AEGIS Baseline 10 and SPY-6 Integration & Path to Navy Operational Architecture (NOA)

"Sea Power to the Hands of Our Sailors"

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IWS 1.0 MPM

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DDG 125 JACK H LUCAS

The ship's seal tells the remarkable story of Jacklyn Harold "Jack H" Lucas.

Encased in the traditional colors of the United States Marine Corps, gold and scarlet, the background illustrates the battle of Iwo Jima via Marines raising the American flag atop Mount Suribachi. On 20 February, 1945, a 17 year old Private First Class Jack H Lucas, serving in the 5th Marine Division (depicted as a PFC Devil Dog on the left-hand side), selflessly dove onto a grenade and simultaneously pulled another under his body, saving three of his fellow Marines. Although severely wounded, he survived, recovered, and was the youngest Marine ever to be awarded the Medal of Honor. In 1961, wanting to continue to serve his country, he joined the United States Army, proudly serving to the rank of Captain in the 82nd Airborne Division (represented as a paratrooper on the right-hand side), where he survived a double parachute failure during training maneuvers. On the ocean's horizon is a silhouette of the USS IWO JIMA (LHD 7), where Jack H Lucas' Medal of Honor citation lies within the ship's hull. Seen in the foreground is the Medal of Honor, with the first in class Flight III Arleigh Burke Destroyer, USS JACK H LUCAS – DDG 125, front-and-center launching two advanced Standard Missiles. Representing his faithful service which started at the age of 14, the 5th Marine Division Insignia is located on the lower left while the 82nd Airborne Insignia is located on the lower right of the Medal of Honor. The Devil Dog, Paratrooper, and USS JACK H LUCAS – DDG 125, share the traditional Navy haze gray color, tying them all together in order to encapsulate Lucas' remarkable story. The ship's motto, boldly displayed in riveted steel representing the strength of the ship, her crew, and the workers who built her, fittingly describes the spirit of Jack H Lucas - ***INDESTRUCTIBLE****.*

The DDG 51 Flight III upgrade is founded on the AN/SPY-6(V)1 Air and Missile Defense Radar (AMDR) system integrated with the AEGIS Baseline 10 Combat System.

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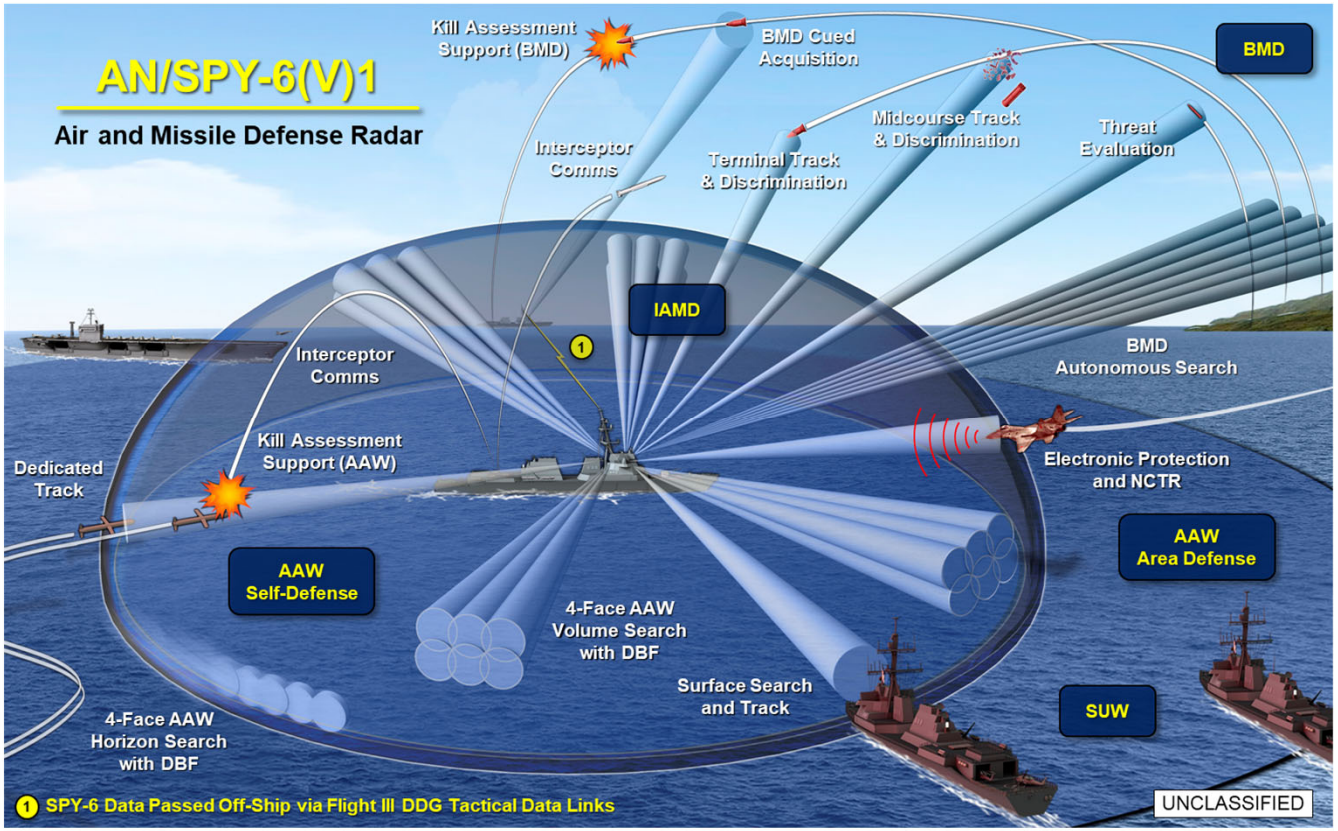
FLT III Capabilities

