Program Executive Office
Command, Control, Communications,
Computers and Intelligence (PEO C4I)

Command & Control Rapid Prototype Continuum
C2 Strategy (ID:033)

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Introduction

• Navy undergoing Command and Control (C2) transformation to meet expanding mission requirements

• “Cloud” infrastructure and capability-related applications will allow Navy organizations to reconfigure to meet dynamic operational environments

• Transformation has 2 inter-related drivers:
  - A new C2 strategy
    – Based upon new paradyme for Maritime Operations the Operational Level of War (OLW)
  - A new acquisition methodology
    – Links Science and Technology (S&T) innovation with Navy C2 Program of Record (POR) requirements
    – Provides environment for rapid and agile C2 software development, test, integration and delivery of capabilities to the Fleet
Agenda

• **New C2 Strategy**
  - Current C2 Situation
  - New component portfolio approach
  - Functional C2 Pillars

• **New C2 Software Acquisition Approach**
  - Changing S&T and POR relationship
  - Command and Control Rapid Prototyping Continuum (C2RPC) initiative
  - Rapid Integration and Test Environment (RITE) processes and infrastructure
Current C2 Situation:
Disconnected islands of C2 data

MIPS
Planning

JFMCC Supporting Plan
To JTF Counterstrike PLAN ALFA

PowerPoint slides

Outlook .PST files

Chat/DCO windows

Sync Matrix

GCCS (COP)

Monitoring (SA)

J/ADOCS (Fires)

 Executing

Assessing

TBMCS (ATO)

PowerPoint slides

Sync Matrix

Excel Spreadsheets

TBMCS (ATO)
C2 Strategy Objectives

- **Provide Expanded Mission Management Capabilities**
  - Add “What”, “When”, “Why”, and “How” to currently provided “Who” and “Where” information
  - Needed to fulfill NWP 3-32 and NWP 5-01* requirements

- **Transition from Stove-Pipe Solutions to Net-Centric Operations**
  - Implement “component portfolio” approach to C2 system development
  - Use rapid prototyping and technology insertion to speed change and engage warfighter

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* Naval Warfare Publication (NWP) 5-01: Navy Planning
* NWP 3-32: Maritime Operations at the Operational Level of War
Navy Doctrine Demands an Integrated C2 Planning, Execution, & Assessment Process

C2 Program of Record (POR) Today:
“Tracks on a Map”
Current Ops
(Comms, COP, Intel)

Navy Planning Process

PLANNING

Course of Action Development
Course of Action Analysis
Course of Action Comparison & Decision
Plans & Orders Development

Mission Analysis
Transition to Execution

EXECUTION

Maintain Alignment
Adjust Apportionment
Advance the Plan

Counter the Enemy
Comply with Procedure

Situation Awareness

“Areas of Control”

NWP 5-01 Navy Planning
NWP 3-32 Maritime Operations at the Operational Level of War
Navy Doctrine Demands an Integrated C2 Planning, Execution, & Assessment Process

PLANNING

- Course of Action Development
- Mission Analysis
- Transition to Execution
- Plans & Orders Development
- Course of Action Analysis
- Course of Action Comparison & Decision

EXECUTION

- Maintain Alignment
- Adjust Apportionment
- Advance the Plan
- Counter the Enemy
- Comply with Procedure

Areas of Control

- Maritime COA Analysis
- Command Relationships
- IPOE CCIRs/PIRs
- ROEs PPRs/CASOPs
- Lines of Operations
- Decision Points
- Readiness & Apportionment
- Ops Sync

Navy Planning Process

NWP 5-01 Navy Planning

NWP 3-32 Maritime Operations at the Operational Level of War
Desired End State

- Implement all C2 functions and process
- Exercise control actions in all six areas of control
Pillars of Future C2 system

**Intelligence & CM**
- I3
- Analysis products & IPOE
- Red Force Service
  - Units/Sites & Capabilities
  - Enemy COAs
  - NAI Characteristics
  - Targets
- Info Req’s
- Collection Req’s

**ISR Data Fusion**
- Conditions of Interest Alerts
  - Area entry
  - task execution deviations
  - (others TBD)
- OTM (new track mgr)
- Associate I3 info w/ OTM reporting

