

# Module 4

## NEC<sup>2</sup> for Complex Endeavors?

Network Enabled Command and Control  
Short Course

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# Questions Addressed

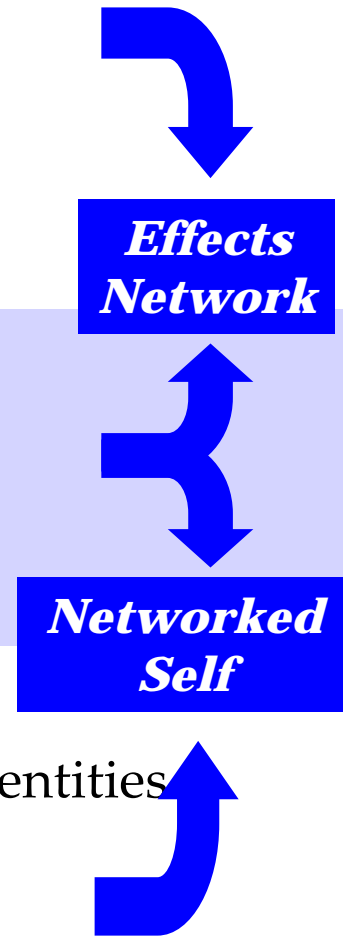
- Is NEC<sup>2</sup> the answer to Complex Endeavors?
- If, not what is a promising approach?

# Agenda

- Review the nature of Complex Endeavors
- Role of networks
- A continuing disconnect
- Re-inventing C<sup>2</sup>

# Complex Endeavors are all about Networks

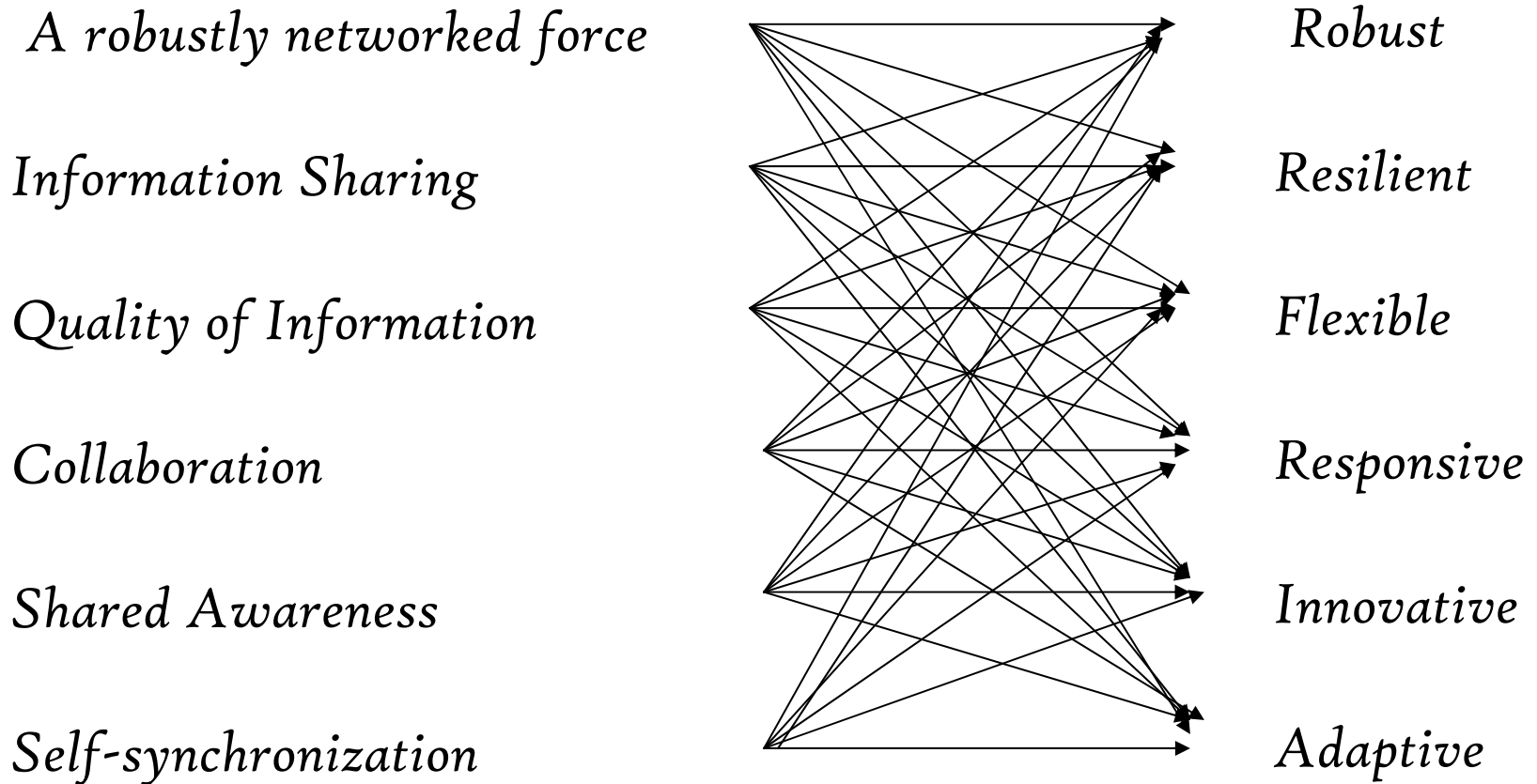
- Complex Effects Space
  - More than just military effects
  - Interactions within the effects space are significant
  - Lack of understanding of cross-domain cause-effects
  - Inability to predict
- Operating in a Network-Centric Environment
  - Many v. Few
  - Unfamiliar v. Familiar
- Complex “Self”
  - “Self” is composed of a large number of heterogeneous entities
  - Different objectives, values, constraints
  - No single entity in charge
  - Entities have significantly different perceptions



