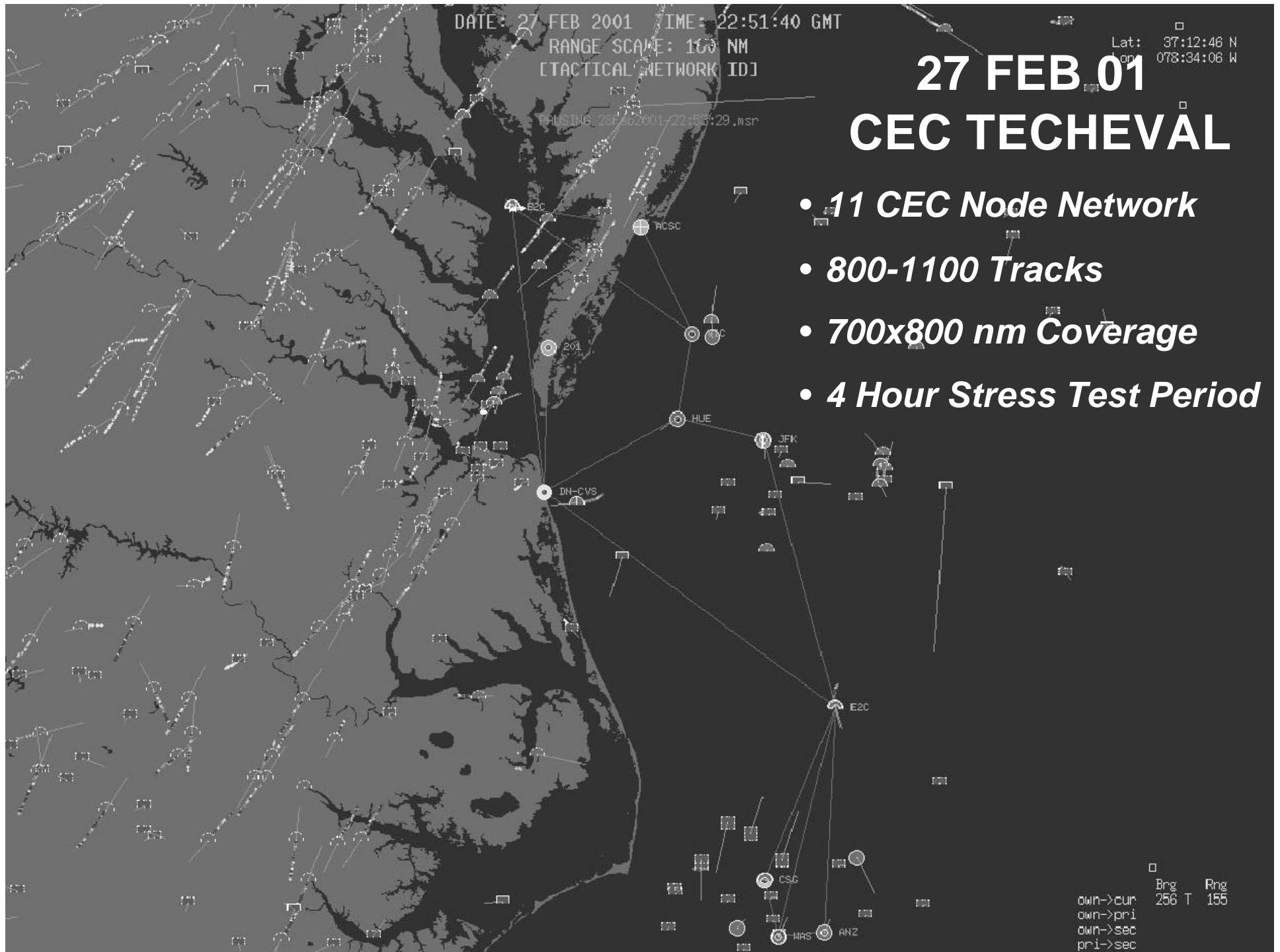
“ This report highlights the complexity of BG system architecture, lack of systems successful integration and failure of critical equipment. *In combination, the factors created an incoherent tactical picture for BG operators.*”

DATE: 27 FEB 2001 TIME: 22:51:40 GMT  
RANGE SCALE: 100 NM  
[TACTICAL NETWORK ID]

Lat: 37:12:46 N  
Lon: 078:34:06 W

# 27 FEB 01 CEC TECHEVAL

- *11 CEC Node Network*
- *800-1100 Tracks*
- *700x800 nm Coverage*
- *4 Hour Stress Test Period*





# CEC TECHEVAL: Link Interoperability

**RD&A  
CHIEF  
ENGINEER**

- **CEC Battle Group Operated in a Demanding Link Environment:**

- **Participants**

- **Eight Surface Units**

- **Four Different Combat Systems**

- Both Model 5 and Model 4
- USG 1 & 2

- **Group II E-2C**

- **Both CEC Equipped NP-3C and A125 E-2C**

- **USG 3**

- **Two Land Based Test Sites**

- **High Track Loads**

- **Over 1000 tracks provided via airborne CEC units**



# The Navy's Organizational Response

**RD&A  
CHIEF  
ENGINEER**

- **PEO (Theater Air Defense) & PEO (AEGIS / Surface Combatants) Merged into Single PEO for Theater Surface Combatants - April 98**
- **CNO Designated NAVSEA (SEA 05) as CNO Lead for Battle Force Interoperability - May 98**
- **OPNAV Initiates Integrated Warfare Architectures (IWAR) Process**
- **ASN(RDA) Designates Chief Engineer as Senior Technical Authority Within the DoN Acquisition Structure**
- **OPNAV Reorganization: N8 → N7, N8, ACNO (MD)**
- **Joint SIAP SE Organization Established With Navy as Lead**



