Interoperability: The Navy View - An Acquisition Perspective

Naval Interoperability Workshop
30 May 2001
**Report Documentation Page**

<table>
<thead>
<tr>
<th><strong>Report Date</strong></th>
<th><strong>Report Type</strong></th>
<th><strong>Dates Covered (from... to)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>30052001</td>
<td>N/A</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Title and Subtitle</strong></th>
<th><strong>Contract Number</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Interoperability: The Navy View - An Acquisition Perspective</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Author(s)</strong></th>
<th><strong>Grant Number</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Paige, Kate</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Performing Organization Name(s) and Address(es)</strong></th>
<th><strong>Performing Organization Report Number</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>RDA CHENG</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Sponsoring/Monitoring Agency Name(s) and Address(es)</strong></th>
<th><strong>Sponsor/Monitor’s Acronym(s)</strong></th>
<th><strong>Sponsor/Monitor’s Report Number(s)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>NDIA (National Defense Industrial Association 2111 Wilson Blvd., Ste. 400 Arlington, VA 22201-3061</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Distribution/Availability Statement</strong></th>
<th><strong>Supplementary Notes</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Approved for public release, distribution unlimited</td>
<td>Proceedings from Armaments for the Navy Interoperability Workshop, 30-31 May 2001 sponsored by NDIA.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Abstract</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Subject Terms</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Report Classification</strong></th>
<th><strong>Classification of this page</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>unclassified</td>
<td>unclassified</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Classification of Abstract</strong></th>
<th><strong>Limitation of Abstract</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>unclassified</td>
<td>UU</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Number of Pages</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
</tr>
</tbody>
</table>
“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

“... 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

From

Independent Program
Focused System
Engineering Efforts

Independent
Program
Management

Stovepipe Program
Development

Stand Alone
Program Test &
Analysis

Ad Hoc Fleet
Involvement

To

Force Level
System
Engineering

Coordinated
Program
Management

Multi-Program
Development

Integrated
Test & Analysis

Integrated
Fleet
Involvement

SENSE OF URGENCY

Without Abandoning the Rigor of
Engineering the Fighting Unit
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.”
27 FEB 01
CEC TECHEVAL

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

- 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

“We Are Making Progress With Interoperability”

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

Joint Link … varsity-level complexity
• Link 11/TADIL A
• Satellite TADIL A
• Link 11/TADIL B
• Link 16/TADIL J
• DNMFL

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)
The Challenge

Systems Engineering & Management

At All Levels
Track Number Management, Please

- **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

SSEC
CEC
AEGIS
E-2C
ACDS
C2P

Functional Teams

SPY/CEP Integration
Link/ID Interoperability
Track Number Management
Displays
Net Ops
Air Control

Industry Engineering Leadership

Advisors

Five Programs From Three Systems Commands Working As One
Interoperability Task Force: Test - Analyze/Assess - Fix

Test - Analyze/Assess - Fix

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

INCREASING PERFORMANCE LEVELS
AEGIS DEA Improvement Program

• 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
CC&D Warfighting Benefits

Improved Interoperability…

- Completeness
- Clarity
- Accuracy
- Continuity
- Commonality

• Shared coherent and correct situation awareness

• Reduction in decision reaction time

• Increased decision effectiveness

• Collaboration among units … sharing of assets

Both of
- Information
- Action

Increased ability to utilize available sensor and weapon assets
Analytical Tools – Essential to Progress

Quantification of BG/ BF Information

Performance Evaluation Tool (PET)

Testable Metrics and Tool Requirements Extracted from Requirements Trace
CNO DIRECTION:

• COMNAVSEASYSCOM is assigned central responsibility to address BMC4I/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

• 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

- Architectures
- Standards
- Protocols
- Processes e.g.
  - Systems Engineering Across Programs
  - Software Disciplines & Metrics
  - Technology Transition Planning

C³ISR

Rule Sets
Naval Service Compliant with Joint Services

Architectures
Standards
Protocols

- Programs e.g.
  - CAC2S
  - E2C
  - GCCS-M
  - TOMAHAWK
  - NSSN
  - CEC

Properly Integrated Systems
Joint Interoperability
Warfighting
SIAP: An Operational Imperative
BFC/MCP Global Process

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
“A conversation is a dialogue, not a monologue. That’s why there are so few good conversations: due to scarcity, two intelligent talkers seldom meet.”

Truman Capote
Conclusion

• 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!”