**Command and Control
Maturity and Agility**

presented to
AFCEA-GMU Critical Issues in C4I
May 2009

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Background

- A networked enabled approach to C2 is required to meet 21st Century mission challenges.

- NEC is a strategic vision, not an implementation plan.

- Progress has been inhibited by a lack of an ability to:
  - Characterize and understand current C2 approaches and capabilities;
  - Measure C2 "quality;" and
  - Identify milestones on the road to NEC.

- NATO RTO chartered a research group to remove these impediments to progress.

Agenda

- 21st Century Mission Challenges

- Implications for Command and Control

- C2 Approaches

- C2 Maturity

- C2 Agility

The Problem
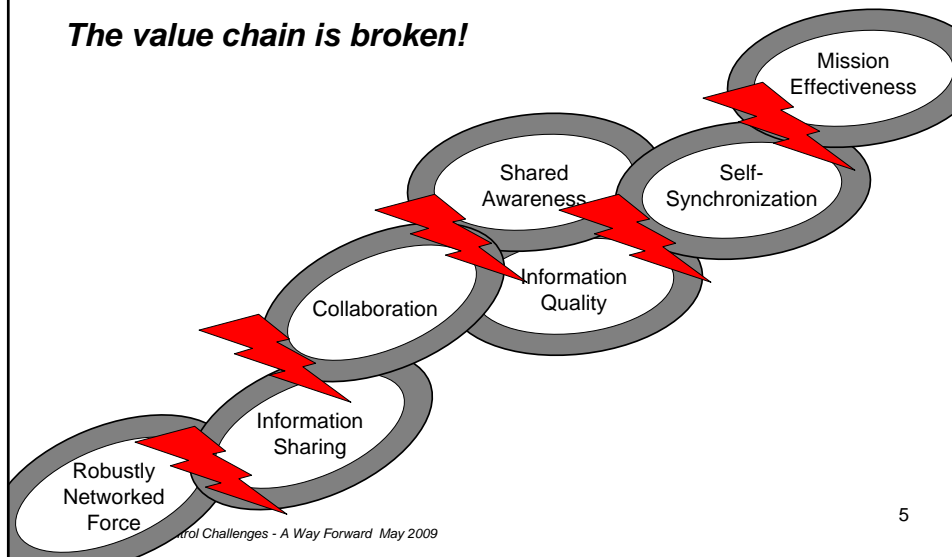
There is a fundamental disconnect between

the state of the art and practice of
Command and Control

&

21st Century
Mission challenges

The Result

The value chain is broken!

Mission Effectiveness

Self-Synchronization

Shared Awareness

Information Quality

Collaboration

Information Sharing

Robustly Networked Force

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21st Century Missions

21st Century Missions are *Complex Endeavors*

Complexity in the Task and Environment

+

Complexity of 'Self'

=

Complex Endeavor

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Task and Environment

Humanitarian Assistance

Peace Keeping

Counter Terrorism

- The success of 21st Century Missions requires a multi-dimensional effects space
  - *political, social, economic, military*

- The complexity of the mission is a result of the interactions between and among the effects particularly across dimensions and the uncertainties associated with a cascading effects chain.

Disaster Relief

Stability Operations

Complexity of Self

- Self = A large number of heterogeneous, independent entities that differ significantly with respect to:

  - Culture, values and norms
  - Laws, policies, rules, and regulations
  - Practices and processes
  - Levels of trust
  - Language
  - Information and communications capabilities
  - Approach to organization and management

- The complexity of 'Self' comes from the nature of the interactions between and among the participating entities and the dynamics of the situation that affect entity willingness, constraints, perceptions, and capabilities.

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Implications for Command and Control

- There will not be a unified chain of command.
- Entities will each have their own intent.
- The situation will be, in part, unfamiliar to all entities.
- There will be multiple planning processes.
- Critical information and expertise necessary to understand the situation will be non-organic.
- Actions, to be effective, will require developing synergies between and among entity actions.