AEGIS Baseline 10 and AN/SPY-6 incorporates next generation technology for performance against threats in an Integrated Air and Missile Defense Environment

- Increased raid sizes
- Larger operating areas
- Advanced discrimination capability against ballistic missile threats
- IAMD mission planner to optimize combat system resources and doctrine
- Improved performance in harsh natural (clutter) and manmade environments



AN/SPY-6 is a significant radar upgrade in AEGIS Baseline 10 – the first active solid state array radar on surface ships – a significant integration challenge!

Transforming AEGIS Combat System Integration

Build and Integrate

Government Aligned with Industry to Build and Integrate the next Combat System

- Well defined Integration Intervals and Goals
- Subject Matter Expert involvement
- Unfettered Information exchange
- Local and Remote Development Environments
- Utilization of Virtualization Technology

Test and Evaluate

Joint Government-Industry Testing and Evaluation focused on continuously measuring Software Quality

- Mission Area Relevant Testing
- Regular Objective Quality Evidence Collection
- Collaborative Analysis and Evaluation
- Collective Root Causing
- Accelerated Defect Resolution
- Automated Tooling ensuring Rigorous and Efficient Testing

Agile Integration with Government Ownership, Subject Matter Expertise, and Industry Partnership provides successful results

Establishing the foundation for future Combat Systems Integration with the Government Led Joint Integration Test Team