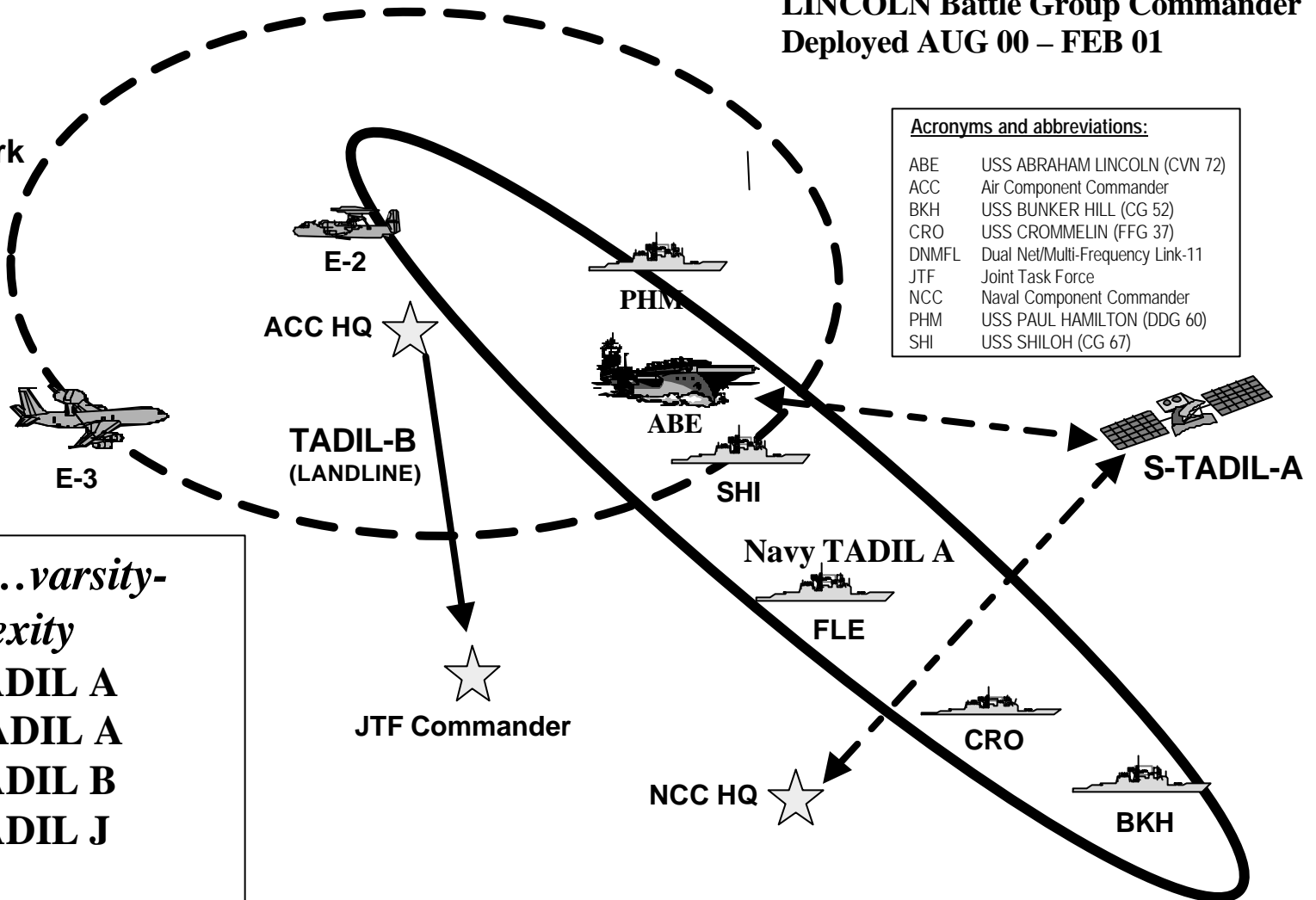
# Battle Group Link Operations

**RD&A  
CHIEF  
ENGINEER**

*“We Are Making Progress With Interoperability”*

**RADM Phil Balisle  
LINCOLN Battle Group Commander  
Deployed AUG 00 – FEB 01**

**TADIL-J  
Joint Network**



**Acronyms and abbreviations:**

ABE	USS ABRAHAM LINCOLN (CVN 72)
ACC	Air Component Commander
BKH	USS BUNKER HILL (CG 52)
CRO	USS CROMMELIN (FFG 37)
DNMFL	Dual Net/Multi-Frequency Link-11
JTF	Joint Task Force
NCC	Naval Component Commander
PHM	USS PAUL HAMILTON (DDG 60)
SHI	USS SHILOH (CG 67)

*Joint Link ...varsity-level complexity*

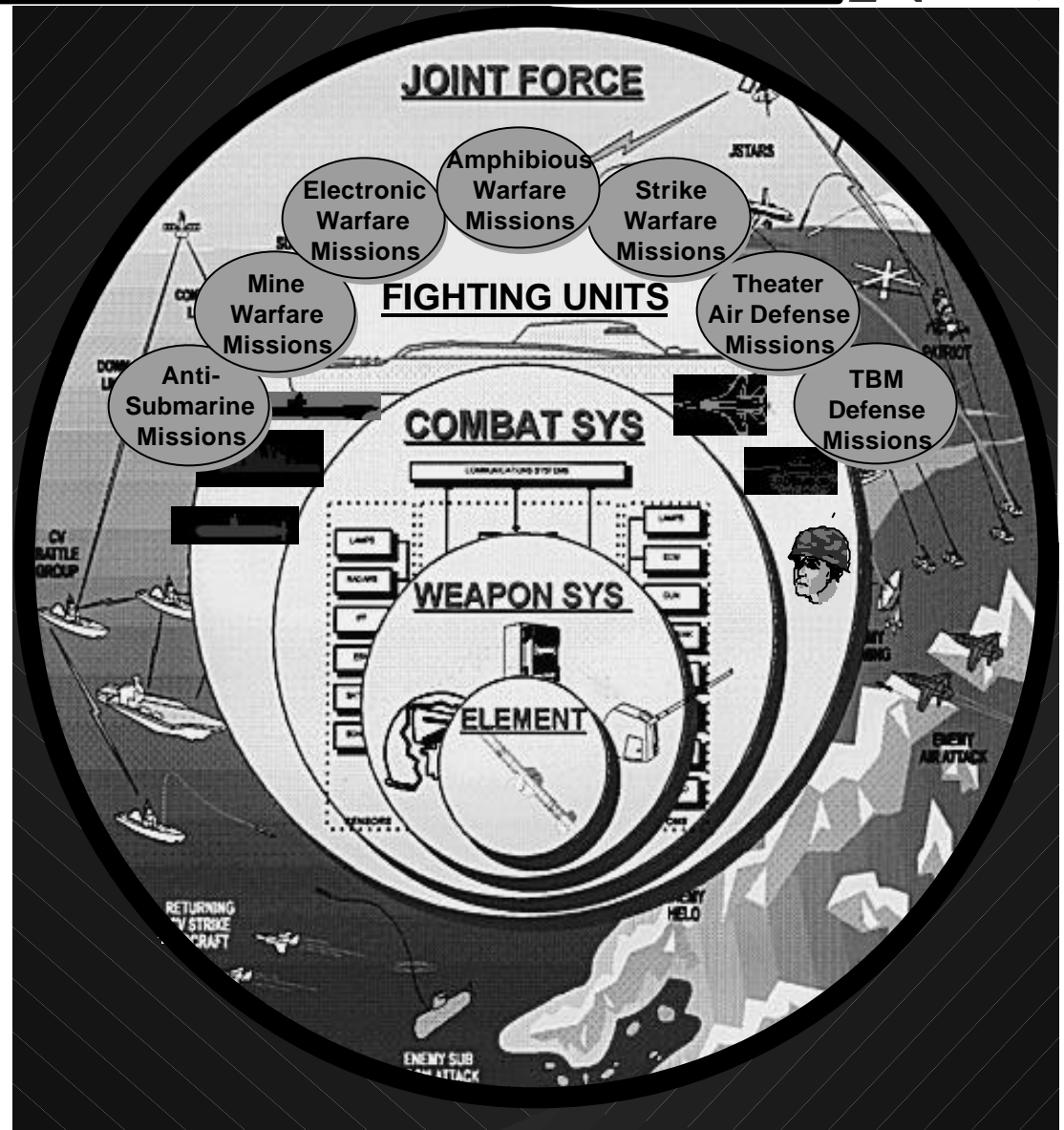
- Link 11/TADIL A
- Satellite TADIL A
- Link 11/TADIL B
- Link 16/TADIL J
- DNMFL



