



Few Warfighters in a More Complex Environment

Presentation to:
Undersea HSI Symposium
4 May 2004

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Human Systems Integration SEA 03
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Outline

- u **What is Technical Authority?**
- u Where we are today
- u New Acquisition Programs
- u Sea Warrior
- u Summary



An Historic Document

29 Mar 2004



DEPARTMENT OF THE NAVY
NAVAL SEA SYSTEMS COMMAND
1333 ISAAC HULL AVE SE
WASHINGTON NAVY YARD DC 20376-0001

IN REPLY TO
5000
Ser 05D/016
29 Mar 2004

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MEMORANDUM

From: SEA 05, SEA 06, SEA 03

To: PEO Ships
PMS 500

Subj: DD(X) TECHNICAL FEASIBILITY ASSESMENT (TFA) RESULTS

Encl: (1) DD(X) Baseline 3 TFA Issues and Recommendations

1. **Purpose.** This memorandum documents the top-level technical feasibility issues briefed to you and the Design Agent (DA) on 10 March 2004. These issues are distilled from the Technical Feasibility Assessments conducted by the SYSCOM Cognizant Technical Authorities (CTAs) on the Baseline 3 DD(X) design released in December 2003, tempered where appropriate by additional information learned in the segment PDRs. The full breadth of the CTAs' issues was briefed to the Ship Program Manager and DA on 21 January 2004. In addition, a similar process was conducted on the highly classified aspects of the program, and documented via a Statement of Findings.

2. **TFA Findings.**

a. No fatal flaws were noted in the Baseline 3 design that would immediately make it invalid or non-viable, but several elements of technical feasibility remain open-ended and must be aggressively managed and resolved as early as possible during Contract Design. They are included in the listing of TFA issues and recommendations provided in enclosure (1). It is anticipated that resolution of those issues will impact the basic functional baseline of the ship to some degree, so the earlier those configuration changes occur, the sooner a reconfirmation of a technically balanced design can be achieved.

b. Though an unprecedented level of detail has been brought forward in the DD(X) Preliminary Design, design maturity remains

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4. There is no auxiliary power source physically separated from the propulsion spaces to ensure power in an emergency IAW NAVSEA Design Practices and Criteria Manual, Chapter 300 (NAVSEA T9300-AF-PRO-020). A power source must be added to generate approximately 450kW.

3. **Action.**

a. We recommend continued dialog with the CTA's and their representatives to reach full understanding on the best course for resolution of the identified issues. The engineering community remains committed to do all that is possible to keep the design on track for CDR and Design Approval in July 2005.

b. Looking ahead to Design Approval, when taking account of the level of risk and concurrent activity in the program, it is clear that time is very short. Speed will be of the essence for completing the Contract Design in the time allotted. We are pleased that you have agreed to reconvene the Stakeholder Steering Board at the end of design cycle 4.1 to help jump start this process and confirm that we are on a steady path of risk retirement.

c. With regard to Design Approval activity, to take benefit from lessons learned on other recent programs, we propose that evaluation of the final Contract Design Baseline and concomitant Ship Specification conclude immediately prior to CDR, and that the final Design Approval be provided following CDR.

RADM P. E. SULLIVAN, USN
Deputy Commander for Ship Design,
Integration and Engineering

RADM V. B. HICKS, USN
Deputy Commander for
Warfare Systems Engineering

G. L. MAXWELL
Deputy Commander for
Human Systems Integration



HSI Technical Authority

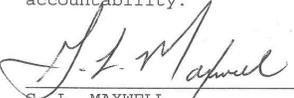
 **DEPARTMENT OF THE NAVY**
NAVAL SEA SYSTEMS COMMAND
1333 ISAAC HULL AVE SE
WASHINGTON NAVY YARD DC 20376-0001

IN REPLY TO
5400
Ser 03/010
18 Mar 2003

From: Commander, Naval Sea Systems Command
To: Mr. J. Robert Bost (SEA 03TD)
Subj: TECHNICAL AUTHORITY WARRANT
Ref: (a) NAVSEAINST 5400.97A, Engineering and Technical Authority Policy, of 03 Feb 03
Encl: (1) Scope of the Technical Authority Warrant for Human Systems Integration

1. You are the NAVSEA warranted technical authority for human systems integration. Your signature of this letter acknowledges your understanding and acceptance of the authority, responsibility and accountability of a Technical Area Expert as specified in references (a), with the scope of technical authority outlined in enclosure (1). This letter is your warrant of technical authority and is effective as of the date of this letter and until it is revoked by letter.

2. This technical authority warrant does not circumvent your operational and administrative chain of command or its accountability.


G. L. MAXWELL
Deputy Commander for
Human Systems Integration


P. M. BALISLE
Vice Admiral, U.S. Navy
Commander
Naval Sea Systems Command


J. ROBERT BOST
Technical Area Expert for
Human Systems Integration

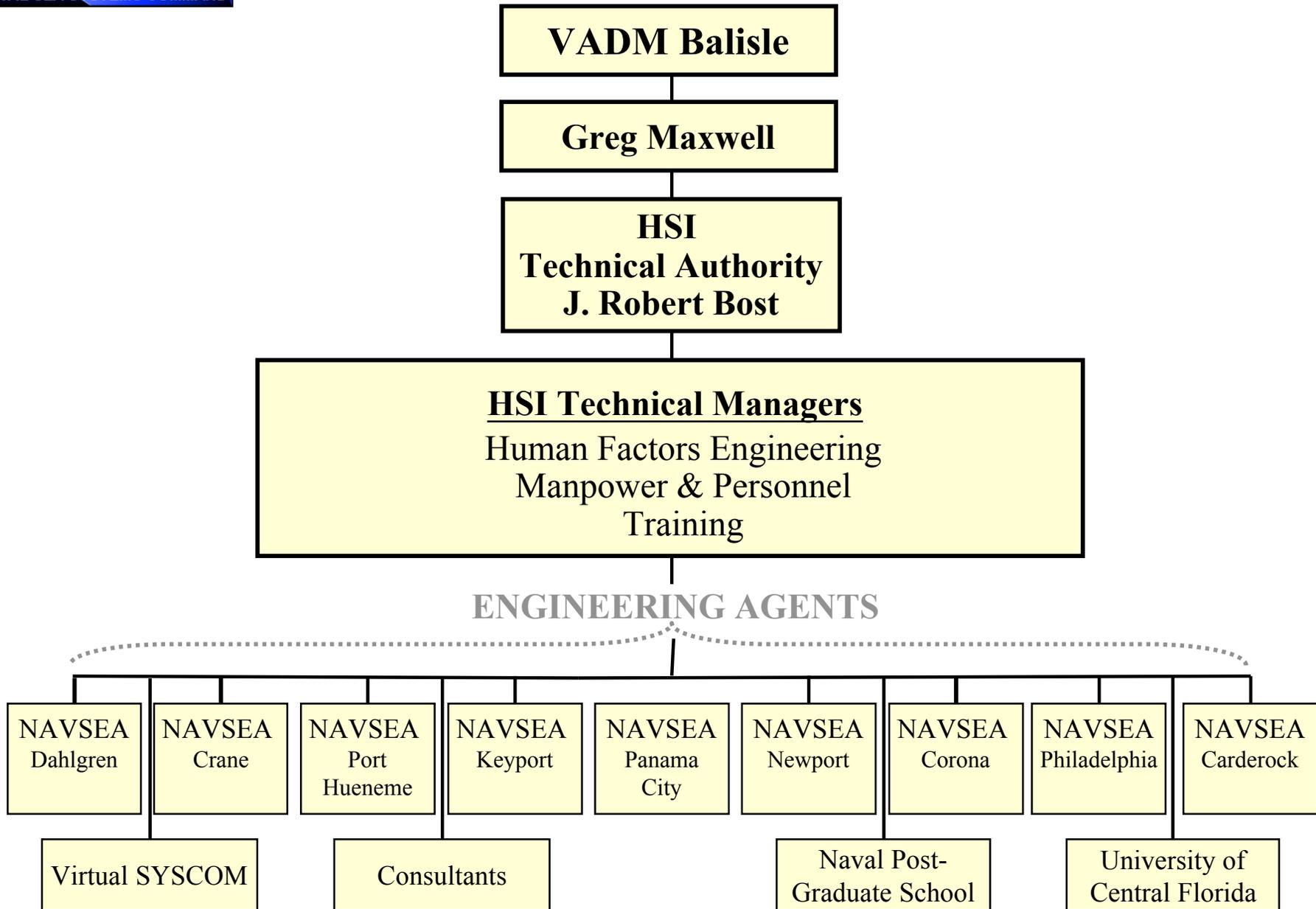
u HSI Technical Authority warranted by COMNAVSEA

u HSI Warrant includes all authority per NAVSEA Technical Authority Policy

- Areas of responsibility include HFE, Manpower, Personnel, and Training
- Technical assessment and certification of Programs
 - Enhanced Sailor Performance
 - Optimized MPT
 - Promote safety, survivability, and QOL