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JITT Across the Country

Port Hueneme, CA:
Shipboard Test and Evaluation

Marlborough, MA:
SPY-6 Production and Development

Moorestown, NJ:
AEGIS Production, Development, and Integration

Kauai, HI
Advanced Radar Development And Evaluation Laboratory

Dahlgren, VA
AEGIS Virtualization

Arlington, VA
AEGIS Virtualization Support

Pascagoula, MS
FLT III Construction

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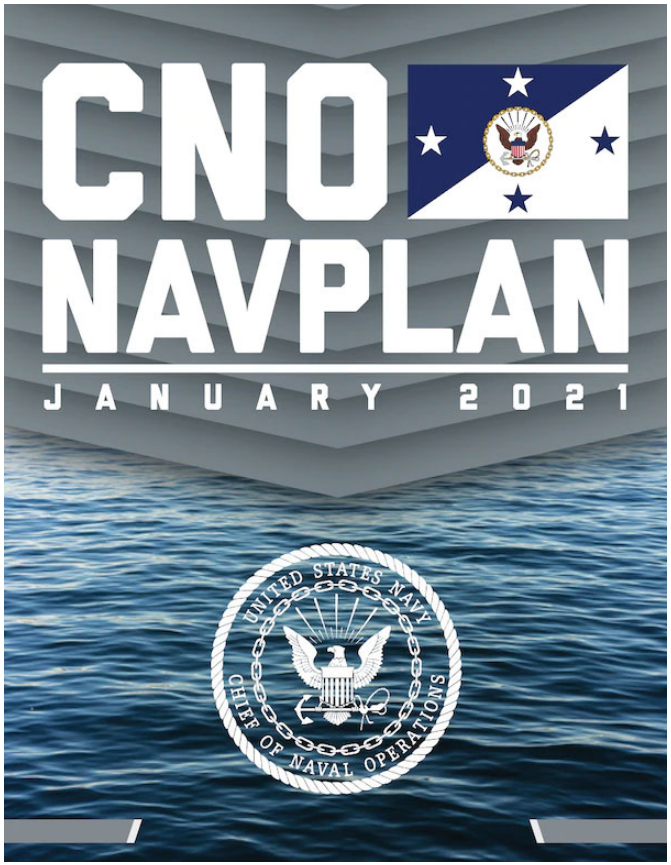
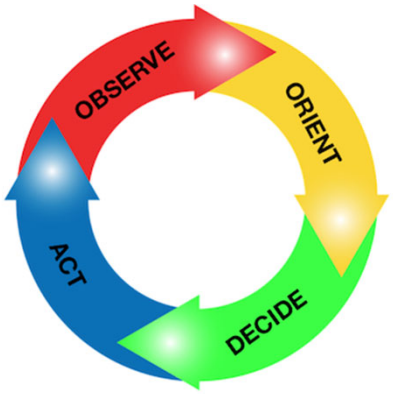
Beyond FLT III…
Navy Operational Architecture

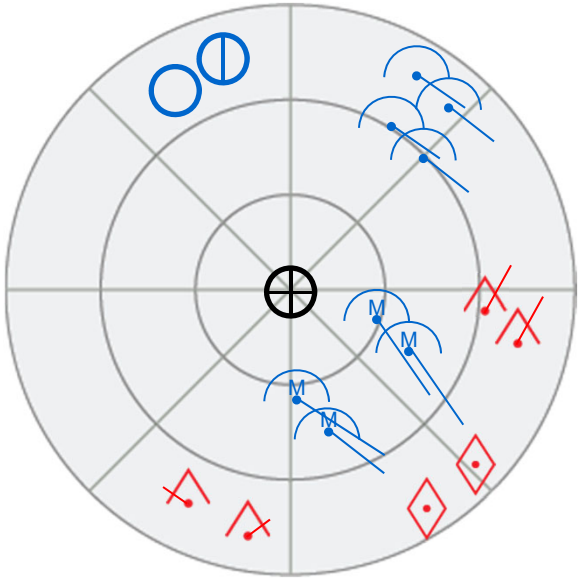
- Navy is deploying the Navy Operational Architecture (NOA): “We must close the kill chain faster than our rivals with a resilient web of persistent sensors, command and control nodes, platforms, and weapons”
  - CNO Navplan, Jan 2021
- The IWS component of the NOA is the **Integrated Combat System (ICS)**, which will connect sensors, networks, and weapons across a distributed naval force
  - The AEGIS Common Source Library (CSL) enables baseline consolidation and will form the software foundation for the future **Integrated Combat System**



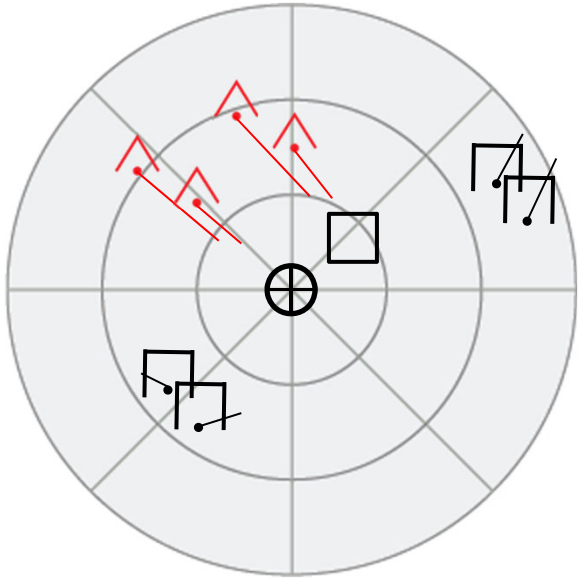
ICS + Project Overmatch are foundational components of NOA