# Networks Enable

- Networks enable
  - Widespread sharing of information
  - Collaboration
- Which enable the creation of
  - Quality Information and Quality Awareness
  - Shared Information and Shared Awareness
- These enable Power to the Edge and NEC<sup>2</sup>
  - Required for effective collective action
  - Provides Requisite Agility for 21<sup>st</sup> Century Missions

# NEC<sup>2</sup> Contributes to Agility



# But... a Continuing Problem

*There is still a fundamental disconnect between*

the state of the art and practice of  
**Command and Control**

**&**

21<sup>st</sup> Century  
**Mission challenges**

# But... a Continuing Problem

*There is still a fundamental disconnect between*

the state of the art and practice of  
Command and Control

**What's the disconnect?**

21<sup>st</sup> Century  
Mission challenges



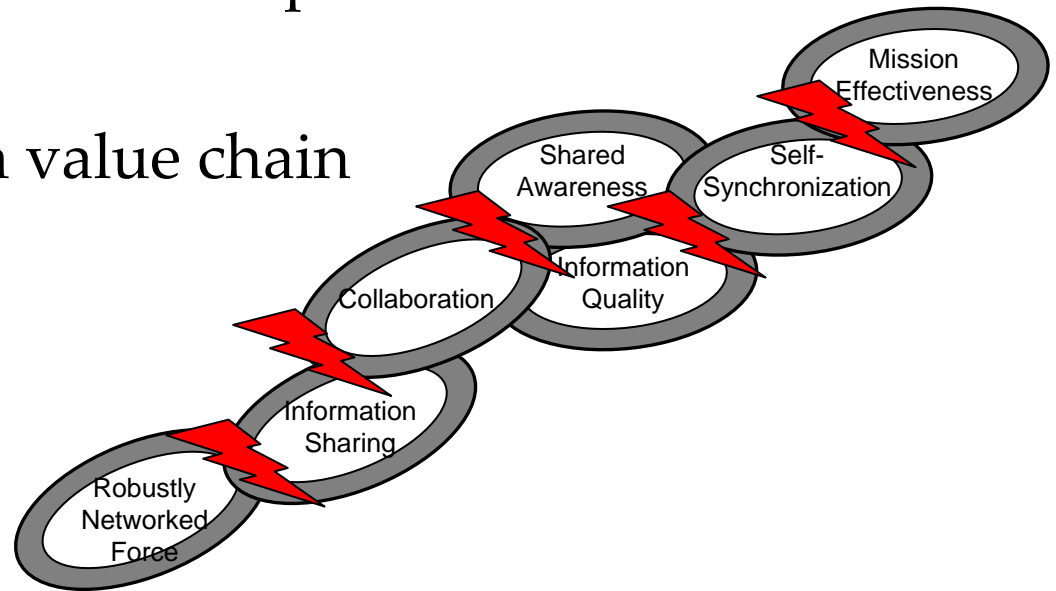
# The Disconnects

- Disconnects in NEC<sup>2</sup> assumptions
  - There is a unified chain of command
  - There is coherent command intent
  - There is access to information and expertise
  - There is a willingness to collaborate

# The Disconnect

- The disconnects in NEC<sup>2</sup> Assumptions
  - a unified chain of command
  - coherent command intent
  - access to information and expertise

- The Result – a broken value chain



# Broken Links in the NEC Value Chain

*A robustly networked force*



*Information Sharing*

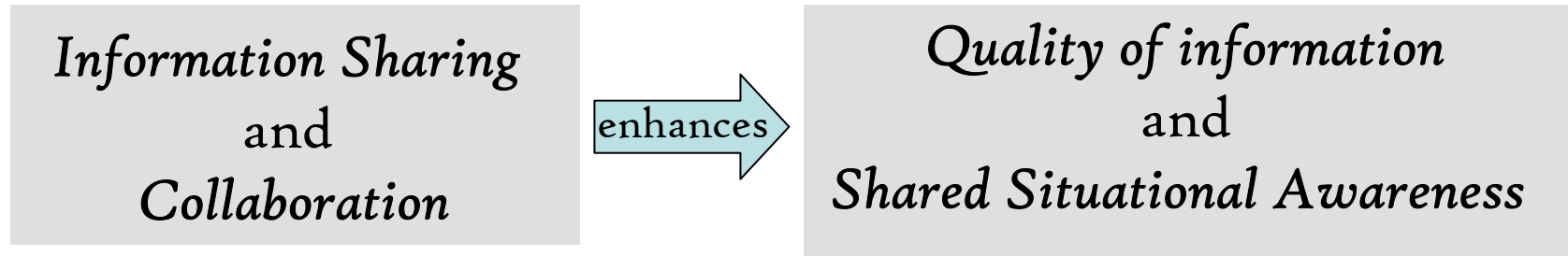
To the extent that mission participants (coalition partners and others that affect the effects space) do not have:

- reliable, secure connectivity with adequate services;
- means of finding the right individual or information;
- policies that promote sharing (e.g. post before process);
