Rapid Delivery of Combat Systems Capability

“Sea Power to the Hands of Our Naval Force”

Captain Andrew Biehn & Captain Brian Phillips
PEO IWS 1.0 & PEO IWS X
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Strategic Imperative

- Our nation’s centuries-long struggle to protect freedom of the individual, society, and the seas continues
- Russia and China have modernized their navies to challenge the USN’s historical superiority in power projection from aircraft carriers
- Surface warfare increase in lethality
  - Long-range fires
  - Terminal defense

We must rapidly deliver the capability the Fleet needs!
Desired Tactical End State

"Desired Tactical End State"

Our View

Adversary's View

Attack Effectively First: “Over the course of history, the central problem of naval tactics has been to attack effectively, that is to say, to bring the firepower of the whole force into battle simultaneously.”

-- Fleet Tactics, CAPT Wayne P. Hughes, Jr., USN (ret.)

Goal is Continuous Delivery of Continuous Combat Systems Superiority
China’s naval modernization and expanding infrastructure makes them the most pressing long-term strategic threat to the United States.

In response the Navy is deploying the Navy Operational Architecture (NOA): “We must close the kill chain faster than our rivals with a resilient web of persistent sensors, command and control nodes, platforms, and weapons”

- CNO Navplan, Jan 2021

The NOA will enable the Integrated Combat System (ICS), which will connect sensors, networks, and weapons across a distributed naval force afloat and ashore

- The AEGIS Common Source Library (CSL) enables baseline consolidation and will form the software foundation for the future Integrated Combat System

ICS + Project Overmatch are foundational components of NOA
Revolutionizing How We Deliver Combat Capability

In our current business model, we struggle to deliver at the pace required. How do we deliver high-quality capability faster?

The Three Ways…

- Maximize flow of work and optimize the system of continuous delivery
- Ensure fast and constant feedback
- Create a generative, high-trust culture that supports disciplined experimentation
  (Reference: The DevOps Handbook, Kim, Humble, Debois, and Willis, 2016)

Implications for Combat System Development

- The Government owns the development/test pipeline
- Closer ties with the user/fleet
- Optimize value stream for requirements, development, integration, test, and deployment (and support with consistent funding)
- Maximize fleet feedback for continuous improvement of both the product and the process
A Continuous Integration / Continuous Delivery (CI/CD) pipeline requires a modern computing infrastructure, Agile software development methodology, and Development, Security, Operations (DevSecOps) engineering culture and practices.

Traditional Process

- **Rqmt**
  - Analysis Ship Feedback
- **Dev**
  - System, Engineering Coding | Testing
- **Ops**
  - Authority to Operate
  - Cert testing Ex Post facto Cybersecurity

DevSecOps Culture and Practices

- **Agile Development** Helps Break Down this Wall
- **DevOps** Helps Break Down this Wall

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ICS Evolution
A Cross Functional Team Approach

Legacy (Platform) Business Model

- IWS 1.0
  - DDG CS
  - CG CS
  - NSC CS

- IWS 4.0
  - FMS Platforms

- IWS 8.0
  - FFG CS
  - LUSY CS
  - MUSV CS
  - LCS CS

- IWS 10.0
  - LHD CS
  - LPD CS
  - LSD CS
  - CVN CS

Independent businesses creating their own custom solution with tightly coupled HW and SW
- Multiple NRE bills for Individual capability delivery
- Large, monolithic deliveries
- Custom HW solutions
- Multiple CS, not necessarily interoperable
- Different Fleet Training Pipelines
- Different Standards & Processes
- Driving different requirements onto elements

Future (Force Level) Model

- IWS ICS Program Office
- SW
- PaaS
- IaaS

Team = OPNAV + Fleet + PEO + Congress

ICS Program Office is Technical Governance and driving force to ensure evolution to single ICS
- Common Requirements
- Common HW and SW
- Reduced NRE bills
- Leverage common training
- Common Standards & Processes
- Common interfaces for Elements
- Element hosting
- Incorporate DDG 1000 efforts
- Small CS deliveries

Thinking - Acting - Operating Differently to evolve

Culture

Technology

Business Processes

Fleet Feedback

Broad cultural changes & disrupting processes leads to faster delivery, higher quality, wider distribution - from requirements to production
Modernizing AEGIS & SSDS to the ICS while Driving Affordability

ICS

Force level tactical coordination and platform-level execution in multi-mission warfare capabilities designed to conduct Distributed Maritime Operations across the range of military operations

Scalable Computer Program

Elimination of technical debt and "spaghetti" code to smaller, containerized pieces (e.g. microservices) to enable rapid development and testing;

Brings AEGIS and SSDS together to ICS architecture

SW Factory / DevSecOps Pipeline (Forge Ecosystem)

Government owned SW Development Environment tailored to Combat Systems to support real-time control system development for weapons;

Safety, Continuous Certification, Continuous Authorization to Operation (ATO)

Infrastructure-as-a-Service

Decouples HW and SW – enabling faster, more frequent capability delivery

“We must close the kill chain faster than our rivals with a resilient web of persistent sensors, command and control nodes, platforms, and weapons” – CNO Navplan, JAN 2021
SBWCUC(2)  Add a picture of a building here too to go along with my other comment
Schneider, Bryan W CDR USN CNO (USA), 1/5/2022
Development Way Ahead

Software is NEVER Done!
Developing hypotheses based on user research
Validating solutions based on use in ops

User Focus, Technology to User, Iterate –
Always Burning Down Risk

Changing the Development Paradigm to Focus on the User
Today we Deliver the Pyramid, Tomorrow We’ll Deliver a Slice at a Time
“Sea Power to the Hands of Our Sailors”