# The Challenge

RD&A  
CHIEF  
ENGINEER

## Systems Engineering & Management *At All Levels*

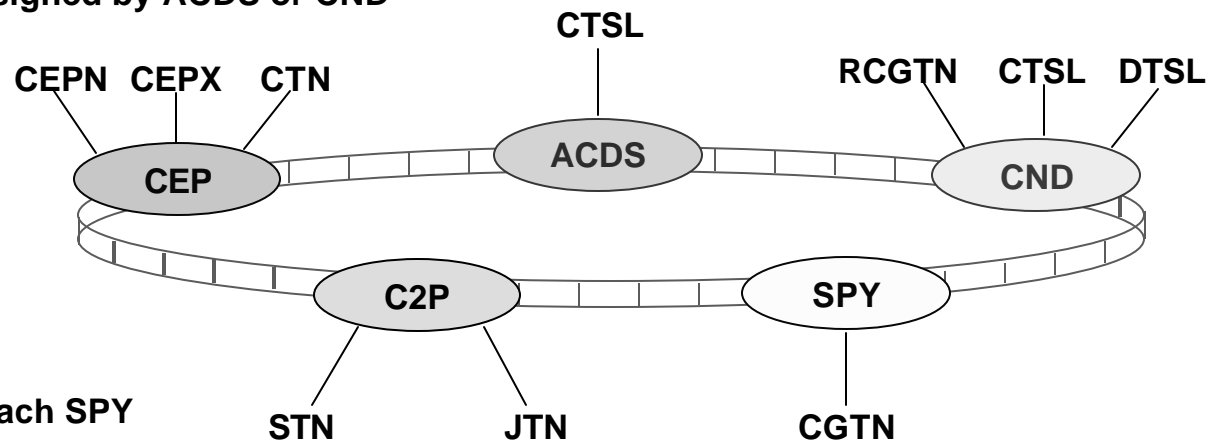




# Track Number Management, Please

RD&A  
CHIEF  
ENGINEER

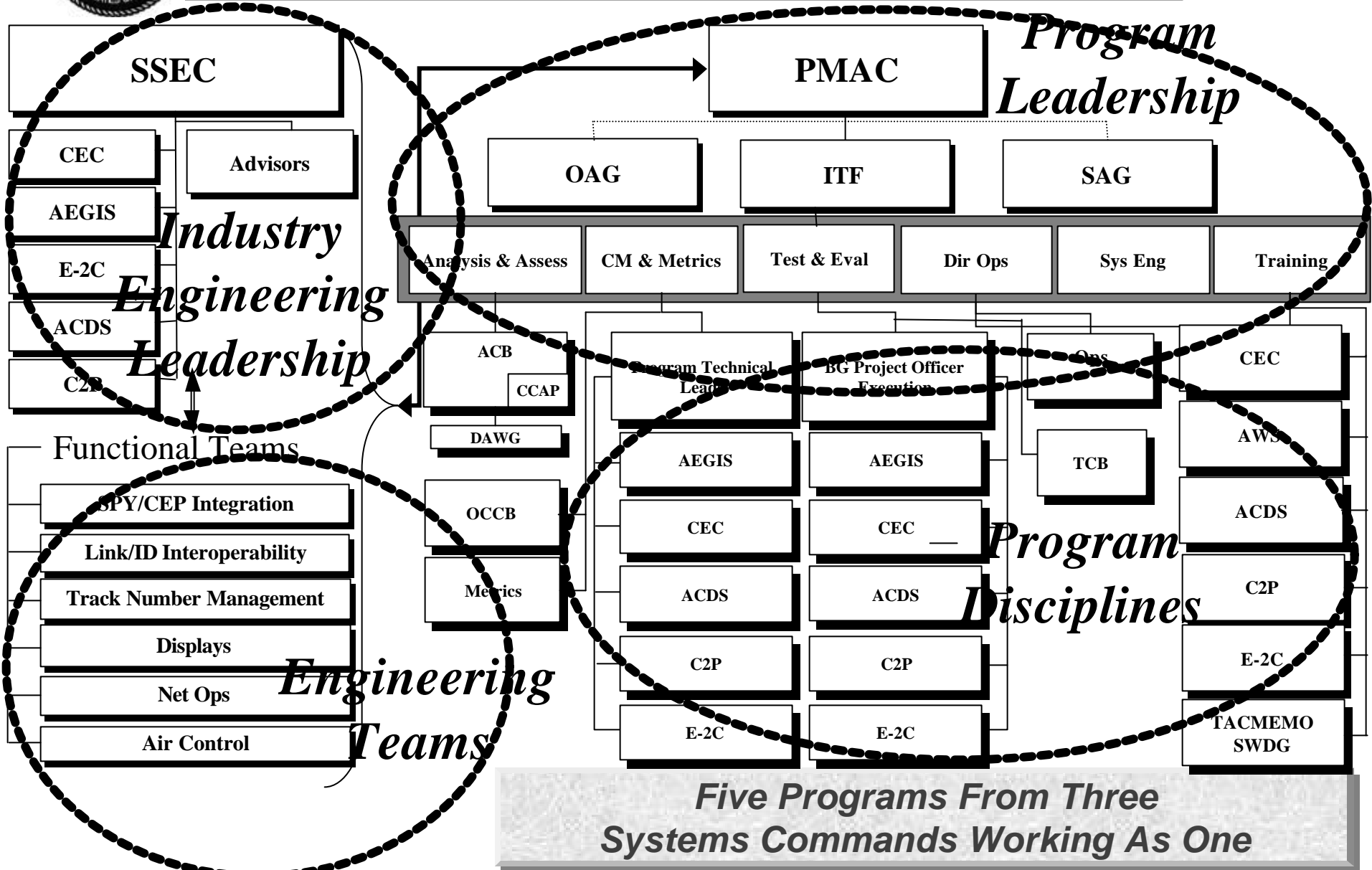
- **STN/JTN**
  - TADIL index used by all link units, assigned by R2 unit (C2P)
- **CTSL**
  - local combat system index, assigned by ACDS or CND
- **CEPN**
  - CEC index used by all CUs, assigned by originating CEP
- **CEPX**
  - local CEP index, assigned by each CEP
- **CGTN**
  - local SPY index, assigned by each SPY
- **CTN**
  - CEP local radar track index, assigned by each CEP adaptive function (SPY, 48, 49, IFF)
- **DTSL**
  - local CND Adjunct index
- **RCGTN**
  - local SPY reserved CGTN, index used for remote SPY measurements and special acquisition, assigned by each CND





