Module 5
Harmonizing C^2 with Focus and Convergence

Network Enabled Command and Control
Short Course

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Questions Addressed

• Can military organizations harmonize their C² with Focus and Convergence?

• Is there a Maturity Model for F&C?

• Is a more maturity approach better?
Agenda

• Review of Focus and Convergence
• Harmonizing C² and F&C
• Maturity Model for F&C
• Uses of a Maturity Model
• Model Validation Efforts
• Overview of Case Studies and Experiments
• Requisite Maturity and Agility
Focus and Convergence

- Focus and Convergence

  - recognizes the complex “Self” by moving from an entity to a collective perspective

  - adopts new language to reflect the heterogeneous nature of the Collective as well as the lack of a unified command chain and related inappropriate C2 connotations and practices
Focus and Convergence

• Replaces the terms
  – Command and control
  – Management
  – Governance

• Focus = developing shared intent and rules of engagement without unified command or an overall management authority

• Convergence = progress toward a set of desired outcomes without the assumption of control
Focus and Convergence

Focus and Convergence accomplishes the functions associated with command and control

*without*

- the existence of a unified chain of command
  - the assumption of control
- without implying a military approach
  - uniform technological capability
Focus and Convergence Approach Space

the F&C Approach Space redefines the dimensions of the space

Distribution of Information Among Entities

Patterns of Interaction Among Entities

Allocation of Decision Rights to the Collective
Harmonizing $C^2$ and F&C

- Harmonizing is about being able to add something that enhances what is already there.
- The only feasible approach to collective action is Focus and Convergence.
- In the case of complex endeavors, harmonizing $C^2$ refers to the ability to “add” a military organization to a Collective in a way that enhances the ability of the Collective to F&C.
- A failure to harmonize has, in the past, resulted in the failure of the endeavor.
Coordinated F&C

- Entity Cluster
- Task Cluster
- Entity Cluster
- Entity Cluster
- Entity Cluster

- individual
- interaction
- cluster

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A Military $C^2$ Entity in a Collective

How does the approach to $C^2$ practiced by the military entity affect the ability of the Collective to function?

- How does it affect the distribution of information?
- How does it change the patterns of interactions?
- What happens when the military entity does not cede any decision rights to the collective?
Harmonizing $C^2$ with F&C

- NEC2 is far more compatible with F&C than are traditional approaches to $C^2$

- Thus, military organizations that have developed a networked enabled capability are better “equipped” to work with others in Collectives

- However, the degree to which $C^2$ is harmonized with F&C depends on the maturity of the NEC2 adopted by the military
What is a Maturity Model?

- A Maturity Model identifies different levels of capability that are achievable and what is required to move from one level to the next.
- It is usually assumed that entities, as they mature, will be able to achieve higher levels of capability.
- Some Maturity Models map maturity levels to a measure of value and/or to the specific characteristics of a number of key value-related variables.
- The maturity levels must be empirically measurable.
NATO NEC C² Maturity Model*

- The NNEC C² Maturity Model was developed specifically for operations that can be characterized as Complex Endeavors.
- It was recognized that traditional C² was inappropriate for Complex Endeavors, thus the term C² should be read as F&C.
- However, this maturity model can be applied to the lesser included case of more traditional military operations.
- Thus, the maturity model can be applied to either individual military entities and/or heterogeneous collections of entities.
- Maturity Levels are associated with the degree to which a Collective or entity is able to conduct network-enabled operations (NEC capability levels).
- Maturity Levels are defined in terms of specific regions of the Approach Space.