There is a difference between _Entity_ Command and Control and _Collective_ Command and Control

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Key C2 Issues

Is Command and Control (in the traditional sense)
for Complex Endeavors an Oxymoron?

Are there new approaches to accomplishing the
functions we associate with
traditional Command and Control
that have a better chance of success?

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Key C2 Issues

Is Command and C_____ 'he traditional sense)
for Compl_____)xymoron?

The Answer
is
Are there nev_____ YES !_____ mplishing the
func_____ with
traditiona_____ .nd Control
that have a better chance of success?

21st Century C2

The Mission Space

- Virtually all endeavors will be complex
- Situations will be dynamic
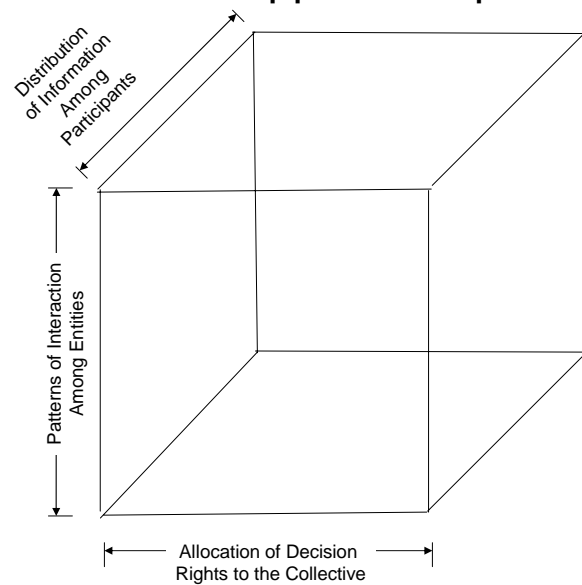- The more complex and dynamic the situation, the greater demands on C2
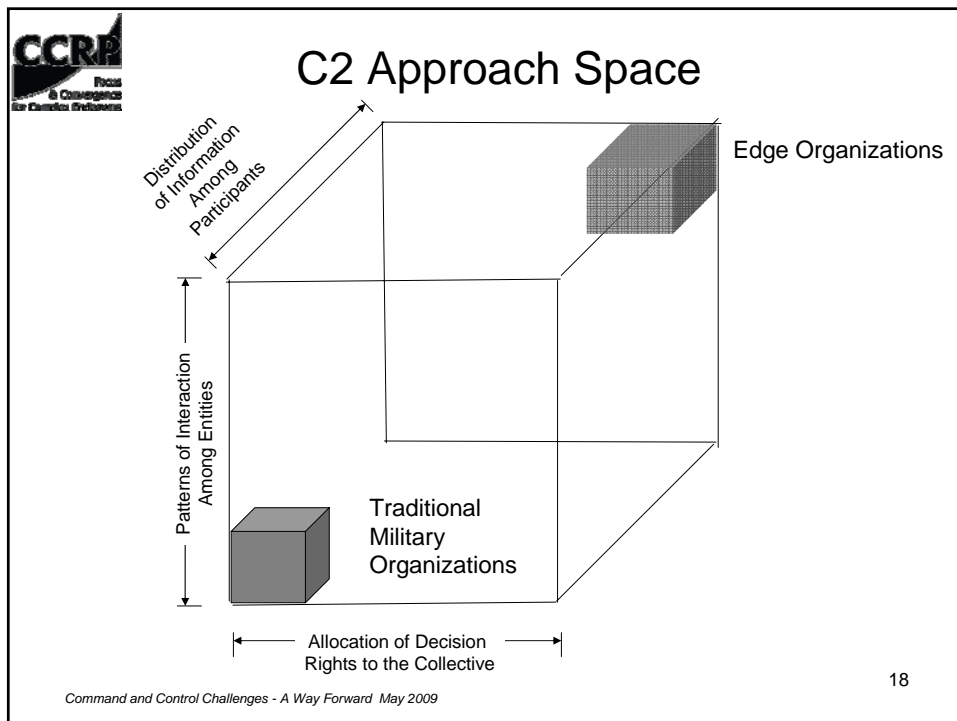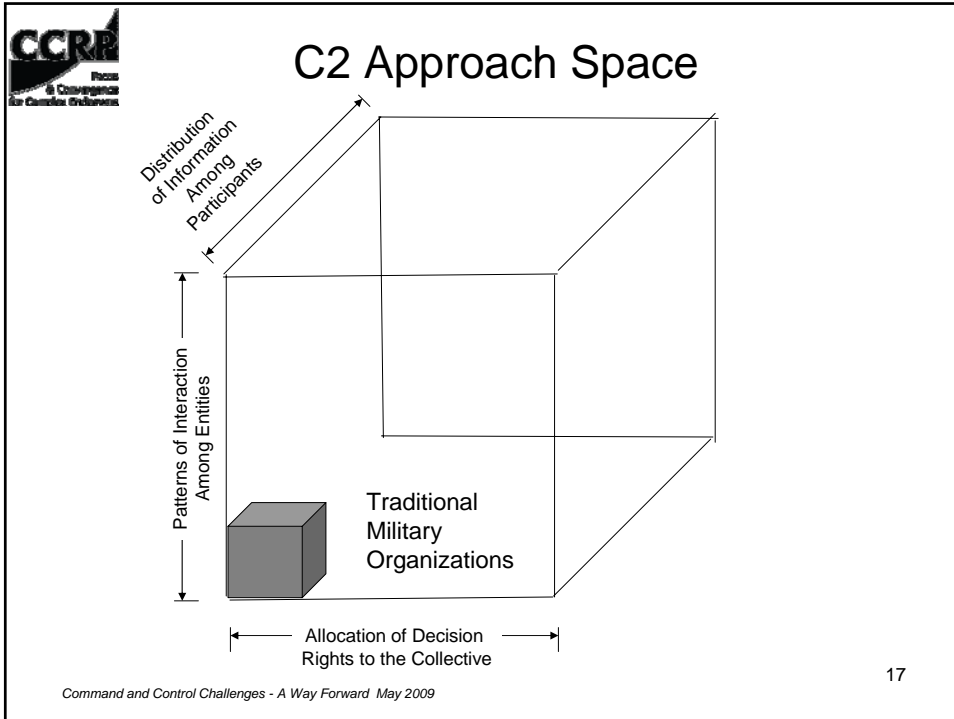
Approach to Command and Control