# A System of Systems Success Story The Road to CEC OPEVAL

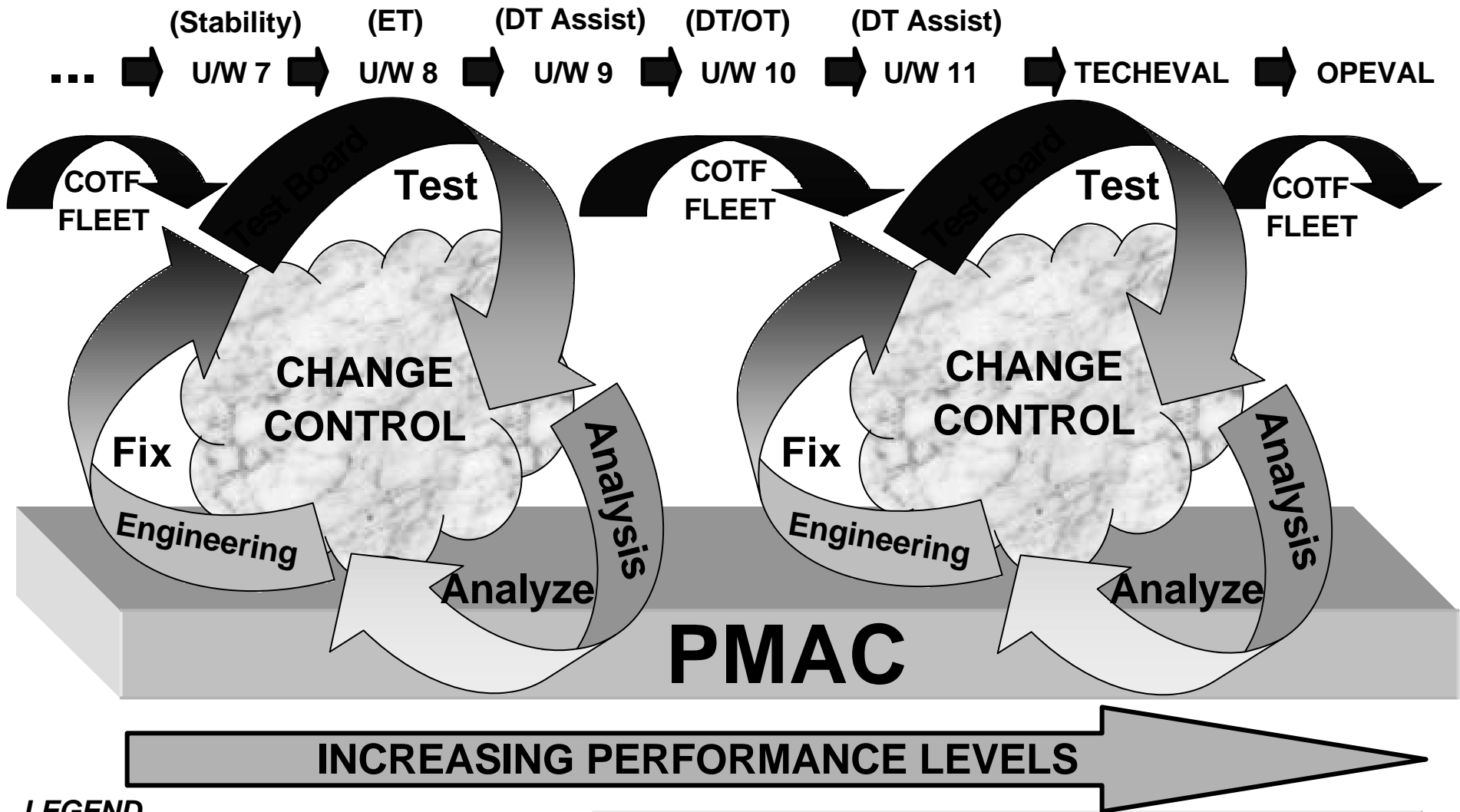
**RD&A  
CHIEF  
ENGINEER**





# Interoperability Task Force: Test - Analyze/Assess - Fix

RD&A  
CHIEF  
ENGINEER



## LEGEND

PMAC - Program Managers Advisory Council  
 COTF - Commander Operational Test & Evaluation Force