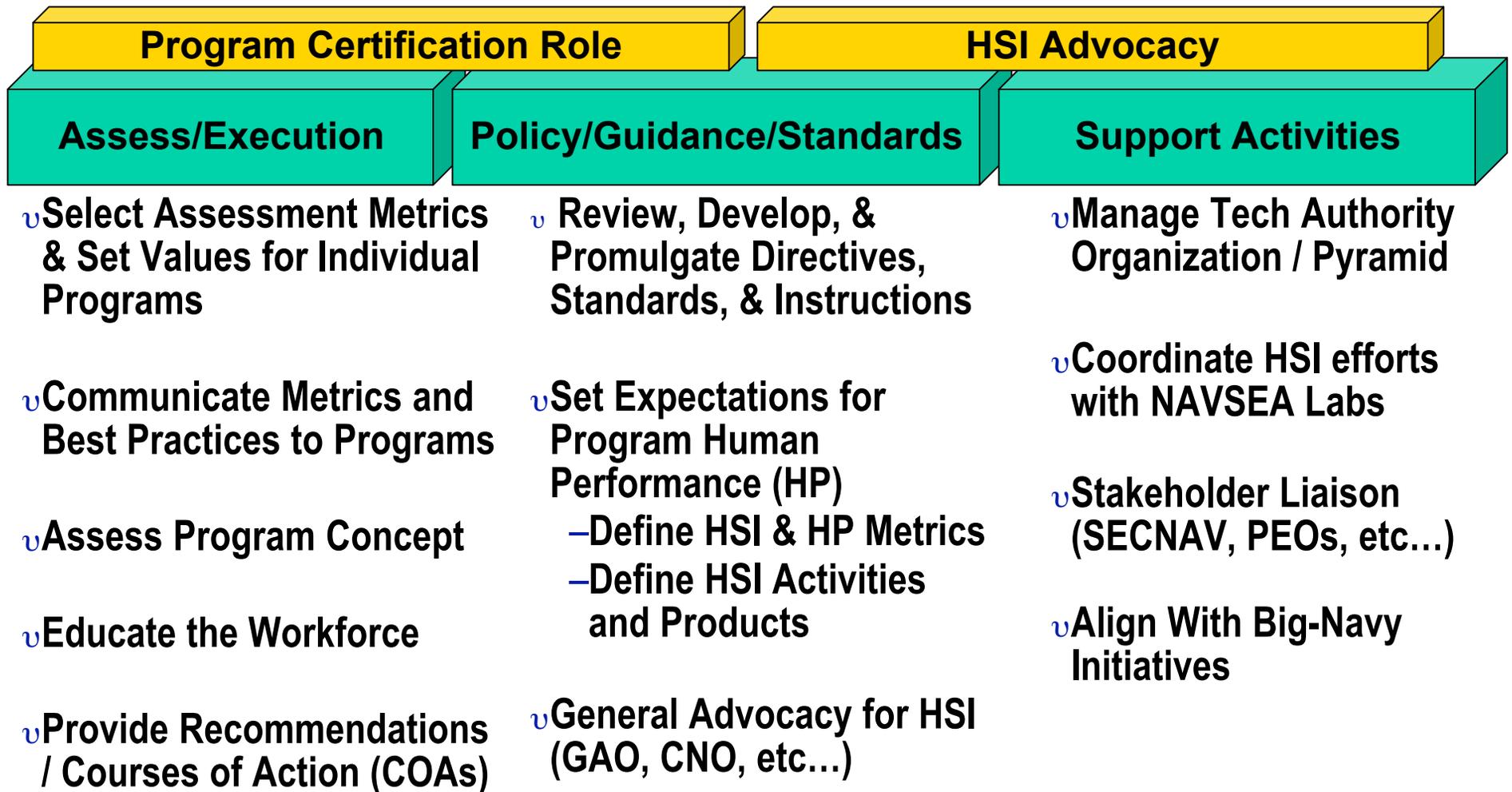


HSI Technical Authority Pyramid



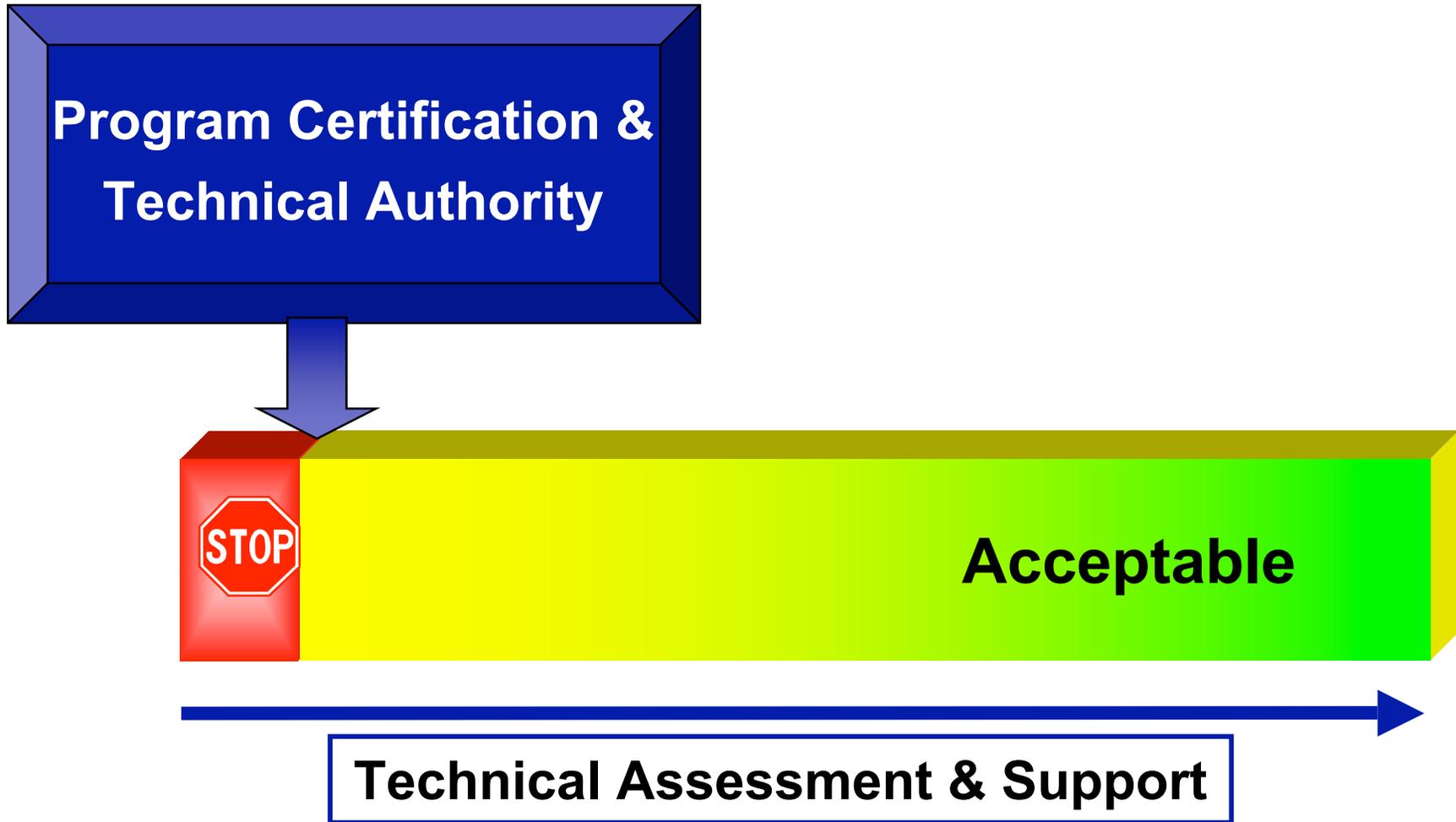


SEA 03 / HSI Technical Authority Functional Areas (Across Domains)