**Planning, Execution, Assessment**
- Plans/Tasks & Data Service
  - Unit tasking & task status
  - Authoritative plans data
- Planning
  - Mission management
  - Decision Points, LOO
  - CMD relationships, COA sketch
- Execution
  - Synchronization

**Capabilities & Readiness**
- Blue Force Service
  - Units data (Admin, Op)
  - Platf’s/Systems Capab
  - Networks Config
- Readiness COP
  - Platforms/Systems Status
  - NetOps Status
- Capabilities
- Conditions of Interest
  - Heuristics & Alerts
  - Plan/task readiness
Acquisition Objectives

• Establish Government Management and Governance of IT Software Acquisition Processes

  ➢ Implement agile IT acquisition and Test & Evaluation (T&E) processes “modeled on successful commercial practices for the rapid acquisition and continuous upgrades and improvement of IT systems.” (National Defense Acquisition Act of FY2010)

  ➢ Execute agile performance-based contracting strategy by reducing vendor’s “Institutional Knowledge Lock”

  ➢ Synchronize Government testing with private-industry development – testing early and often

• Establish methodology that takes advantage of Navy S&T innovation and successfully transitions it to Navy C2 programs of record
C2 Rapid Prototyping Continuum (C2RPC)
Migrating to Maturity

- Coalition of PEO C4I, Office of Naval Research (ONR), and Commander Pacific Fleet (COMPACFLT)

- Develop a C2 Prototype that Feeds Back into Enduring, Supported Programs Of Record

- Accelerate Development of OLW C2 CONOPS
  - COMPACFLT: “Use PACFLT as a ‘Petri Dish’”
  - Advance the State of the Art of C2
    - Reduce Uncertainty
  - Ensure Systems Meet Fleet Prioritized Capabilities/Needs

Bringing S&T community and C2 acquisition together as one continuous program
Technology Maturation and Funding Bridge

Mission Capability Gap Identification and Prioritization

Science and Technology Research & Development

Science & Technology Map to operational gaps

War Gaming TRL 1-2

Modeling and Simulation TRL 1-2

Technology Transition

S&T ‘Push’

C2RPC

Laboratory Experimentation TRL 3-8

Operational Experimentation TRL 6-8

Valley of Death

Transition Impediments

• S&T’s job is complete at the tech dev stage
• Implementation of technology is the customer’s responsibility
• “Role of S&T is tech push- build it and they will come”
• Develop cycle for S&T is too long for most acquisition and Warfighter (Customers)
• Lack of understanding on level of effort to transition technology

POR ‘Pull’

Program of Record TRL 8-9

C2 Release Distribution

• Transition process lacks definition and visibility
• Different goals & timelines between S&T and Acquisition Mgrs
• Lack of incentives
• No clear guidance during development from POR

Technology Maturation and Funding Bridge

Science and Technology Research & Development

Mission Capability Gap Identification and Prioritization

Science & Technology Map to operational gaps

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Bridging the Transition Valley of Death

Continuum
- Organizational
  - Relationships
  - Cultural Change
  - Communication
  - POR Guidance
- Technical Innovation
- Funding

Transition Impediments
- Transition process lacks definition and visibility
- Different goals & timelines between S&T and Acquisition Mgrs
- Lack of incentives
- No clear guidance during development from POR

Implementation
- Processes
  - Incremental development
  - Experimentation/Demos/LTEs
  - Frequent, early & automated testing
- Infrastructure
  - Centralized develop repository

RITE: Rapid Integration and Test Environment
Rapid Integration and Test Environment (RITE)  
‘Foundational Pillars’

RITE addresses findings and facilitates development and distribution of Navy C2 systems:

▼Check – software development  
▼Stabilize – the current build  
▼Influence – the final product delivery

“Manage as close to the source, as possible”
**IT Acquisition Life Cycle Alignment**

**S&T**

- Materiel Development Decision
- Business Case Analysis and Development
- Coordinated DOD stakeholder involvement
  Up to 2 years

**C2 POR**

- Milestone Build Decision
- Development & Demonstration
  Iteration 1
  Iteration 2
  Iteration “N”
- Operations and Support
- IOT&E
- RELEASE 1
- RELEASE 2
- RELEASE “N”