- There are many ways to accomplish the functions associated with Command and Control
- No one approach fits all missions or situations
- The most appropriate approach will be a function of the endeavor
- Entities will need to be able to utilize more than one C2 approach
- The Collective needs to be able to adopt an appropriate C2 approach

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C2 Approach Space

Distribution of Information Among Participants

Patterns of Interaction Among Entities

Allocation of Decision Rights to the Collective

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C2 Approach Space

Distribution of Information Among Participants

Patterns of Interaction Among Entities

Traditional Military Organizations

Allocation of Decision Rights to the Collective

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C2 Approach Space

Distribution of Information Among Participants

Edge Organizations

Patterns of Interaction Among Entities

Traditional Military Organizations

Allocation of Decision Rights to the Collective

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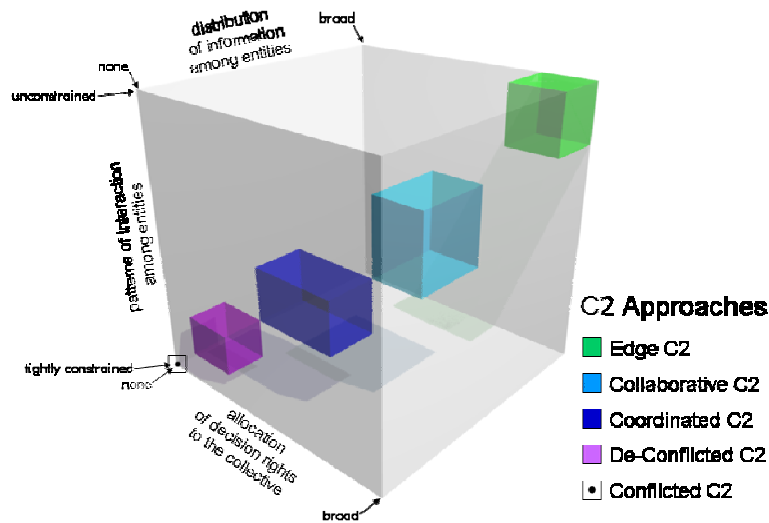
Archetype C2 Approaches