Technical Assessment / Authority





Outline

- u What is Technical Authority?
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The Bottom Line

λ **Old Think: How do we man ships and systems?**

λ **Old Think results in:**

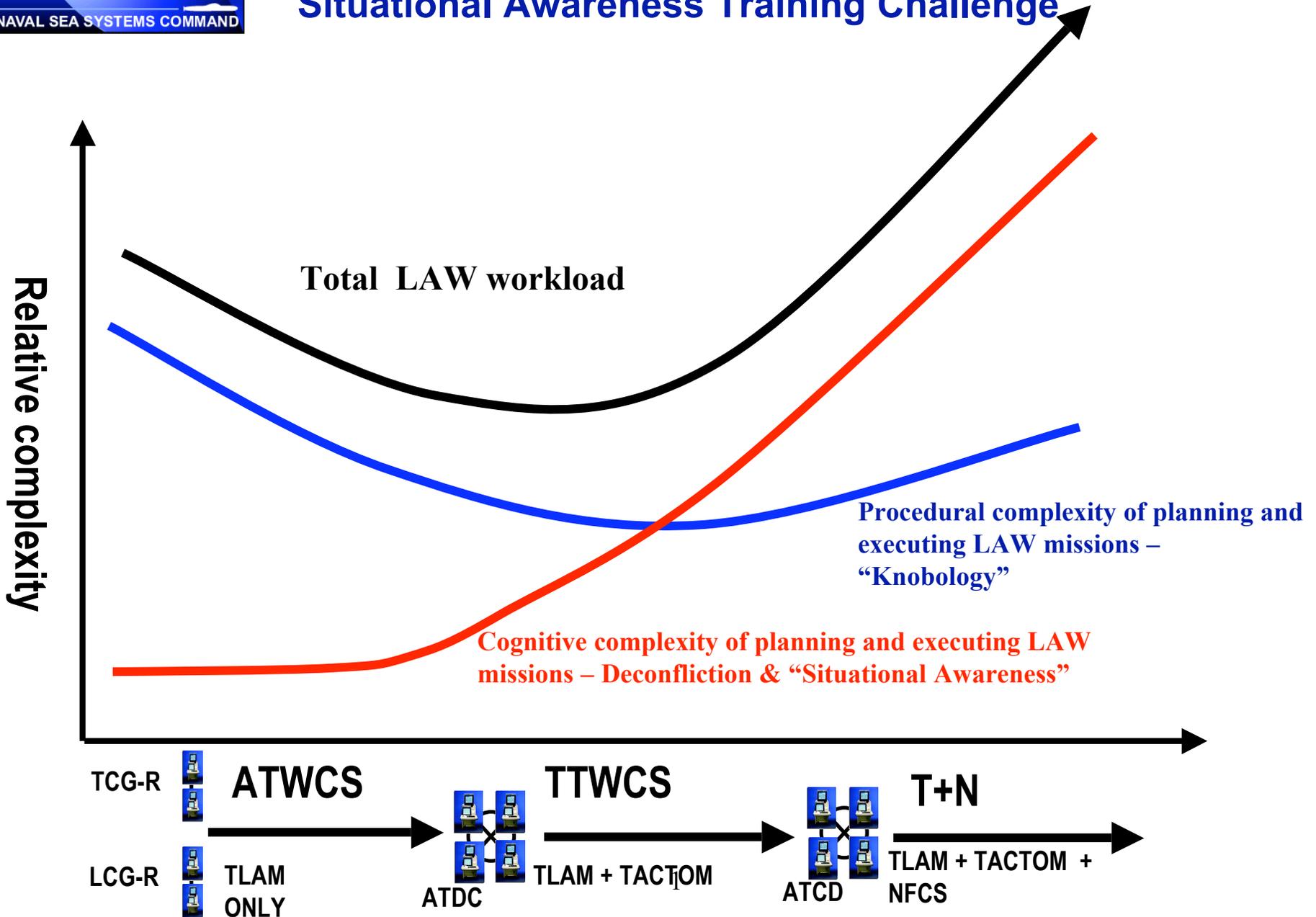
- **Sub-optimized human performance and reliability**
 - **Poor usability**
 - **Confusing situational awareness**
 - **Complicated systems**
 - **Complex, costly logistic tails**
- **High training & manning costs**
- **Increased system response time**



New Think: How do we design Warfighter performance into ships and systems?



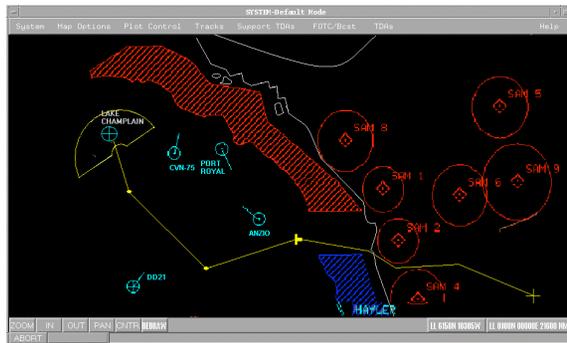
An Example: Situational Awareness Training Challenge



