Innovation for Life Cycle Management

In-Service Aircraft Carriers Program
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“ Aircraft Carrier Readiness is our Mission”

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In-Service Aircraft Carriers: Years of Service

NIMITZ Class: 500 total carrier-years, serving over 84 years, from 1975 until 2059

FORD Class: Ushering in the Next Generation of Excellence

Only 54% through the service life of the NIMITZ-Class → 229 carrier-years remaining.
Then and Now...

1975

USS NIMITZ CVN 68

2018

USS NIMITZ CVN 68

Enduring, Relevant, and Capable
Innovation: Identifying Opportunities

PMS 312 Opportunities (1-10)

ID Complex Alterations Early and Recommend Mitigation

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New Navy LCM Tool for Maintenance & Modernization on all numbered Fleets
Houses and schedules requirements throughout service life for 278 hulls
Common business process for Carriers/Subs/Ships
Tracks completions and costs
Replaces existing system and five databases

“Go Live” Fall of 2018
CCIMS
Corrosion Control Information Management System

- Extensive online database of tank coating conditions
- Customized application to generate failure probabilities
- Statistical forecasting supports resource planning

Results over the last 10 years:
“Unknown” condition reduced from 40% to <0.5%
Tanks requiring action reduced from 51% to 20%
Use of Composites on Carriers

Deck Grating

Before

After

Electrical Enclosures

Extensive use Topside… but more opportunities exist
Innovative Method of Ship Checks

Existing Equipment  Old equipment removed  New Foundation  New Equipment

Ship checks performed for Overhaul planning with Laser Scanning:

- CVN 73 RCOH – Performed in Yokosuka, Japan
- CVN 74 RCOH – Performed in Bremerton, WA
“Backfit” 3D Technology for Nimitz Class

Laser scanning technology closes “3D Gap”

- CVN 78 designed in 3D product model
- CVN 68 designed in “2D” drawings

HII-NNS is using Digital Work Instructions for:

- Simple Ripout
- Interferences
- Installation
- Simple Repair & Maintenance
- Complex Repair & Modernization
Fleet Experimentation – “FLEX”

<table>
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<tr>
<th>Examples</th>
<th>Product</th>
<th>Problem</th>
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| OCEAN AR (Google Glass)       | • CNO Rapid Innovation Cell Demonstration  
                                 • Stand-alone system  
                                 • Two hour pier-side demonstration | • Installation rejected after months of effort and resources  
                                 • Fleet Commander overrode installation process |
| Gunner Augmented Reality (GunnAR) | • System is disconnected  
                                 • Comprised of a tablet and helmet that allows personnel to experience heightened, integrated visual and audio coordination in order to identify, track and fire upon targets | • Installation rejected because of shock and vibe for a tablet  
                                 • Fleet Commander overrode installation process on a CG (USS BUNKER HILL). |

FLEX promises Speed to Fleet
“Tele-Maintenance”

**Distance Communication Maintenance System (DCoMS)**

- “Over the Horizon” Communication system being developed to help “Subject Experts” remotely assist Ship’s Force resolve maintenance issues
- DCoMS is a portable ship-to-shore maintenance communication system which enables shore-site “Subject Expert” to actively support important maintenance related activities aboard Navy ships
- *Initiated as SBIR (N103-218)*

**Portable system:** 2 Backpacks - less than 25lbs each, Includes gear (2.3lbs) for sailor to wear and carry laptop
Modular Refrigeration System (MRS)

Modular Refrigeration Units (MRU)

- Self-contained and “hatchable” system promises to eliminate 90% of current maintenance requirements and require minimal operator support/training

Rapid Innovation Funding (RIF) Program

- Enabled the CVN community to accelerate the technology transition several years
- Accelerated fielding plan will support $7M in savings in retiring maintenance on legacy NIMITZ class refrigeration system
Shipboard Additive Manufacturing

- Training Aids
- Rapid reverse-engineering
- Form-Fit-Function verification
- Low-criticality direct-print parts
- Warfighter Prototyping
- Tailored solutions for the mission and warfighter
- High-criticality direct print parts with local approval

**USS JOHN C. STENNIS (CVN 74)**
Additive Manufacturing capability currently being developed and installed for testing and evaluation
CVN Cybersecurity

**Identify**
- Cyber Table Tops & Cyber Attack Kinetic Events
- Network Topology Definition

**Protect**
- Engineering Solution Development
- CYBERSAFE Information Assurance / Technical Standards

**Detect**
- Vulnerability scans of equipment before installation
- Advanced Automation

**Respond**
- Disconnect Procedures, Incident Response Plans

**Recover**
- FORD CLASS DATA ENVIRONMENT
- ATRT - Automated Configuration Verification and Restoration

**Cyber Table Tops & Cyber Attack Kinetic Events**

**Network Topology Definition**

**CYBERSAFE Information Assurance / Technical Standards**

**Advanced Automation**

**Disconnect Procedures, Incident Response Plans**

**FORD CLASS DATA ENVIRONMENT**

**ATRT - Automated Configuration Verification and Restoration**

**CYBER Vulnerability Assessment Tool**

**Physical Security Upgrades**
Targeted Logistics

Mission Limiting (ML) Downtime Days vs O & I Level Operating Cost
CVN High Priority Systems | Progression from Cycle 17-2 to 17-4

CVN 68 CLASS
HIGH PRIORITY SYSTEMS

HIGH DOWNTIME
LESS COST

HIGH COST and
HIGH DOWN TIME

Data driven Logistics Decision Making
C-ARTS
Carrier – Advanced Reconfigurable Training System

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Contracting for CVN LCM

Refueling Complex Overhaul and Inactivation
Huntington Ingalls Newport News Shipbuilding, HII-NNS

In-Service CVN Maintenance
Navy Public Shipyards, supported by -
- Southwest: HII-NNS
- Pacific Northwest: General Dynamics NASSCO
- Mid-Atlantic: General Dynamics NASSCO

Alteration Installation Teams
- Contracted teams working for a NSWC OSIC
- Installation of Ship Alterations
- Opportunities for Small Businesses

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What got you here...
...won’t get you here!

Innovation is a necessary component of LCM!