	Allocation of Decision Rights to the Collective	Inter-Entity Information Sharing Behaviors	Distribution of Information (Entity Information Positions)
Edge C2	Not Explicit, Self-Allocated (Emergent, Tailored, and Dynamic)	Unlimited Sharing as Required	All Available and Relevant Information Accessible
Collaborative C2	Collaborative Process and Shared Plan	Significant Broad Sharing	Additional Information Across Collaborative Areas/Functions
Coordinated C2	Coordination Process and Linked Plans	Limited Focused Sharing	Additional Information About Coordinated Areas/Functions
Deconflicted C2	Establish Constraints	Very Limited Sharply Focused Sharing	Additional Information About Constraints and Seams
Conflicted C2	None	No Sharing of Information	Organic Information

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C2 Approaches

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C2 Maturity and C2 Approaches

- A Maturity Model has the following essential properties:
  - Identifies different levels of capability that are achievable;
  - Entities and Collectives, as they mature, will be able to achieve higher levels of capability;
  - Maturity levels must be measurable.

C2 Maturity Levels	Conflicted C2	De-Conflicted C2	Coordinated C2	Collaborative C2	Edge C2
5		■	■	■	■
4		■	■	■	
3		■	■		
2		■			
1	■				

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C2 Maturity

C2 Maturity Levels	Contents of C2 Toolkit	C2 Approach Decision Requirement	Transition Requirements
Level 5	Edge C2	Emergent	Fluid
Level 4	Collaborative C2 Coordinated C2 De-Conflicted C2	Recognize 3 situations and match to appropriate C2 approach	Collaborative C2 ↕ Coordinated C2 ↕ De-Conflicted C2
Level 3	Coordinated C2 De-Conflicted C2	Recognize 2 situations and match to appropriate C2 approach	Coordinated C2 ↕ De-Conflicted C2
Level 2	De-Conflicted C2	N/A	None
Level 1	Conflicted C2	N/A	None

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C2 Agility

- Agility is an umbrella concept that includes:
  - Responsiveness;
  - Robustness;
  - Resilience;
  - Flexibility;
  - Innovativeness;
  - Adaptability.

- C2 Agility is the ability to maintain effective C2 as a function of changing circumstances and stresses.

C2 Agility

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Level 3	Coordinated C2 De-Conflicted C2	Recognize 2 situations and match to appropriate C2 approach	Coordinated C2 ↕ De-Conflicted C2
Level 2	De-Conflicted C2	N/A	None
Level 1	Conflicted C2	N/A	None

C2 Agility ↑

C2 Agility

- C2 Agility involves more than being able to recognize the nature of the situation and adjust the C2 Approach
- C2 Agility also involves being able to maintain an acceptable level of effectiveness in the face of:
  - Physical, Electronic, and Cyber attacks that destroy or degrade nodes and/or links;
  - Information attacks that results in a loss of information or the insertion of misinformation;
  - A loss of trust in information, services, or entities;
  - An austere environment that limits connectivity and services;
  - ….

Summary

- The NATO NEC C2 Maturity Model enables entities and collectives to:
  - Characterize and understand current C2 approaches and capabilities;
  - Measure C2 "quality";
  - Identify milestones on the road to NEC.

- For a given situation there are minimum levels of C2 Maturity and Agility required for success.
  (Requisite C2 Maturity and Requisite C2 Agility)

- Increased C2 Maturity is necessary, but not sufficient to achieve C2 Agility.

Homework Assignment

Distribution of Information Among Participants

Patterns of Interaction Among Entities

Edge Organizations

?

Allocation of Decision Rights to the Collective

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