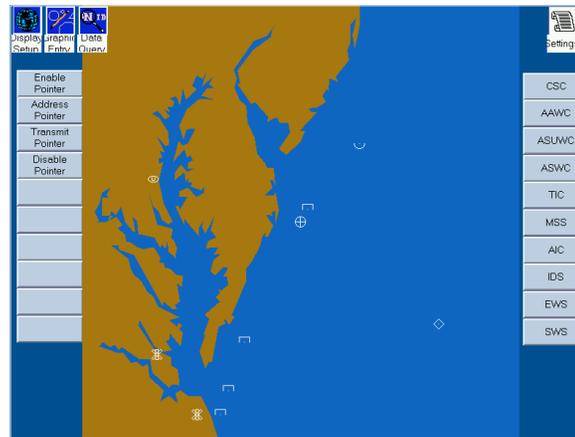


Aegis and Land Attack Related Displays

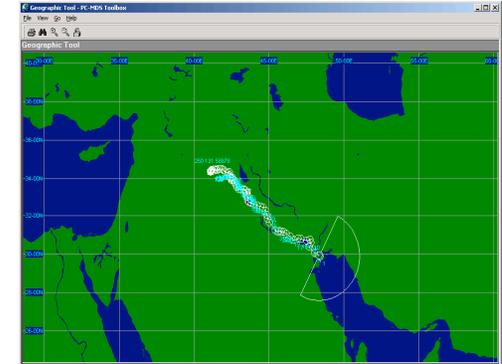
TTWCs



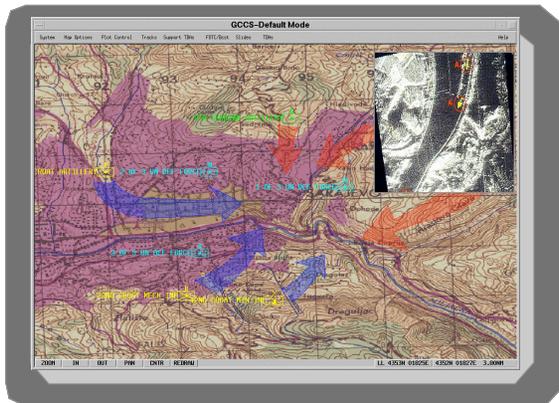
ADS



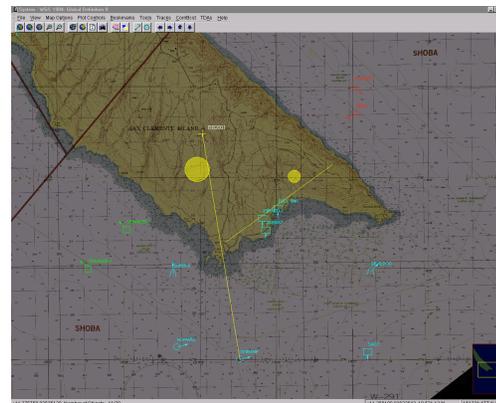
PC MDS



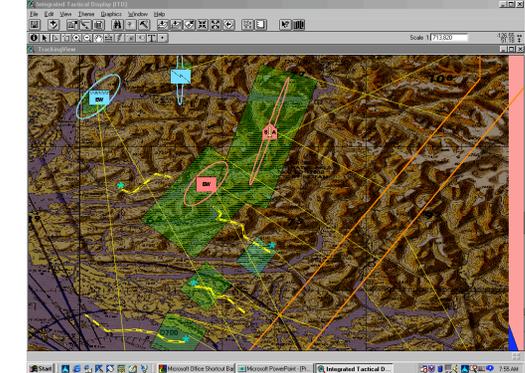
GCCS-M



NFCS



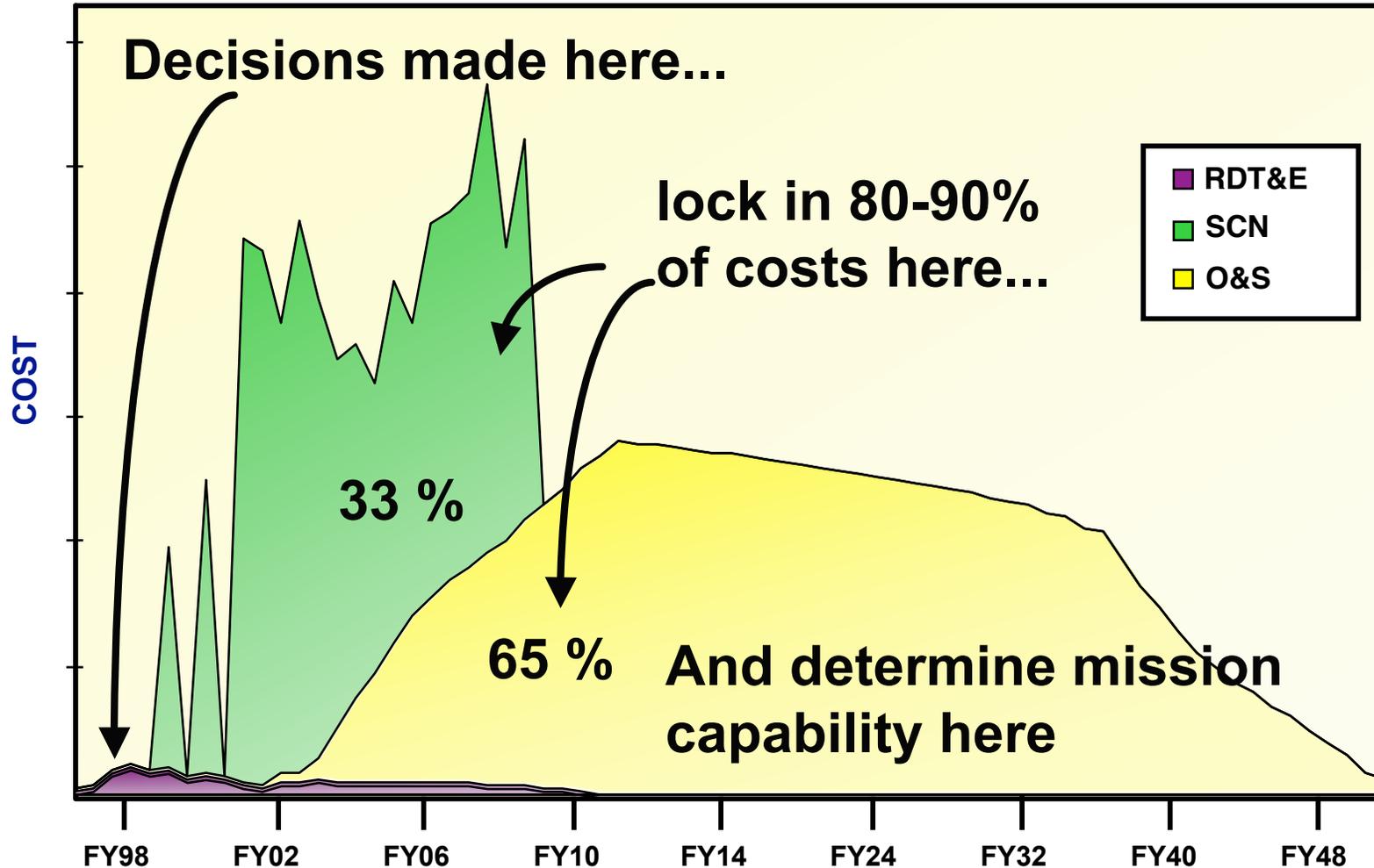
TES-N*



*NFN ≈ TES + GCCS + JSIPS-N
Converged Architecture

Why HSI?