- trust in another;

*the sharing of information will be limited.*

To the extent that information sharing is limited,  
*the ability to collaborate will be limited.*

# Broken Links in the NEC Value Chain



Limited information sharing and collaboration

*limit the quality of information that is developed.*

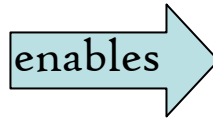
Limitations in the quality of information available and differences in:

- mental models;
- perceptions;
- prior knowledge and experience:

*limit the degree to which Shared Situational Awareness can be achieved.*

# Broken Links in the NEC Value Chain

*Shared situational awareness*



*Collaboration  
and  
Self-synchronization*

Limited Shared Situational Awareness and a failure to adopt new approaches to Command and Control will:

*limit collaboration;  
limit the ability to self-synchronize; and  
limit agility.*

Limited ability to collaborate and self-synchronize and limits on agility will

*limit mission effectiveness.*

# Need to re-invent $C^2$ for Complex Endeavors

- Need to recognize the complex “Self” by moving from Entity and Mission perspectives to Collective perspective
- Need to change the language of  $C^2$  to reflect the lack of a unified command chain, the heterogeneity of “self”, and the realities of complexity
- Need to recognize that more mature NEC<sup>2</sup> is not necessarily appropriate for every endeavor or every entity

# Focus and Convergence

- Replaces the terms
  - Command and control
  - Management
  - Governance
- Focus = developing shared intent as well as 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

Focus and Convergence accomplishes the functions associated with command and control