Desired Tactical End State

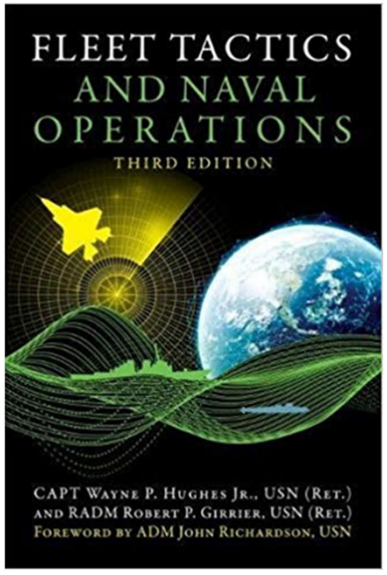




Our View



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

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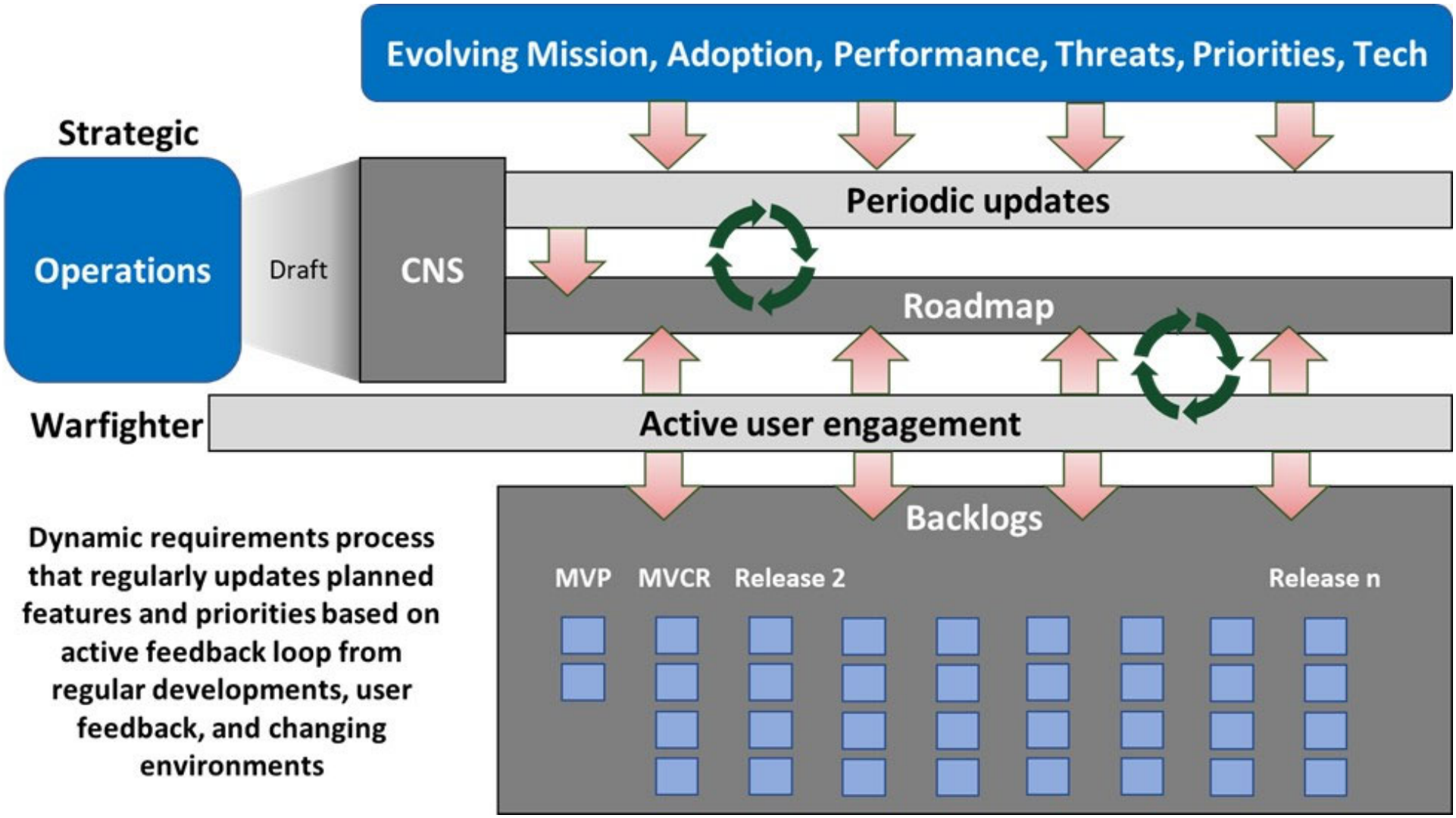
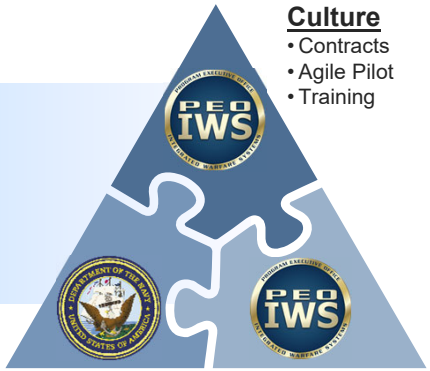
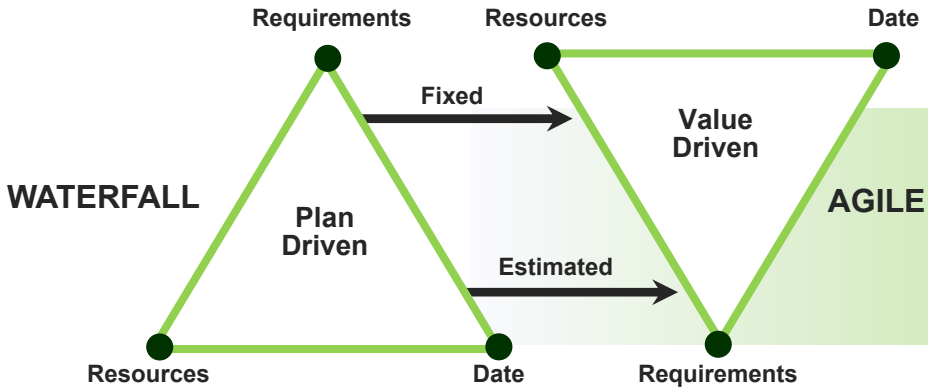
Software Acquisition Framework