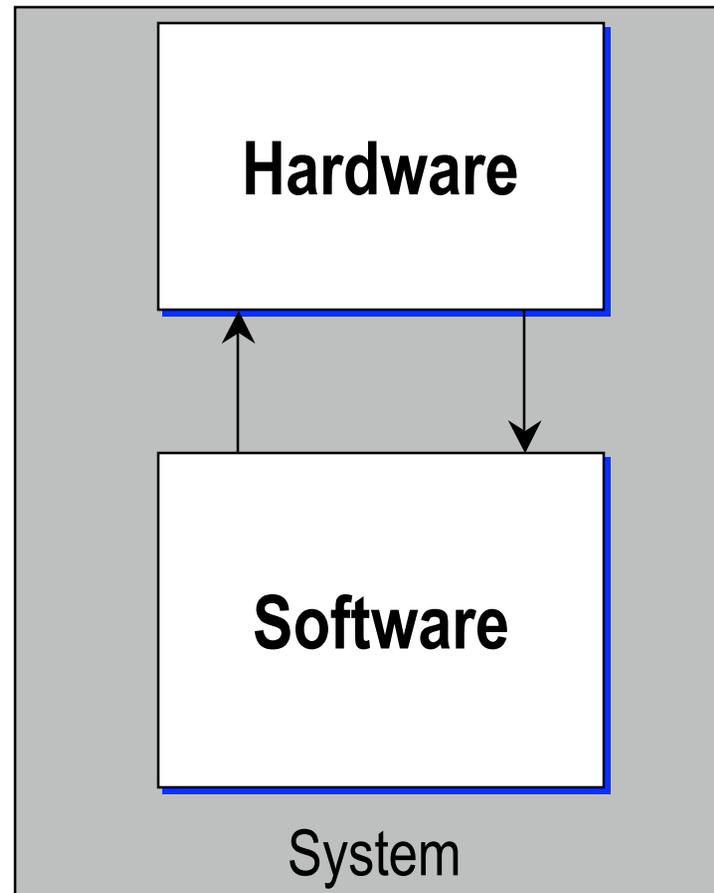
No Change = Legacy \$ Profile



Early decisions drive TOC

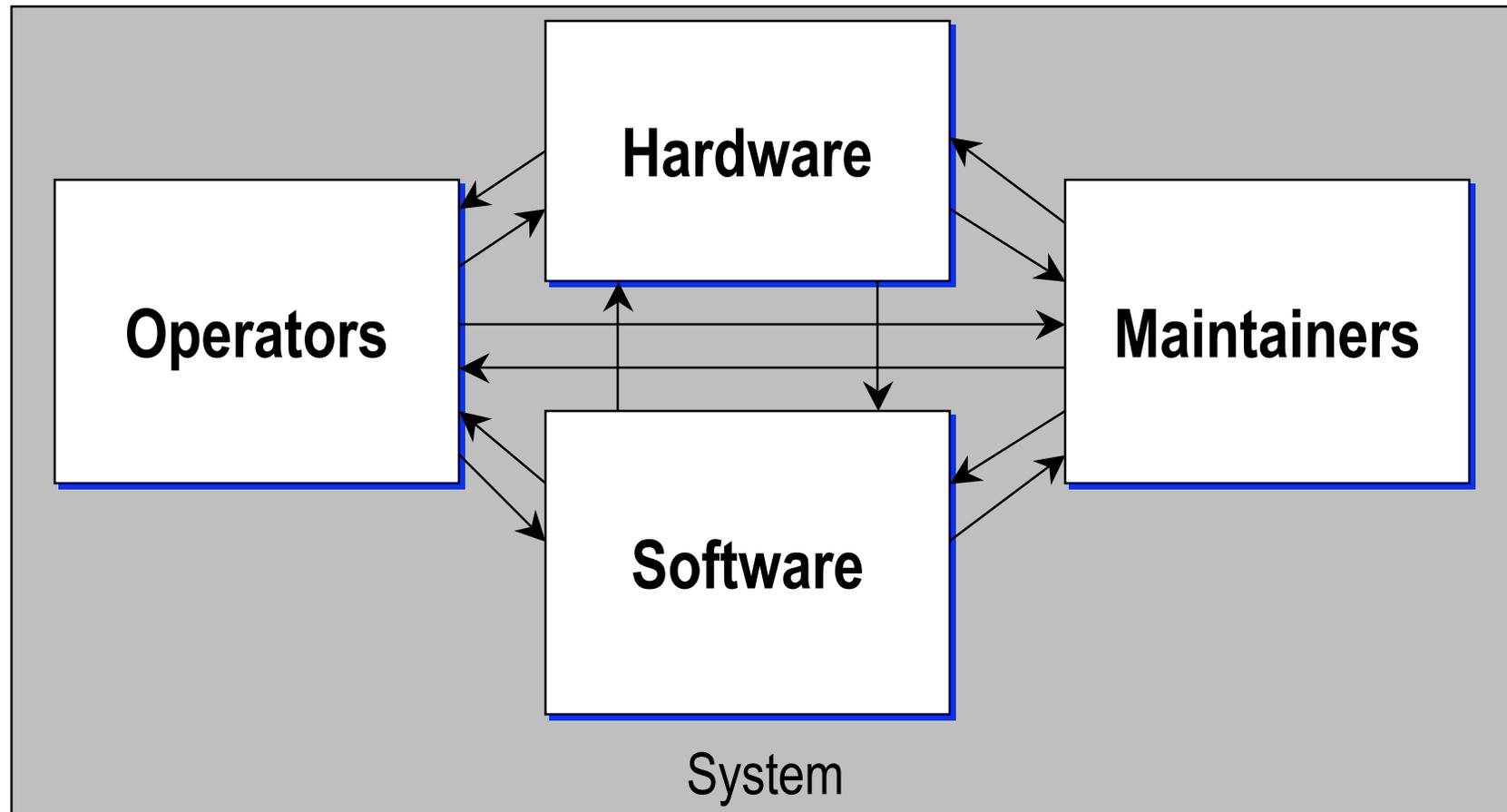
Thinking Traditionally

Traditional Perspective of System



Thinking Differently

New Perspective of System



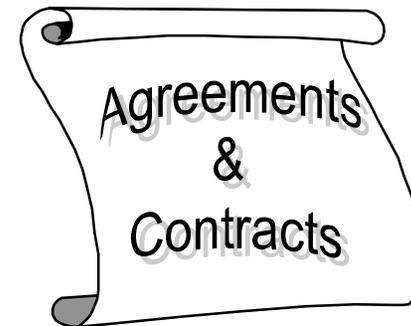
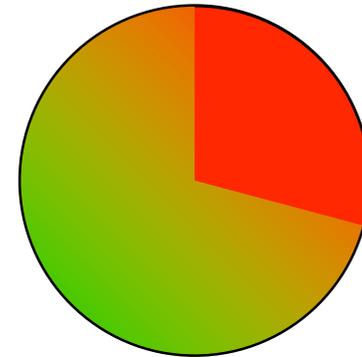
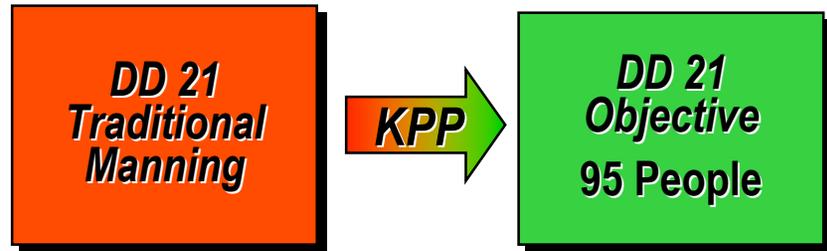


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DD 21/DD(X) Acquisition Revolution

- u Manning as a KPP
- u Total Ownership Cost includes the human cost
 - Reduces Operation & Support cost by 70% of DDG 51
- u New funding profiles to support acquisition and life cycle support reformations



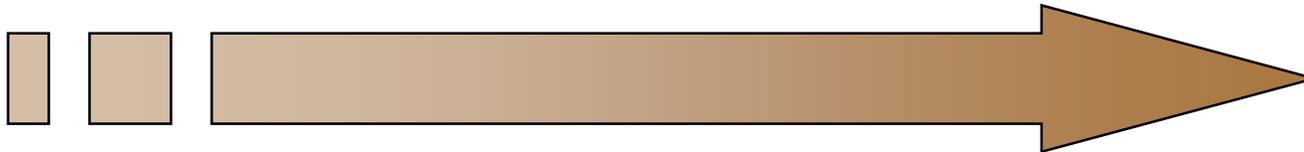


Littoral Combat Ship (LCS) HSI Issues

Hey, Chief! I just woke up in Rota!
How did I get detailed to this module?
How did I get trained??
How do I maintain my proficiency?
Where's the rest of the crew?
Do I have a future?

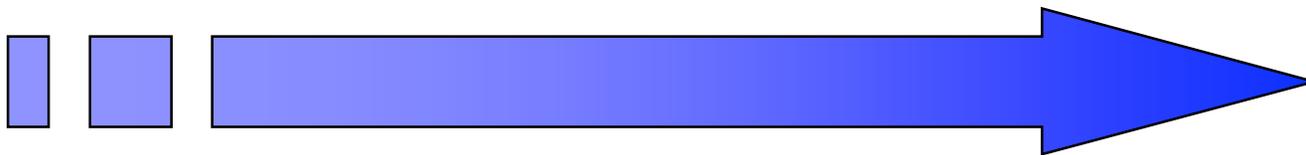
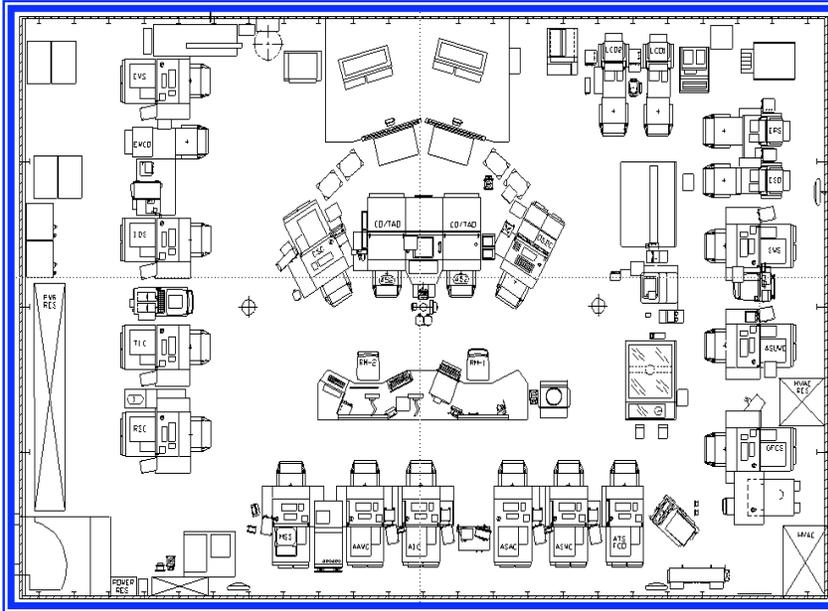