## Test - Analyze/Assess - Fix



# AEGIS DEA Improvement Program

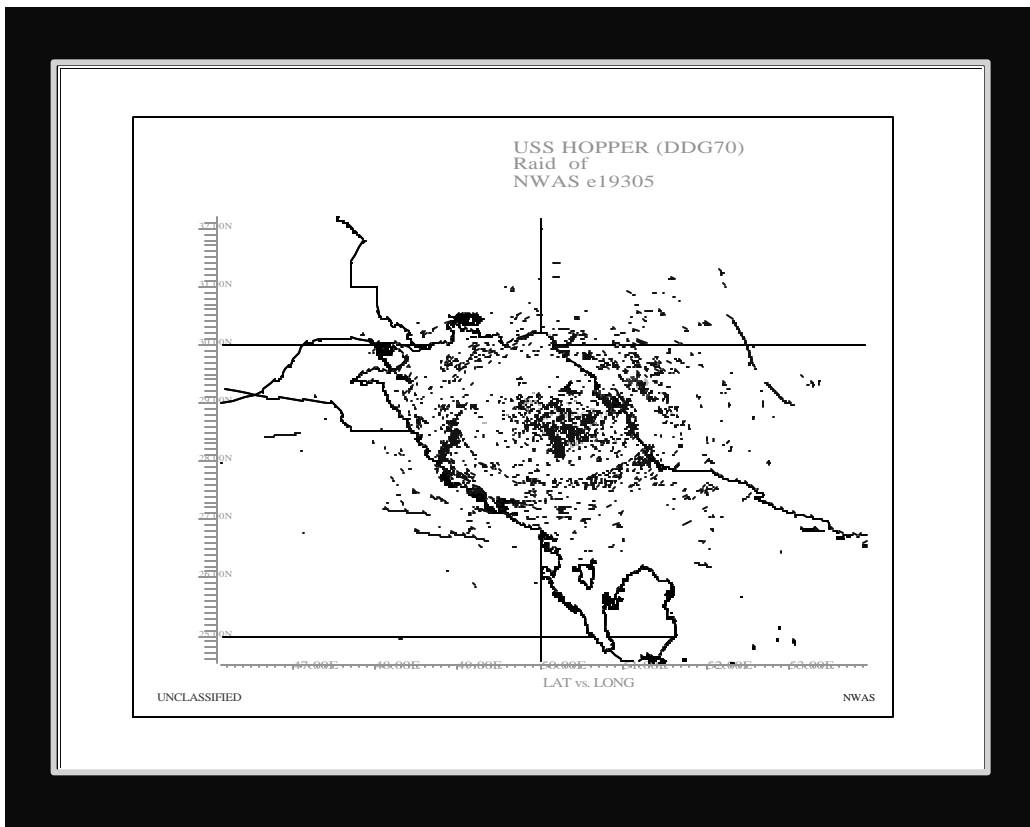
**RD&A  
CHIEF  
ENGINEER**

- **Goal:**
  - **Improve Radar Performance in the Littoral**
    - Reduce False DEA Identification
    - Reduce Track Maintenance Resource Requirements
    - Improve Track Continuity for Clear and DEA Targets

## By Redesigning:

- DEA Identification and Maintenance
- Track Steal Avoidance Logic
- Acceleration Sensing
- Track Filtering
- Track Association and Gating

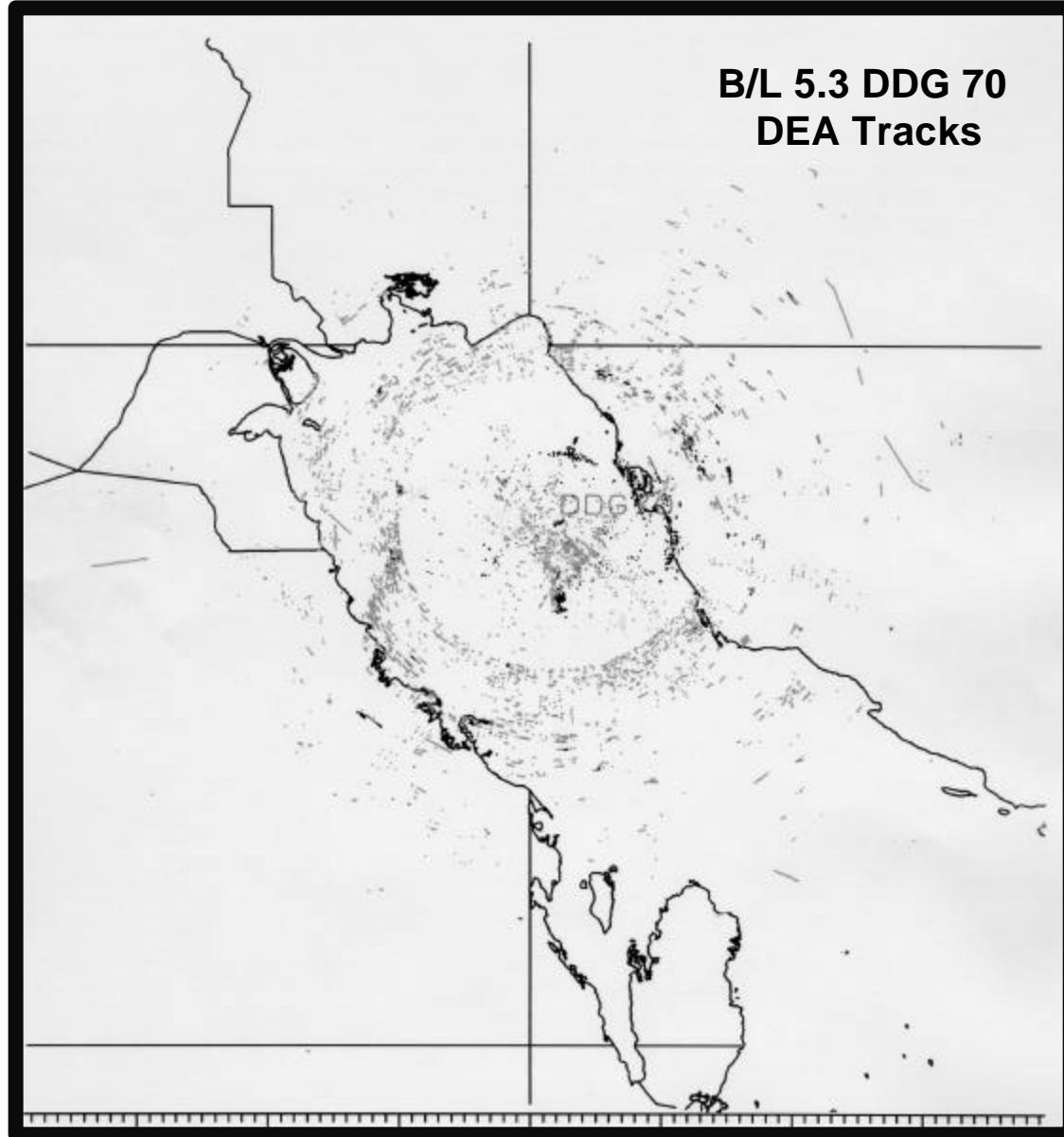
***Interoperability is  
More Than a  
Data Link Issue***