Continuous Integration (CI) / Continuous Delivery (CD) Pipelines

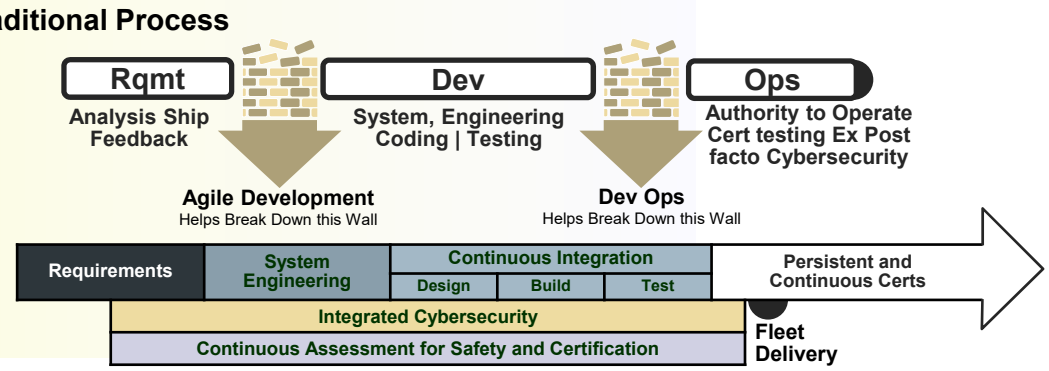
A Continuous Integration / Continuous Delivery (CI/CD) pipeline requires a modern computing infrastructure, Agile software development methodology, and Development, Security, Operations (DevSecOpsS) engineering culture and practices