Knowledge Superiority



- ∪ Fused information
- ∪ Situational awareness

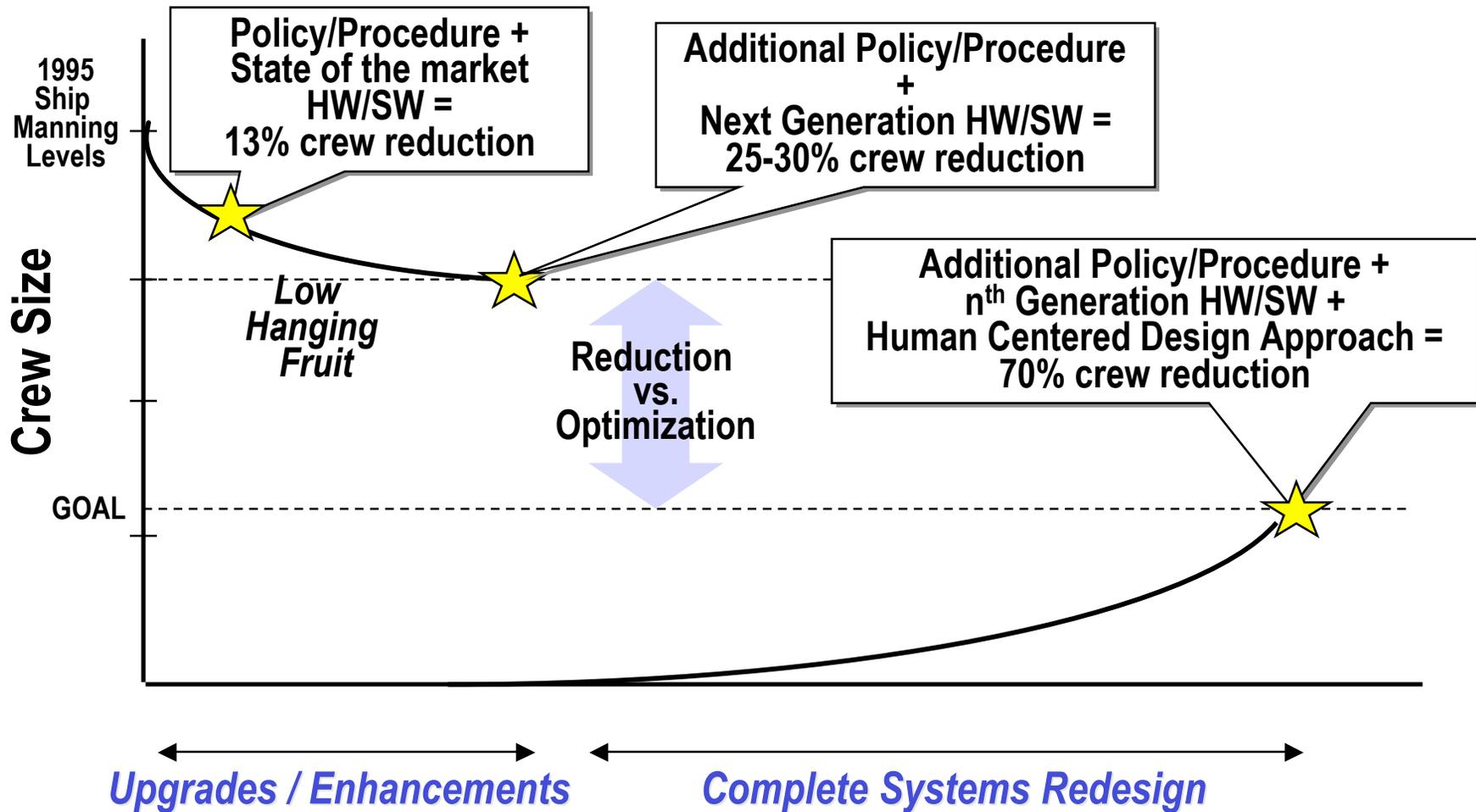
Engineering Challenges Integrated Command Environment



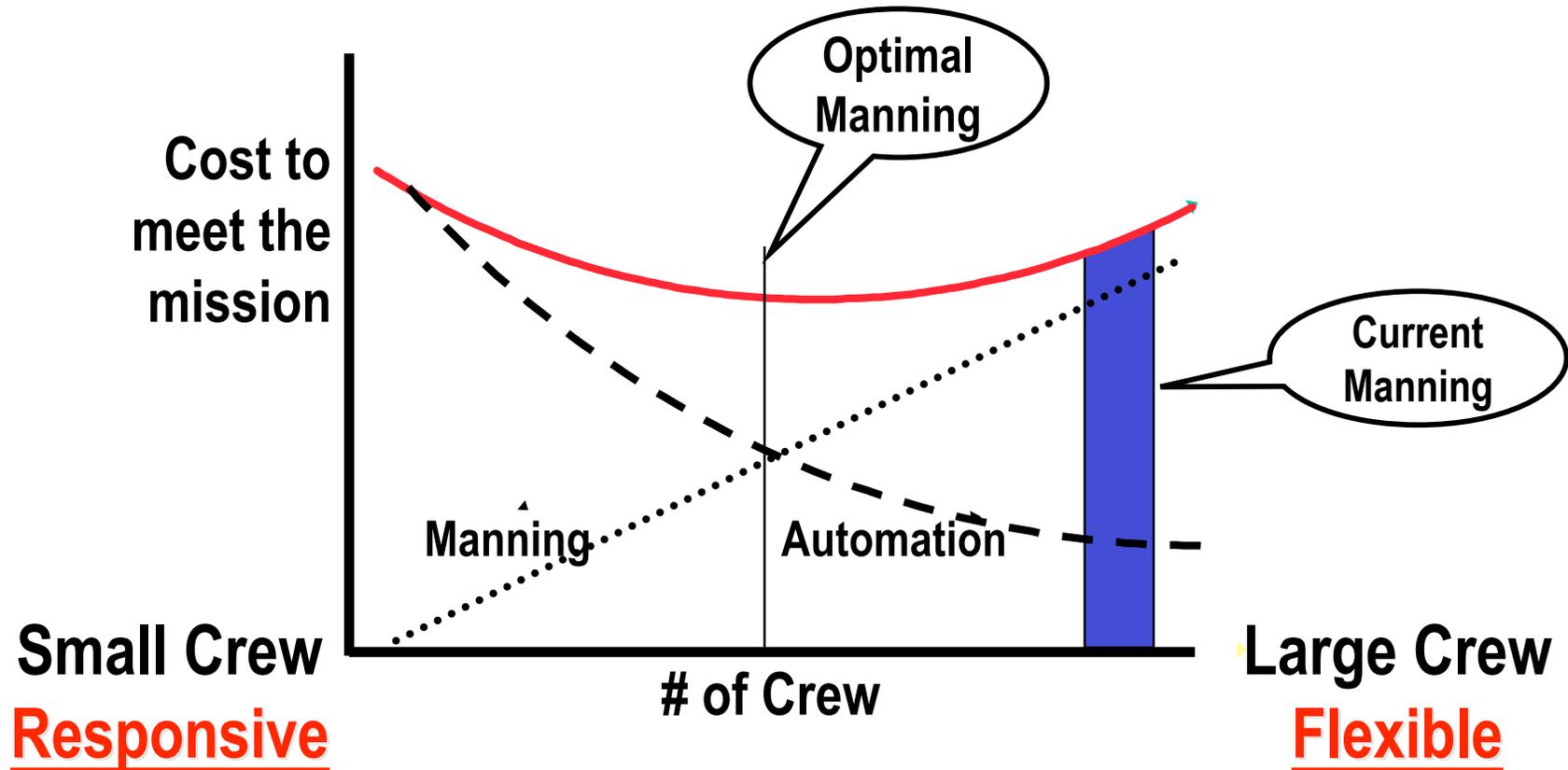
- ◆ Streamlined organization
- ◆ Flexible teams