* source: NATO Research Group - SAS-065
Maturity Levels

A Maturity Level is defined by the specific approaches that the entity (collective) is capable of employing appropriately.
## Maturity Levels & Approaches

### F&C Maturity Levels

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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**Legend:**
- **Black**: Mature
- **White**: Not mature

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NEC2 Short Course – Module 5 Harmonizing C2 with F&C
Maturity Levels

A Maturity Level is defined by the specific approaches that the entity (collective) is capable of employing *appropriately*.
## F&C Maturity Levels

<table>
<thead>
<tr>
<th>Maturity Levels</th>
<th>Approaches in Toolkit</th>
<th>Situation Recognition</th>
<th>Transition Requirements</th>
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</thead>
<tbody>
<tr>
<td><strong>Level 5</strong></td>
<td>Edge</td>
<td>Emergent</td>
<td>Fluid</td>
</tr>
</tbody>
</table>
| **Level 4**     | Collaborative         | locate situation in one of 3 Regions and match to approach | Collaborative ↑
|                  | Coordinated           |                       | Coordinated ↓
|                  | De-Conflicted         |                       | De-Conflicted           |
| **Level 3**     | Coordinated           | locate situation in one of 2 Regions and match to approach | Coordinated ↑
|                  | De-Conflicted         |                       | Coordinated ↓
| **Level 2**     | De-Conflicted         | None                  | None                    |
| **Level 1**     | Conflicted            | None                  | None                    |

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Maturity Levels & NNEC Capability

**Maturity Levels**

- Level 5
- Level 4
- Level 3
- Level 2
- Level 1

**NNEC Capability Levels**

- Transformed (Coherent) Operations
- Integrated Operations
- Coordinated Operations
- De-Conflicted Operations
- Stand Alone (Disjointed) Operations
Uses of NATO NEC C² Maturity Model

- **CD&E** - Development of new concepts, formulation of hypotheses and design campaigns of experimentation and exercises
- **Doctrine** - Development of new concepts and assessment of current doctrine
- **Operational Analysis (OA)** - Structuring field data collection and lessons learned analyses
- **Education and Training** - help individuals and organizations to better understand what is being modelled
- **Modelling & Simulation (M&S)** - Framework for development of conceptual and executable models for exploration and assessment
- **Operational Design and Force Planning** - assessment of capabilities to face current and future challenges
- **Programming and Budgeting** - investment decision support
Verification and Validation Effort

• Purpose of Verification and Validation effort
  – Is the articulation of the Maturity Model Clear?
  – Can the model be usefully applied?
  – Is the Maturity Model a valid representation of reality?

• Types of Validity
  – Expert (face) Validity
  – Construct Validity
  – Empirical Validity

• SAS-065 Approach to Verification and Validation
  – Conduct case study applications across a range of relevant situations
  – Conduct analyses of relevant experimentation
  – Peer Review
## SAS065 Case Studies and Experiments

<table>
<thead>
<tr>
<th>Mission</th>
<th>Case Studies</th>
<th>Dates</th>
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<tbody>
<tr>
<td>Combat Exercises</td>
<td>Brigade Exercises</td>
<td>2005</td>
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<td>Combat Operations</td>
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<td>2003-2005</td>
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<td>WISE Wargames</td>
<td>UK C² Alternatives</td>
<td>2006-2007</td>
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<td>Peace Operation</td>
<td>IFOR in Bosnia</td>
<td>1995-1996</td>
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<td>KFOR in Kosovo</td>
<td>1999</td>
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<td>Small Natural Disaster</td>
<td>Elbe River Flood Germany</td>
<td>2002</td>
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<td>Small Natural Disaster</td>
<td>Strong Angel III in US</td>
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<td>Small Natural Disaster</td>
<td>Golden Phoenix in US</td>
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<td>Complex Disaster Response</td>
<td>Katrina in US</td>
<td>2005</td>
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<td>Pakistan Earthquake</td>
<td>2005</td>
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<td>Complex Disaster Response</td>
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<td>2004</td>
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<tr>
<td>Situation Awareness</td>
<td>ELICIT Experimentation</td>
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## Combat Operations: $C^2$ Approaches

### Variables Defining Collective $C^2$ Maturity Levels

<table>
<thead>
<tr>
<th>C2 Approach</th>
<th>1/25 SBCT</th>
<th>1/25 SBCT</th>
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<td>3/2 SBCT Stryker Ex.</td>
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### Required Patterns of Interaction