Agile Software Development

DevSecOps Culture and Practices



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Integrated Combat System Vision

Vision: Implement modern computing technologies and processes to rapidly and continuously deliver capability to outpace the threat

CI/CD Pipeline:
- IL5 / IL6 networks
- Model Based Systems Eng (MBSE)
- Software Factory - The Forge
- CSEA Combat System Testing
- Deployment via Software Activity

IL5 / IL6

Computer Programs

CI/CD Unclas/Secret (IL5/IL6) Pipeline

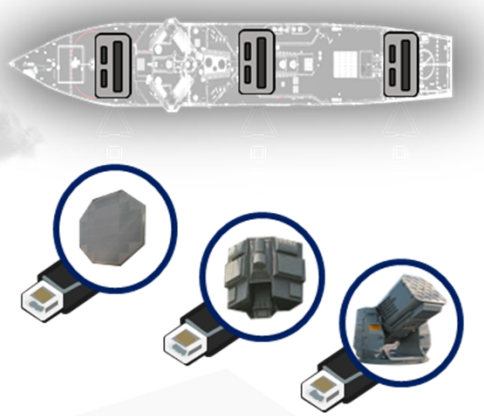
Continuous integration and delivery of capability to the Fleet via secure means with continuous ATO/certification

Code → Build → Test → Release → Deploy → Operate

Feedback Loop

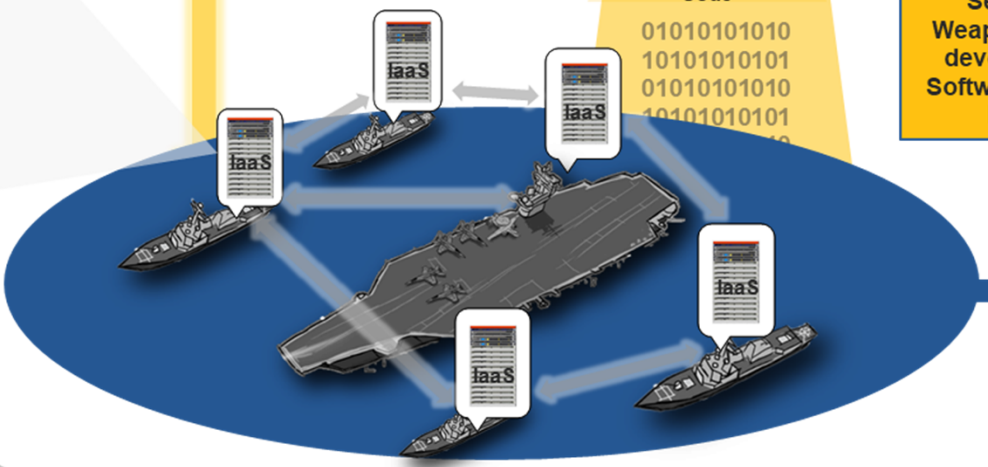
Communication
CANES / C4I

Capability pushed to ICS as Code



Sensors and Weapons software developed using Software Developer Kit (SDK)

Infrastructure as a Service:
- Commercial / Government Cloud Testing
- Shipboard 'cloud' in TI-16/TI-12H w/ Hypervisor, Virtual Pilot Ship (VPS) CI, and ICS CI
- Enables Platform as a Service (PaaS) and Software as a Service (SaaS)



Combat Systems Ops Center
- Health and Status Monitoring
- Configuration Mgmt.

CI/CD Pipeline → Tactical Application

Persistent ATO

Health & Status Monitoring / Configuration Mgmt. Feedback Loop

Higher Quality, Faster Delivery, More Capacity, Better User Experience

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