Engineering & Operational Revolution Needed

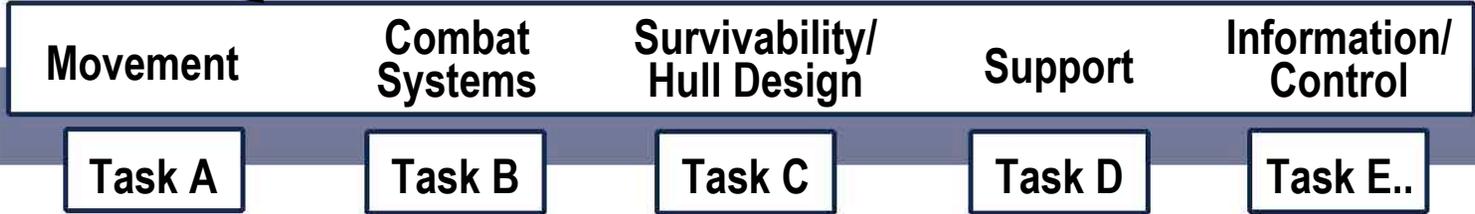


Optimal Manning



↑ Total System Performance and Total Ownership Cost ↓

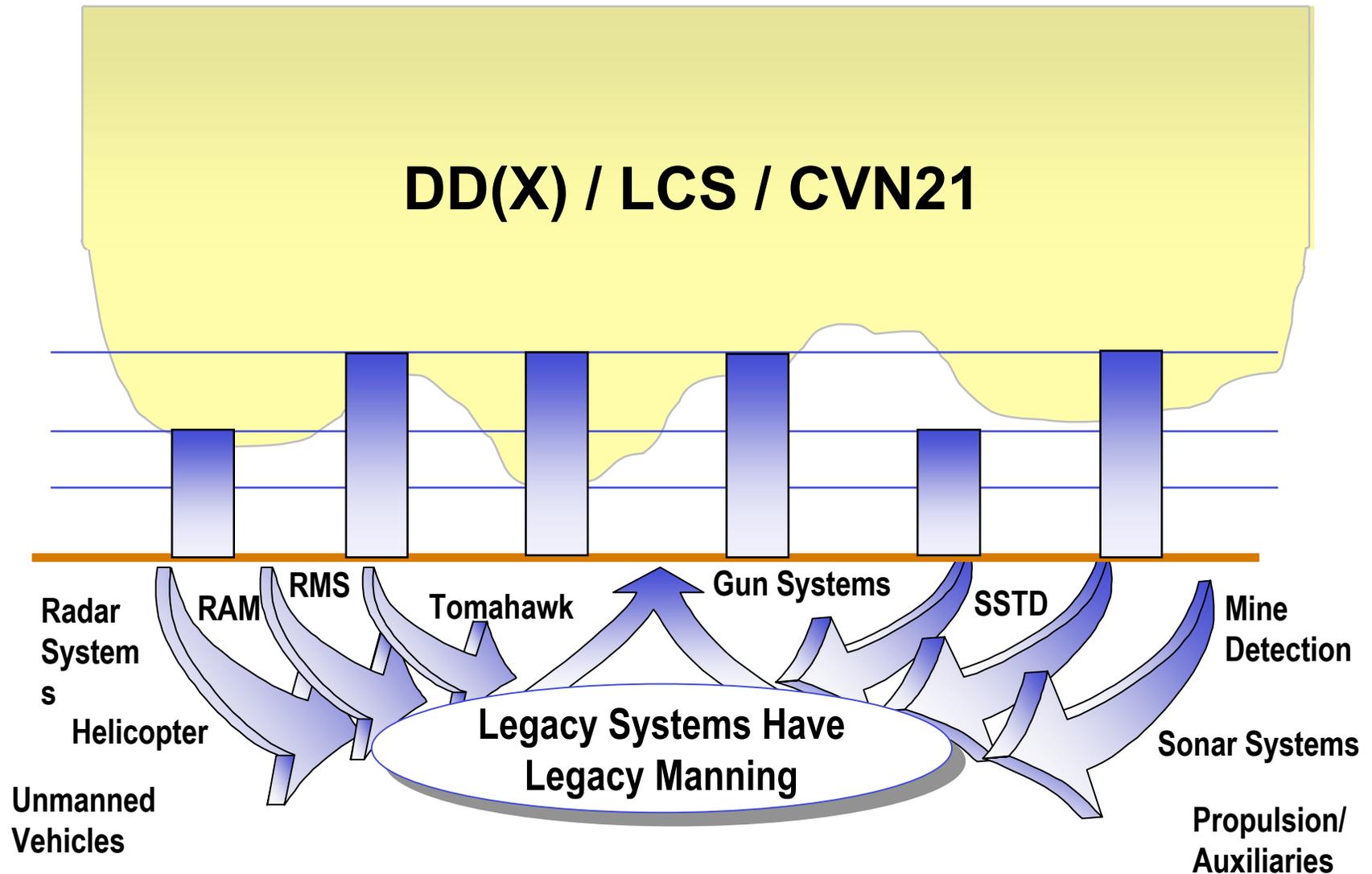
Top Down Function Analysis



Allocate tasks among Hardware, Software and People



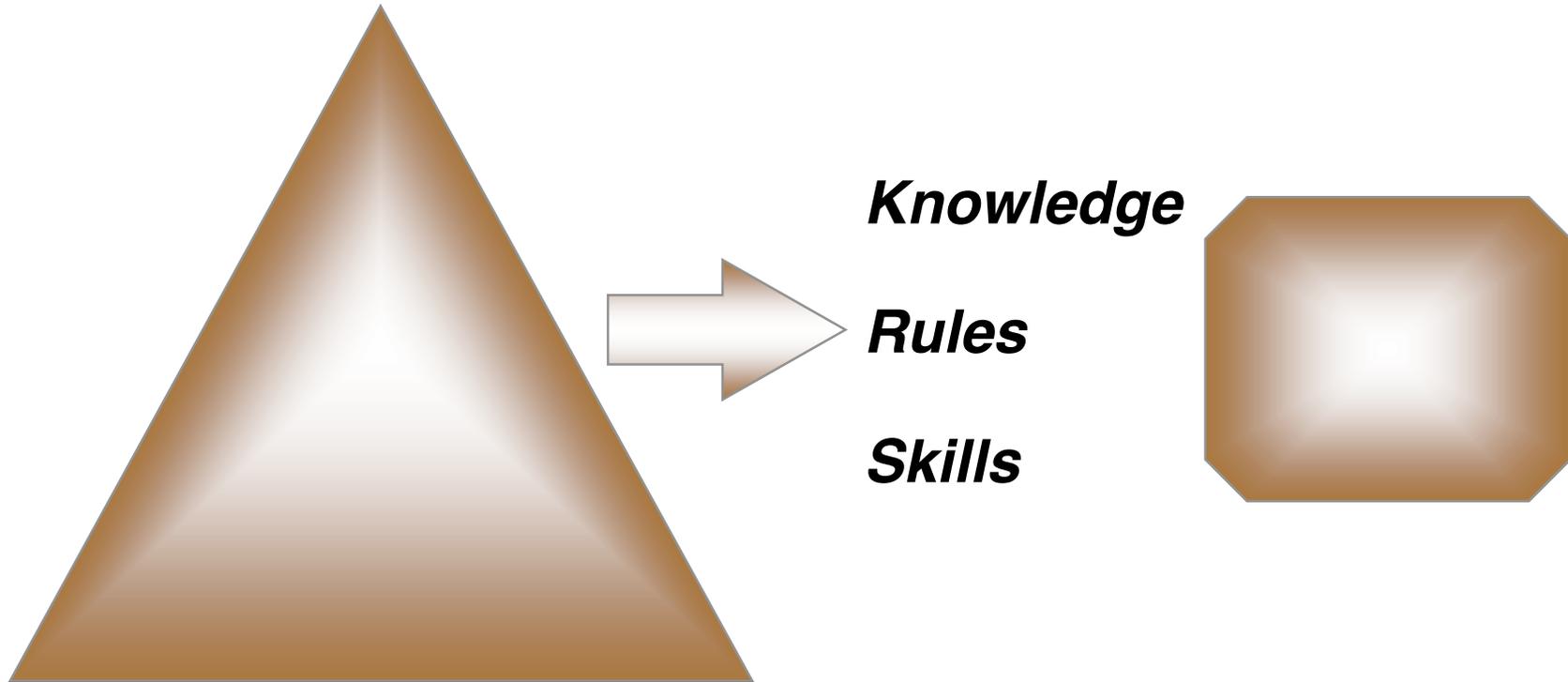
Legacy Impact on New Ship Manning



Key Areas and Influences on Performance and Cost



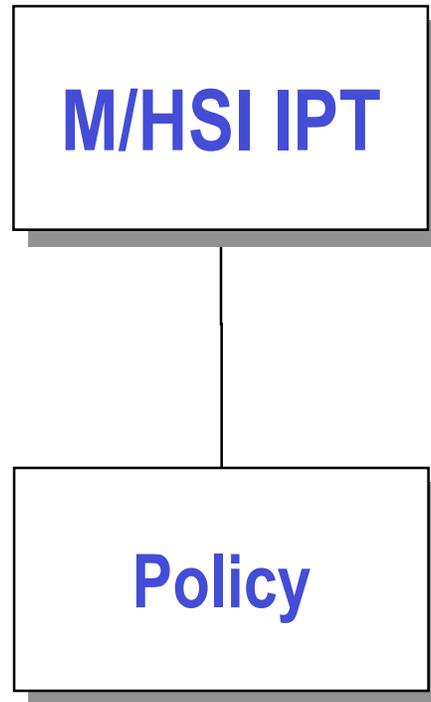
Skills Revolution



*Experienced personnel on future platforms and
no room for gaps*



Ship Clearinghouse for Issues and Policy (CLIP)