- the existence of a unified chain of command
- the assumption of control
- that implying a military approach
- uniform technological capability

*F&C is applicable to both individual entities and to collectives*

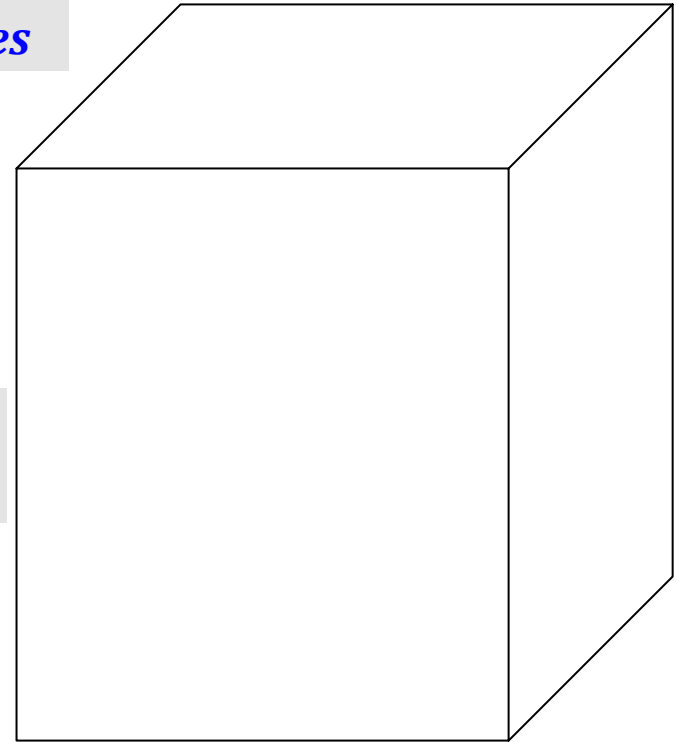
# Focus and Convergence Approach Space

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*



# NEC2 and Complex Endeavors

- C2 In a Net-Centric Environment (NEC2)
  - Expression and communication of Intent
  - Sharing Awareness
  - Collaborative Planning
  - Enabling Self-synchronization
- Focus and Convergence In Complex Endeavors
  - Fundamentally NEC2 but....
  - Negotiating Intent vs Establishing Intent
  - Complex effects space vs Military effects
  - Multiple Chains of Command vs Single Chain of Command
  - Trust in Partners vs Trust in Subordinates