# AEGIS DEA Improvement Program Command and Control Results - June/July 2000

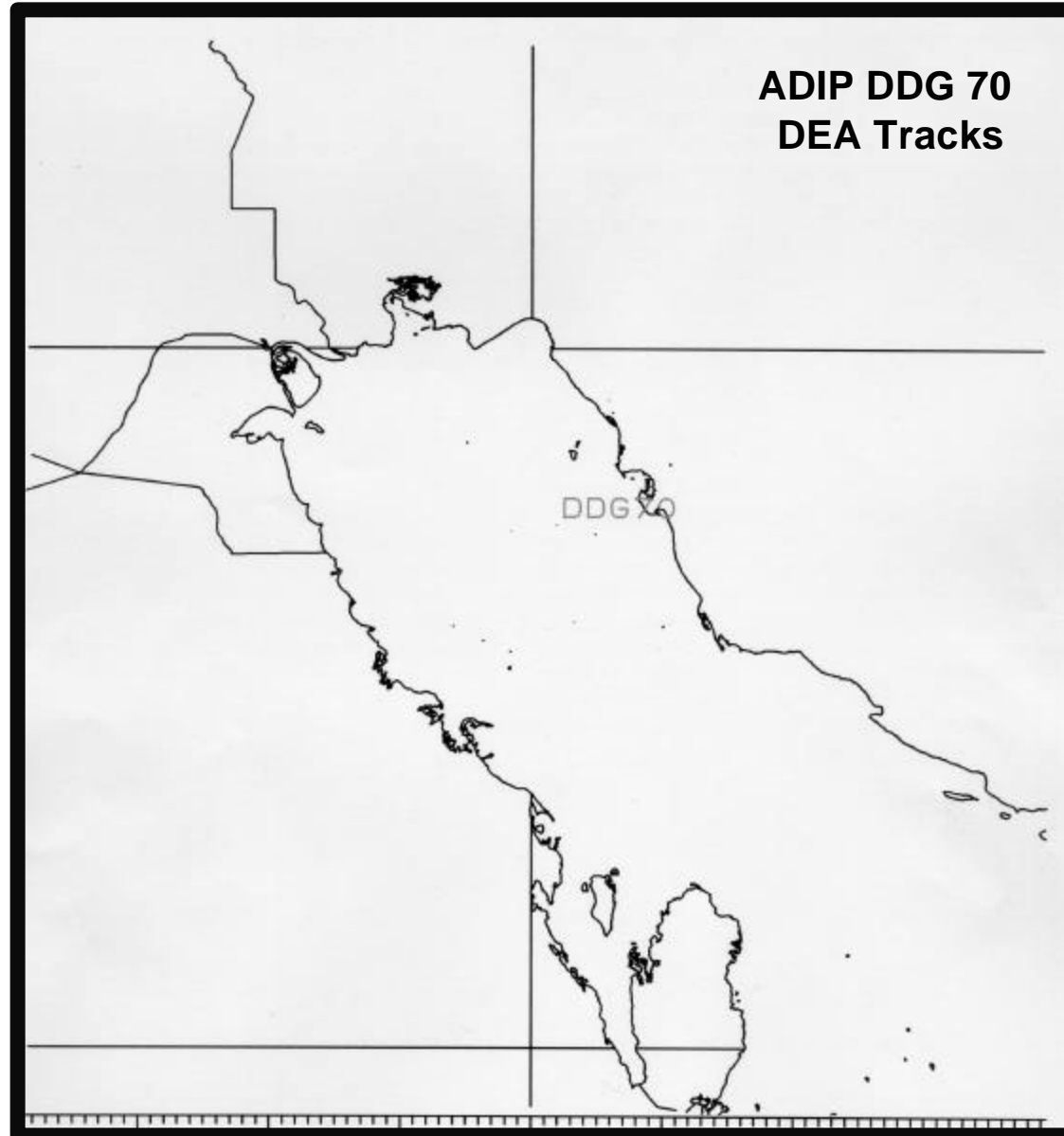
*RD&A*  
*CHIEF*  
*ENGINEER*





# AEGIS DEA Improvement Program Command and Control Results - June/July 2000

*RD&A*  
*CHIEF*  
*ENGINEER*





# CC&D Warfighting Benefits

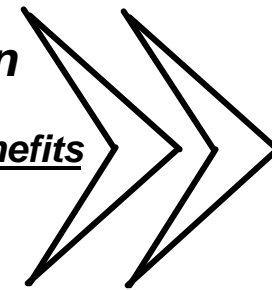
**RD&A  
CHIEF  
ENGINEER**

## Improved Interoperability...

- Completeness
- Clarity
- Accuracy
- Continuity
- Commonality

*Both of*  
• *Information*  
*And*  
• *Action*

Warfighting Benefits



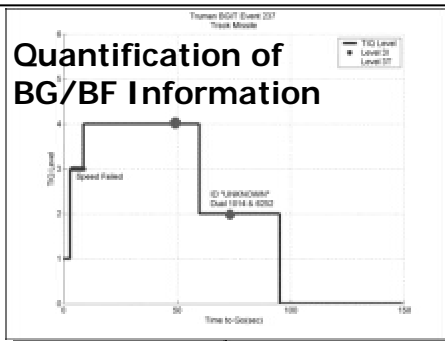
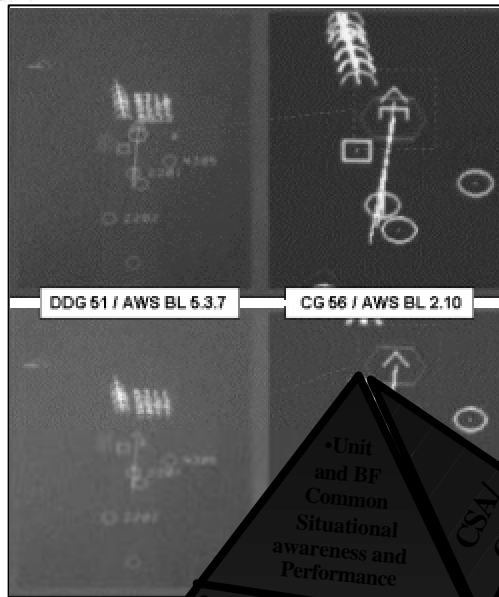
Increased  
Ability To  
Utilize Available  
Sensor  
And Weapon  
Assets

- **Shared coherent and correct situation awareness**
- **Reduction in decision reaction time**
- **Increased decision effectiveness**
- **Collaboration among units ... sharing of assets**