Membership:

All ships and subs
CNO
N12 (+NAVMAC)
N13 N7
N76 N78

NETC, N00T, NPDC
TYCOMS
N1 N8 ATG

Coast Guard
MSC
Navy Labs
Industry Team



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HSI's Relationship to Sea Power 21



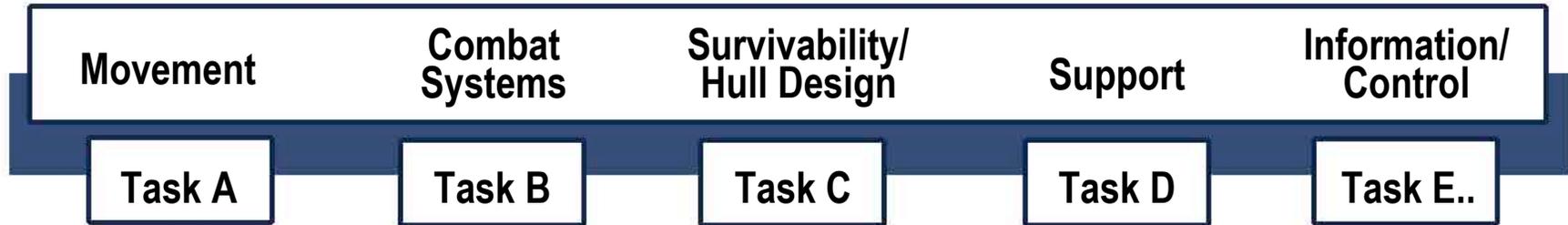
- ∪ Institutionalize HSI as Fundamental Element of Systems Engineering
- ∪ Measure Sailor productivity using Sailor Performance Metrics including:
 - Response Time
 - Decision Accuracy
 - Workload
- ∪ Tailor Training

“The Warrior is a Premier Element of All Operational Systems”

–CNO, U.S. Naval Institute Proceedings, October 2002



SYSCOM Contribution to Sea Warrior



Allocate tasks among Hardware, Software and People





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Sea Power 21



SUPERIOR WARFIGHTING PERFORMANCE AT BEST COST

- Fewer People Operating in a More Complex Operational Environment



“The Warrior is a Premier Element of All Operational Systems”
– CNO, U.S. Naval Institute Proceedings, October 2002



Recommendations to SECNAV



λ Establish HSI leadership position in the Secretariat

λ Institutionalize HSI through SEAPRINT

λ Expand HSI education to the engineering curricula at USNA and NPS

λ Direct Research Programs to apply HSI principles



BACKUP SLIDES



Think Certification Isn't Important?

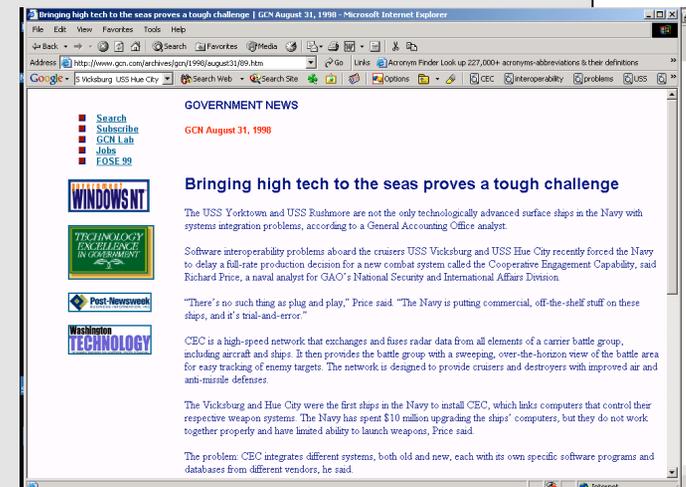
Bringing high tech to the seas proves a tough challenge

... Software interoperability problems aboard the cruisers USS Vicksburg and USS Hue City recently **forced the Navy to delay a full-rate production decision** for a new combat system called the Cooperative Engagement Capability.

...“Those two cruisers were **kept from going out on deployment** with a battle group because of the problem...”

Programmatic expediency (e.g., cost and schedule) can overshadow sound engineering practice

...but “*expediency*” can cost more in the long run.

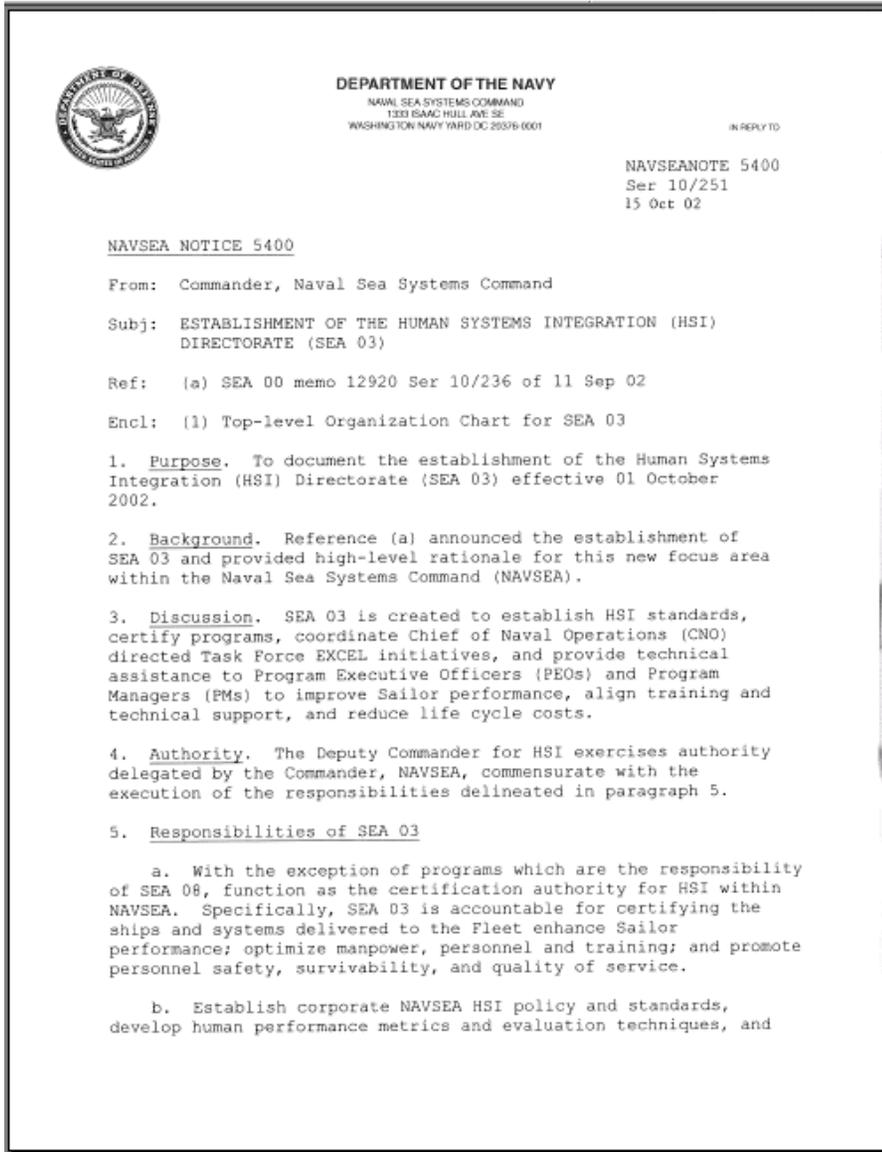


Certification affords technical objectivity...



SEA 03 Certification Authority

- ∪ HSI Certification Authority delegated by COMNAVSEA
- ∪ SEA 03 Charter includes:
 - Establish HSI Standards
 - Certify Programs
 - Provide Technical Assistance
 - Improve Sailor Performance
 - Coordination with Navy Initiatives





Making HSI Technical Authority a Reality

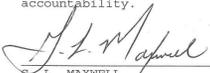
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