# Getting to Yes

- Recognize the Need for a new approach to C<sup>2</sup>

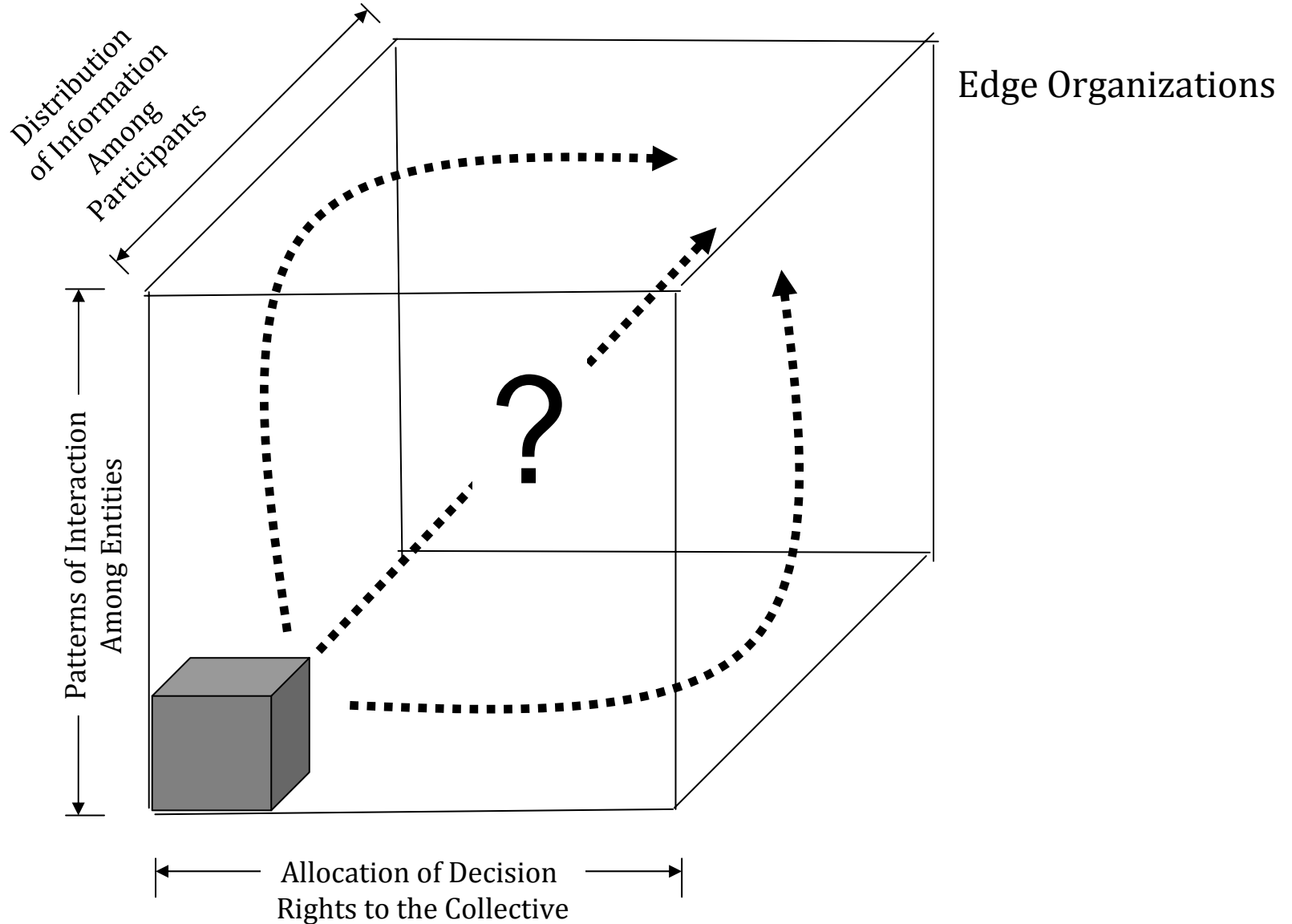


- A new language



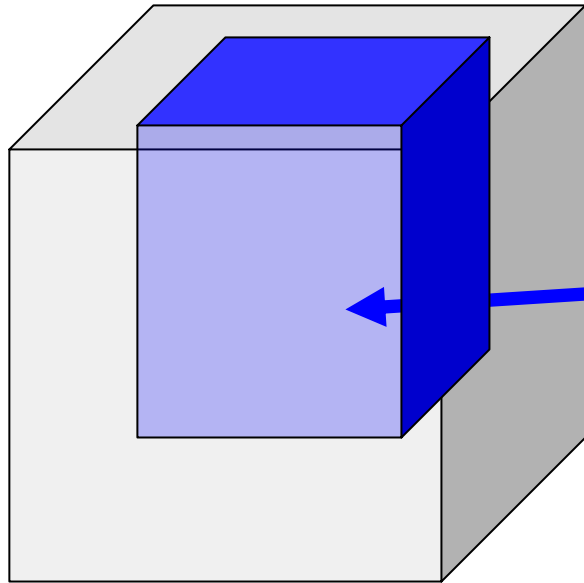
- Explore the space of possibilities
- Make the Investments in Co-evolution