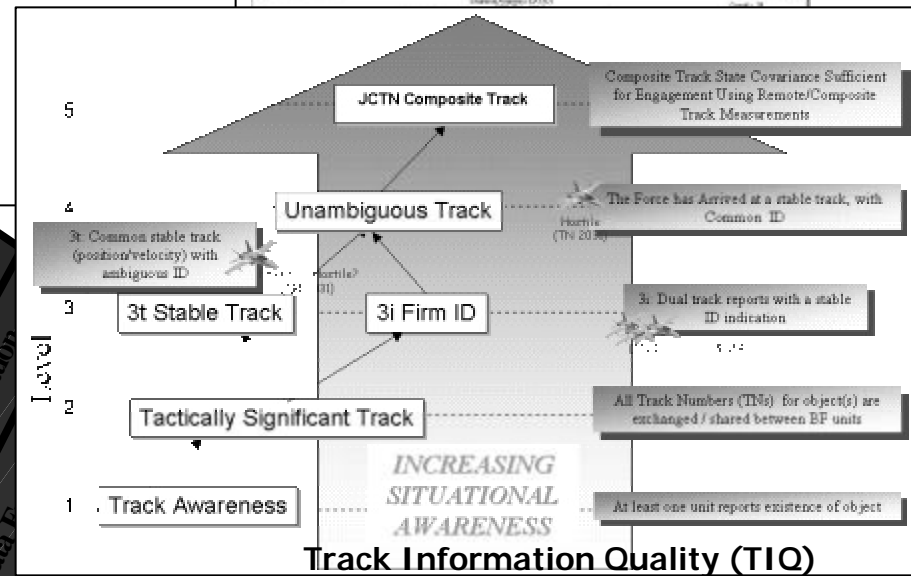
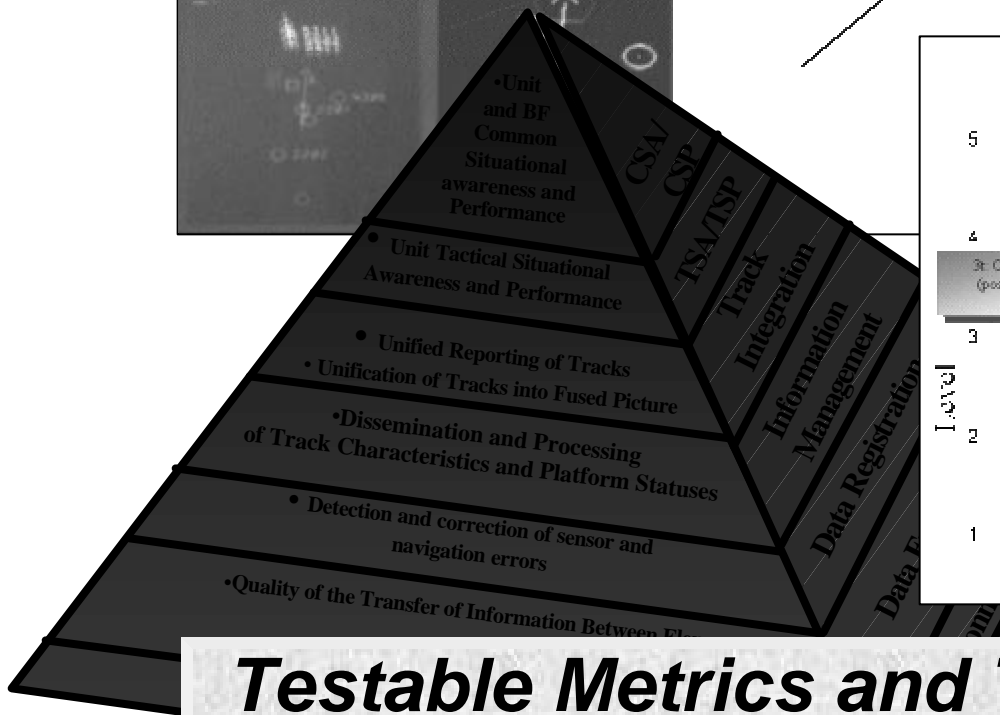
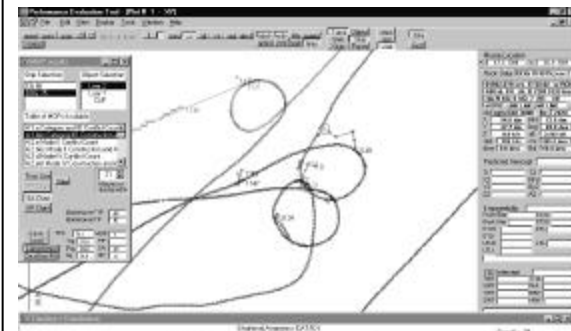


# Analytical Tools – Essential to Progress

**RD&A  
CHIEF  
ENGINEER**



Performance Evaluation Tool (PET)



## Testable Metrics and Tool Requirements Extracted from Requirements Trace



# NAVSEA 53

## Roles and Responsibilities

**RD&A  
CHIEF  
ENGINEER**

### CNO DIRECTION:

- **COMNAVSEASYS COM is assigned central responsibility to address BMC4/Combat Systems interoperability problems within the SYSCOMS/PEOs, and to coordinate resolution with the fleet. (CNO RMG 021648Z May 98)**
  - **Develop policy and architecture for BF Warfare Systems Engineering Process**
  - **Implement a common Warfare Systems Engineering Process**
  - **Provide top level direction for fielding and support of balanced combat systems in shipboard submissions**
  - **Develop and implement, with OPNAV and FLTCINCs, an improved battle group interoperability management process**

### COMNAVSEA RESPONSE:

- **Assigned single office with responsibility for implementation/execution of Battle Force Interoperability (SEA 53)**
- **Designated Battle Force Systems Engineer (SEA 007)**
- **Issued guidance and policy paper 98-03, with FLTCINC concurrence, as interim guidance**