**Rapid Integration and Testing Environment (RITE)**

- Supports ALL phases of IT Acquisition

**Valley of Death**

Incremental Functionality Leads to C2 POR

S&T Prototyping Continuum – Vision to Transition

Baseline

- OTM
- R/W Objects in HaloCOP
- HaloCOP Demo of Task Icons
- CPF Readiness Pilot (OPLAN Readiness)
- Multiple Readiness Feeds
- HaloCOP, selected data mgmt services

Readiness and MOC Tools

- Track Mgmt Widgets – Initial Capability
- (I3 Red Force Objects in COP)
- IPOE Assoc w/Plans
- Task Navigator (Task Drill-Down from HaloCOP)
- Decision Point, SOP & Cmd Relationships
- CPF Readiness Pilot (Priority Missions Readiness) w/PTDS
- Navy Blue Capab/orgs
- UFS APIs & WebTop

Enhanced Readiness and MOC Tools

- White Force Svc, Navy Blue Force mov’ t (WebSked), Environmental Conditions/Wx
- Targets
- IPOE Integr’n with Maritime COA Sketch
- COA Sketch, Line of Ops Tools First Look
- COA Collaboration
- Additional Readiness Heuristics
- Additional Mission Areas
- Collaborative COP Initial Capability
- AIF Prototype

Multi-MOC Operations

- Navy Blue Force mov’ t (OTSR)
- OTM Link & Acoustic Tracks
- Initial Link of CCIRs to Plans & Decis Points
- Maritime COA Sketch/LOO & Decision Pts
- Ops Sync tool (Sync Matrix)
- Distributed Planning Among MOCs & TF/TGs
- Readiness Integrated with Planning Processes & Tools
- Initial AIF Capability (Ashore, Afloat)
- UFS Process Workflow Support

Capability cut-off and transition to C2 POR

New Capabilities
4 Pillars

Planning & Execution

- ISR Data Fusion
- Intel & CM

Capabilities & Readiness

- Apps support
- Data Mgmt
- Enterprise Services abstraction

Baseline

Drop 1 (MAR10)
Drop 2 (SEP10)
Drop 3* (JUL 11)
Drop 4* (NOV11)
iPhone™ Analogy for Navy C2 Software Distribution

- Intelligence & Collection Mgmt Pillar
- ISR Data Fusion Pillar
- Plans, Execution & Assessment Pillar
- Force, Unit, Net, Capabilities & Readiness Pillar

Afloat Core Services and Infrastructure Software

CANES Network Hardware

Satellite Communications
**C2 Mission Management App Store**
- C2 SW component catalog
- Incremental engineering drops (developer builds)
- Automated Test Tools
- FAQs, Guidance, Mil-STDs
- Requirements, Best Practices, and Lesson’s Learned
- Codes Sample

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**Operational Commander**
- Assigns new Tactical Mission (e.g. Civil-Military; Counter-drug; humanitarian relief, etc) to LCS-1
- Designates additional Navy C2 capability applications needed to conduct new operations and to inter-operate with other tactical forces
- Provides ‘authorization code’ to download needed C2 Apps

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**Operational Unit**
- Upon new assignment notification and Mission Package Update authorization – logs into Apps Store
- Using authorization code is able to access Apps Catalog that pertains to specific unit
- Downloads new Mission Package components
- Runs automated acceptance test and installs into C2 Core

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**Navy C2 Software Support Activity (SSC Pac)**
- Maintains Apps Store and Active Fleet configuration Management
- Interfaces with OPCON to identify specific “components” (app/version/release) for assigned unit
- Conducts interoperability and compatibility testing prior to releasing new components, as necessary
- Assigns ‘Authorization Code’ for selected Components
- Releases new components for designated unit

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**Possible Scenario**
- C2 SW component catalog
- Incremental engineering drops (developer builds)
- Automated Test Tools
- FAQs, Guidance, Mil-STDs
- Requirements, Best Practices, and Lesson’s Learned
- Codes Sample

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**Reconfigurable Navy C2 Distribution**

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**USS Freedom (LCS – 1)**
Summary

- C2 implementing a new strategy to expand beyond Situational Awareness to assist in full spectrum of C2, and to address changes in Mission requirements.