# Exploring the Space - A False Choice

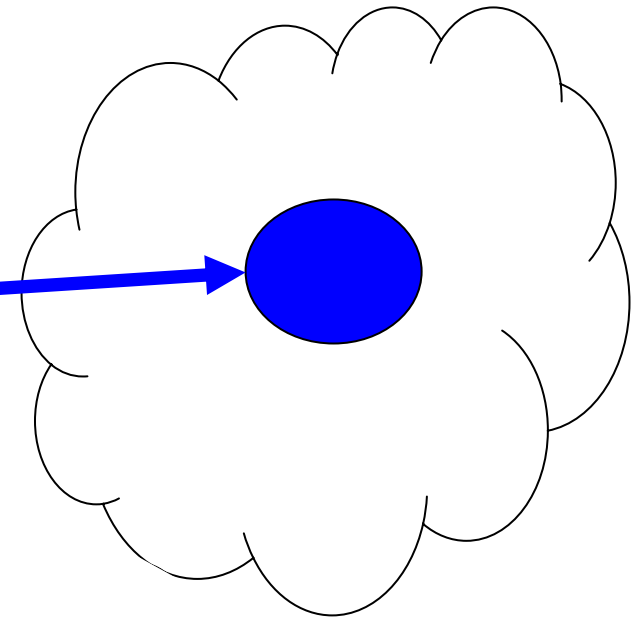


# Exploring the Space – Making the Right Choices

Approach to  
Focus and Convergence



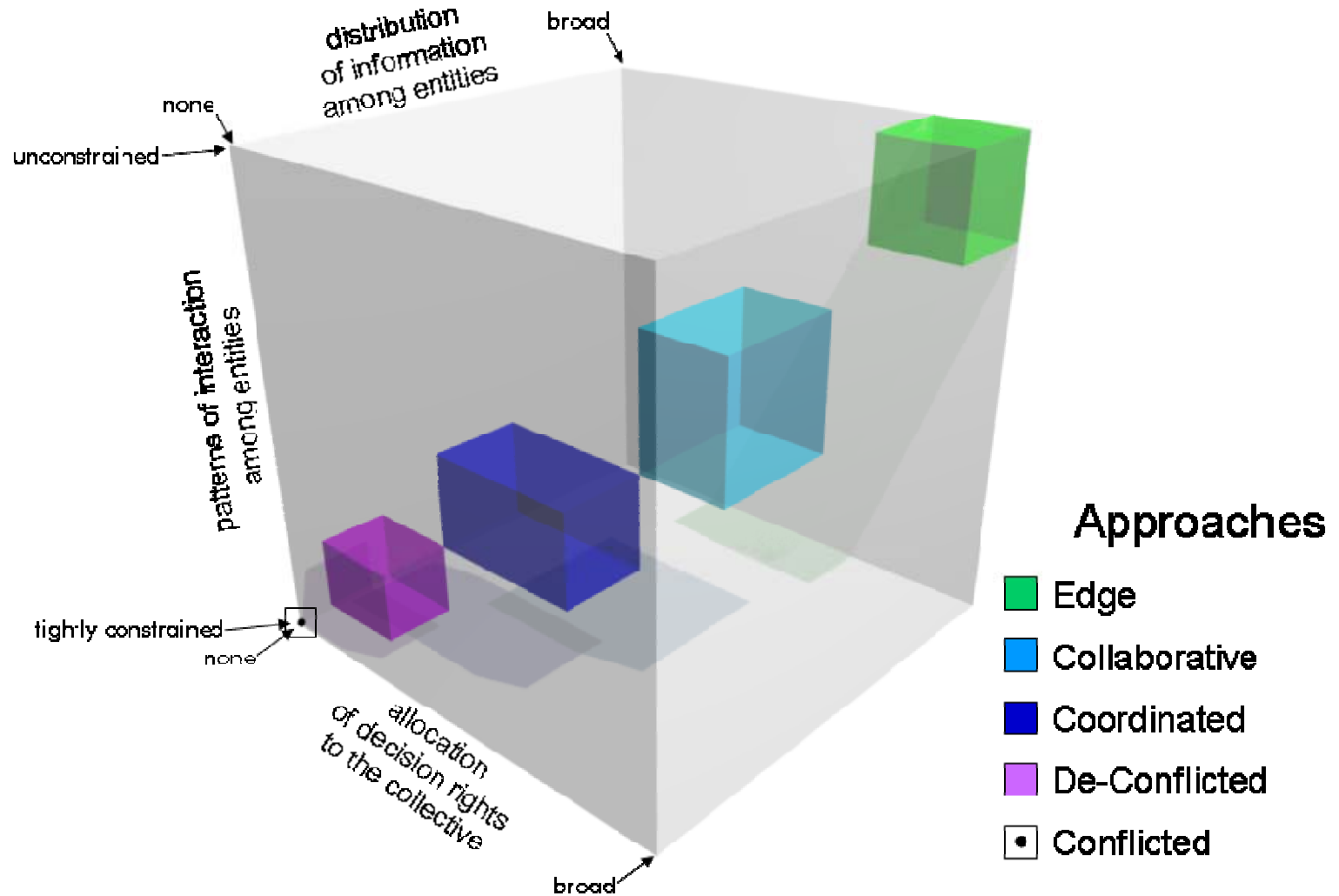
Endeavor Space



- There are many ways to accomplish the required functions
- 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 approach