# SEA 53 Products & Processes Supporting Interoperability Today

**RD&A  
CHIEF  
ENGINEER**

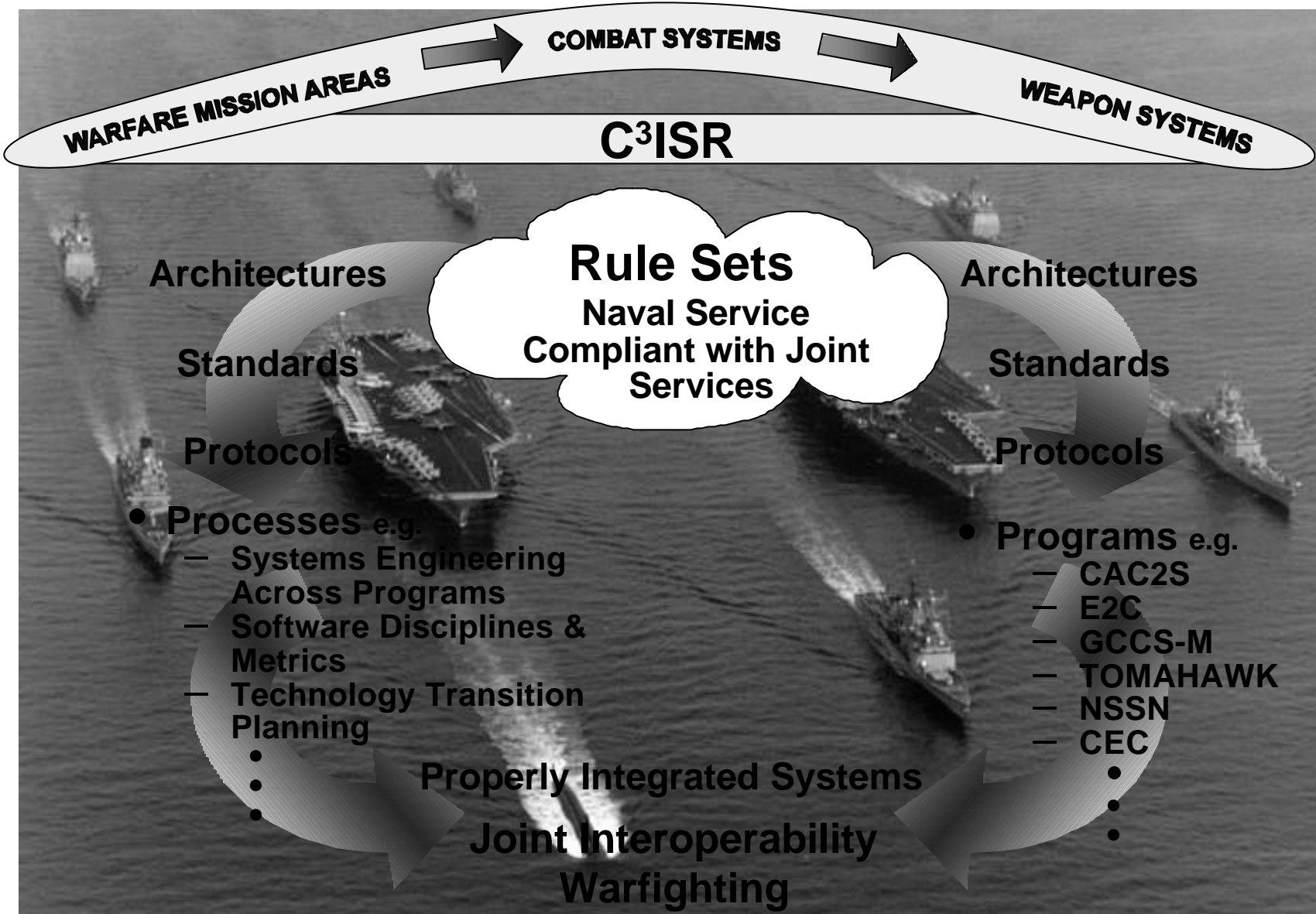
- **Tools, Process and People in Place**
  - Navy Distributed Engineering Plant (DEP)
  - D-30 Certification Process
  - Battle Force Action Officer/Fleet Liaison Program
- **Responsive to CNO/Fleet Requirements**
  - Joint CLF/CPF Instruction 4720.3A (D-30 policy)
  - CPF RMG 251912Z May 00 (adapts FDNF to D-30)
- **Shifted Interoperability Focus From Ship-Centric to Battle Group-Centric**
- **Moved Interoperability Testing Ashore**
- **Credibility established - CINPACFLT RMG 300229Z Aug 00**

***A Disciplined Systems Engineering  
Approach Is In Place, and Is Maturing***



# RDA CHENG Philosophy

**RD&A  
CHIEF  
ENGINEER**

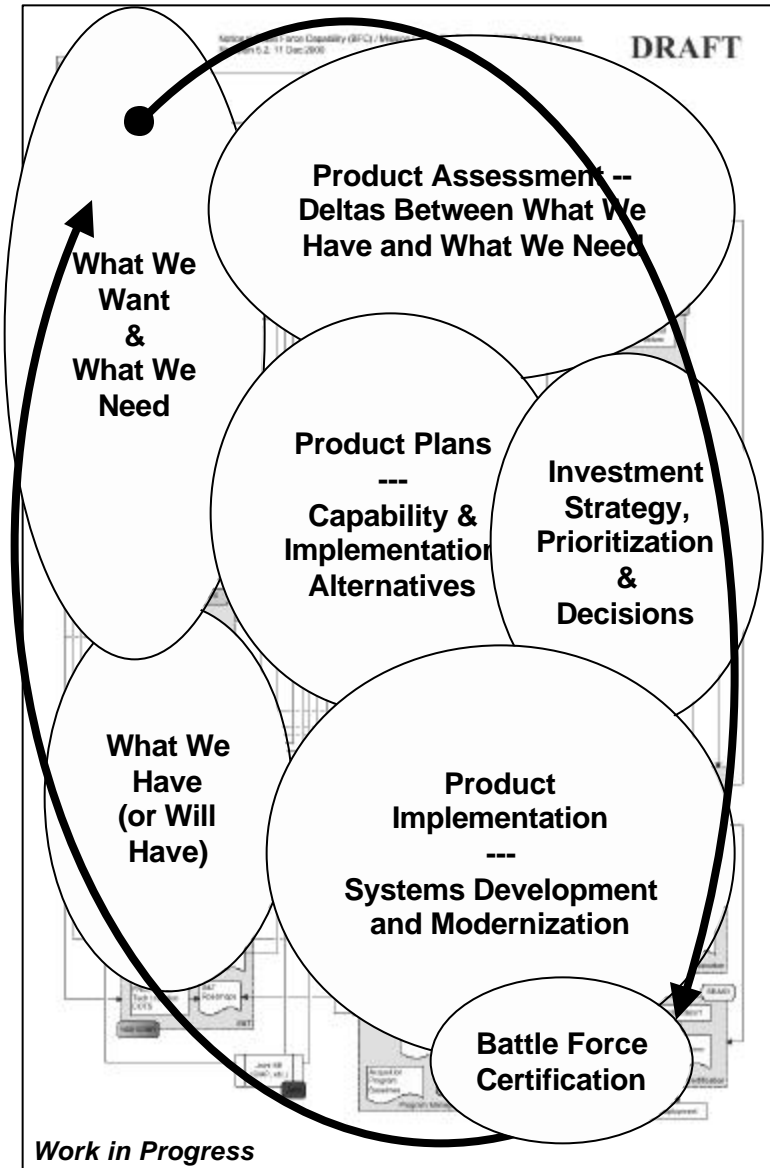






# BFC/MCP Global Process

**RD&A  
CHIEF  
ENGINEER**



## Changes to the status quo:

- Requirements integration
- Integrated capability architectures
  - Linked to service/joint strategy
  - Approved at highest levels
  - Linked to Navy's PPBS process
- Integrates the DoD decision support systems
  - Requirements generation
  - PPBS
  - Acquisition management

***A Unified Work in Progress Among  
OPNAV, SEA 53,  
RDA CHENG, SIAP SE***





# Conclusion

**RD&A  
CHIEF  
ENGINEER**

- **Lessons Learned Implementation**
  - Organizational change (structural/behavioral)
  - Developmental speed and agility achieved through adherence to fundamentals
  - Clearly identified and defined system boundaries
  - Disciplined system engineering
  - Clearly documented and articulated interoperability requirements
  - Visible and meaningful involvement of the operator... for interoperability... More is better
- **Interoperability is a Priority Issue**

**From “Fire Fighting” to “Fire Prevention!”**