- C2RPC is an ONR and PEO C4I Partnership to improve development strategy and infuse new technology into future C2 systems:
  - Provides insertion path for POR expectation and guidance to S&T prototyping.
  - Coordinates various funding sources to bridge the valley of death.
  - Supports open communication between all stakeholders.
  - Establishes continuous interaction with Fleet to understand operational needs and validate prototype solutions.
  - Accelerates the transition of User-Validated C2 capabilities into POR.

- RITE provides assured integration of the technologies to meet cost, schedule & performance.

C2RPC is the first, from-the-ground-up, services architecture application designed to run on a shore based "cloud" infrastructure or from new Consolidated Afloat Network Enterprise Services (CANES) infrastructure.

Establishes C2 autonomous afloat capability (when needed) AND ashore high performance computer and network infrastructure augmentation when available.
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<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
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<tbody>
<tr>
<td>AIF</td>
<td>Architecture Infrastructure Framework</td>
<td>HADR</td>
<td>Humanitarian Assistance and Disaster Relief</td>
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<td>AMW</td>
<td>Air Mobility Wing</td>
<td>I3</td>
<td>Integrated Imagery and Intelligence</td>
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<td>ASW</td>
<td>Anti-Submarine Warfare</td>
<td>IO</td>
<td>Information Operations</td>
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<td>ATO</td>
<td>Air Tactical Order</td>
<td>IPOE</td>
<td>Intelligence Preparation of the Operational Environment</td>
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<td>BMD</td>
<td>Battle Management Development</td>
<td>ISR</td>
<td>Intelligence, Surveillance and Reconnaissance</td>
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<td>C2</td>
<td>Command and Control</td>
<td>JCIDS</td>
<td>Joint Capabilities Integration Development System</td>
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<td>C2RPC</td>
<td>C2 Rapid Prototyping Continuum</td>
<td>JFMCC</td>
<td>Joint Forces Maritime Command Center</td>
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<td>CANES</td>
<td>Consolidated Afloat Network Enterprise System</td>
<td>JOPES</td>
<td>Joint Operation Planning and Execution System</td>
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<td>CCIR</td>
<td>Commander’s Critical Information Requirements</td>
<td>JP</td>
<td>Joint Publication</td>
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<td>CM</td>
<td>Configuration Management</td>
<td>JTF</td>
<td>Joint Task Force</td>
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<td>CMD</td>
<td>Cruise Missile Defense</td>
<td>LCS</td>
<td>Littoral Combat Ship</td>
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<td>COA</td>
<td>Course of Action</td>
<td>MIO</td>
<td>Maritime Interdiction Operations</td>
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<td>COP</td>
<td>Common Operational Picture</td>
<td>MIW</td>
<td>Mine Warfare</td>
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<td>CPF</td>
<td>Commander Pacific Fleet</td>
<td>MOC</td>
<td>Maritime Operation Center</td>
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<td>DIL</td>
<td>Disconnected, Intermittent and Limited</td>
<td>MSO</td>
<td>Maritime Security Operations</td>
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<td>DT</td>
<td>Development Test</td>
<td>MTC2</td>
<td>Maritime Tactical C2</td>
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<tr>
<td>GCCS</td>
<td>Global Command and Control System</td>
<td>NTTP</td>
<td>Naval Technical Training Program</td>
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## Acronyms (continued)

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<td>OLW</td>
<td>Operational Levels of War</td>
<td>S&amp;T</td>
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<td>Operational Control</td>
<td>SOP</td>
<td>Standard Operating Procedures</td>
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<td>OT</td>
<td>Operational Test</td>
<td>SSA</td>
<td>Software Support Activity</td>
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<td>PEO C4I</td>
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<td>Program Warfare Office Command and Control</td>
<td>TBMCS</td>
<td>Theater Battle Management Core System</td>
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<td>POR</td>
<td>Program of Record</td>
<td>TF/TG</td>
<td>Task Force/Task Group</td>
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<td>Pre-Planned Response</td>
<td>TLAM</td>
<td>Tomahawk Land Attack Missile</td>
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<td>PTD</td>
<td>Plans, Tasks and Data Services</td>
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<td>Technology Readiness Levels</td>
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<td>RITE</td>
<td>Rapid Integration and Test Environment</td>
<td>UFS</td>
<td>User Facing Service</td>
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<td>ROE</td>
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