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### C2 Approach

- **Allocation of Decision Rights to the Collective**
- **Inter-entity Information Sharing Behaviors**
- **Distribution of Information (Entity Information Positions)**

### Frequency/Continuity of Interaction

- **Cluster Attractor**
- **Degree of Intercluster Connectivity**

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**Key Abbreviations:**
- 1/25 = Stryker Brigade Combat Team (SBCT)
- Stryker Ex = Stryker Exercise
- 101 Abn = 101st Airborne Division
- Light Inf = Standard US Light Infantry Brigade Force
- 3/2 = SBCT

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*NEC2 Short Course – Module 5 Harmonizing C2 with F&C*
## Combat Operations: MoEs

### Expected Values of Measures of C2 Effectiveness

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### Measures of Endeavor Effectiveness

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### Notes

- **1/25 = Stryker Brigade Combat Team (SBCT)**
- **3/2 = SBCT**
- **Stryker Ex = Stryker Exercise**
- **Light Inf = Standard US Light Infantry Brigade Force**
- **101 Abn = 101st Airborne Division**

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**NEC2 Short Course – Module 5 Harmonizing C2 with F&C**
## Peace Operations: C² Approaches

### Variables Defining Collective C² Maturity Levels

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### C² Approach

- **Allocation of Decision Rights to the Collective**
- **Inter-entity Information Sharing Behaviors**
- **Distribution of Information (Entity Information Positions)**
- **Cluster Attractor**
- **Degree of Inter-cluster Connectivity**
- **Frequency/Continuity of Interaction**

- IFOR/CIV = IFOR – Civilian interactions
- KFOR/UN = KFOR – UN interactions
- IFOR/Mil = IFOR – within Military
- KFOR Air = Air Campaign
- KFOR Bde = Inter-Brigade (first year)
- KFOR NGO = Interactions with NGO (first year)
UK WISE Wargames and Peace Operations

UK WISE Wargames

Baseline/Traditional C2 Approach
Treatment/Functional Task Organizations
IFOR Bosnia
KFOR Kosovo
C2 Maturity Level

Edge
Collaborative
Coordinated
De-Conflicted
Conflicted

UK WISE Wargames
Peace Operations

Characteristic Mode
Military
Range
Civil

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Maturity Model Impacts (summer 2009)

- Germany developing a guideline for CD&E analysis using N2C2M2 to support assessment of C2 related concepts (CD&E)
- Italy conducting experiments using the N2C2M2 in a synthetic environment (M&S, CD&E)
- Portugal: experiments focused on the five levels of C2 Maturity (CD&E)
- UK developed approach using N2C2M2 for NEC Maturity Assessment (Programming and Budgeting)
- UK exploited the N2C2M2 in the development of its Command Doctrine as part of the High Level Operational Conceptual Framework (Doctrine)
- US developing empirical field metrics for applying the N2C2M2 (OA)
- C2CoE collaboration in NATO Response Force (NRF) Assessment (Operational Design and Force Planning)
- Switzerland using N2C2M2 for Strategic Exercise STABILO 2012 (Operational Design and Force Planning)
- Singapore incorporating N2C2M2 into their Innovation Hub (CD&E)
- Presented N2C2M2 to NCW 2009 and NNEC Conference 2009 (Total of 800+ participants) (Education and Training)
- HFM-156 used C2CRM as a basis for research hypotheses (CD&E)
Requisite Maturity

• The appropriate approach to employ depends on the situation and circumstances

• Complex endeavors are dynamic; thus it is often the case that the approach that is appropriate changes during the endeavor

• For this reason, collectives need to be able to 1) employ different approaches, 2) recognize the approach that is appropriate and, 3) if necessary, transition to that approach

• The evidence shows that if the collective is less mature than is required, the mission will not succeed

• Requisite maturity is the minimum level of maturity that is adequate for the situation – including how the situation is likely to evolve