- The Collective needs to be able to adopt an appropriate approach

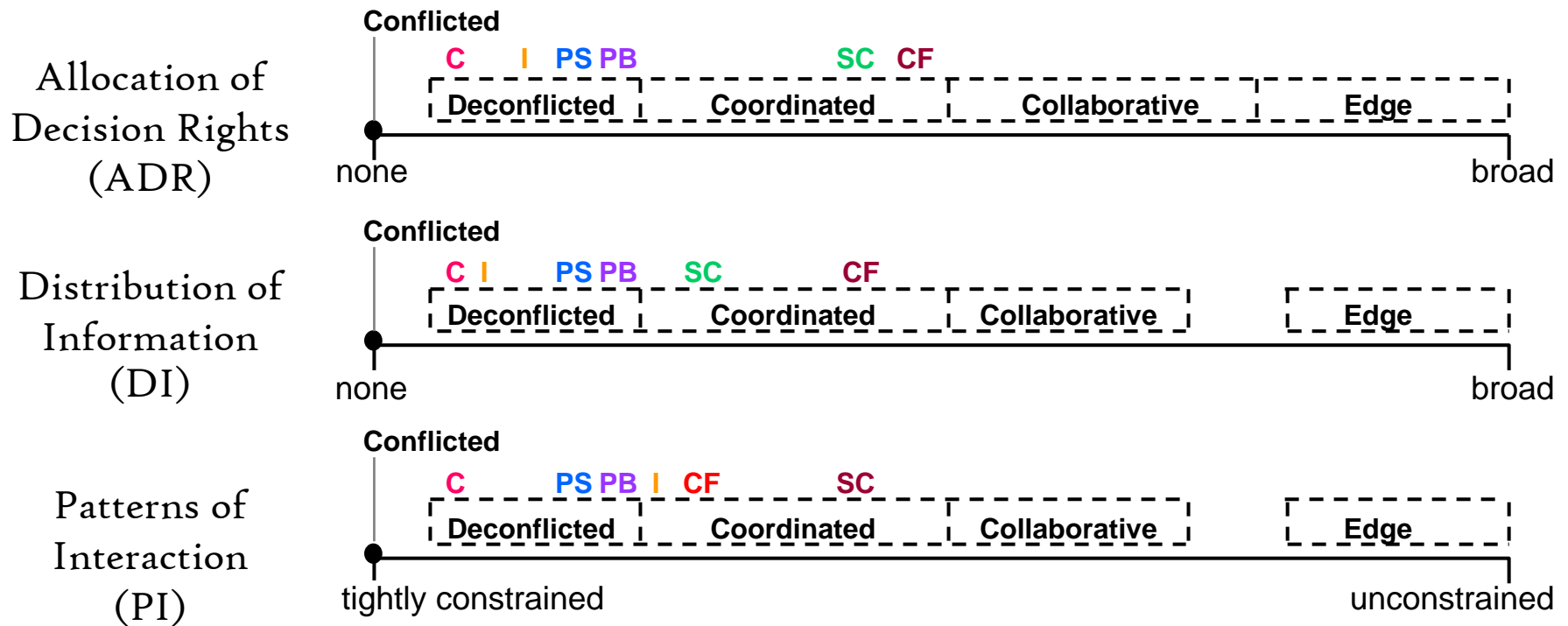
- Virtually all endeavors will be complex
- Situations will be dynamic
- The more complex and dynamic the situation, the greater demands on C<sub>2</sub>

# Archetypical F&C Approaches



# Industrial Age C<sup>2</sup> v. F&C Archetypes

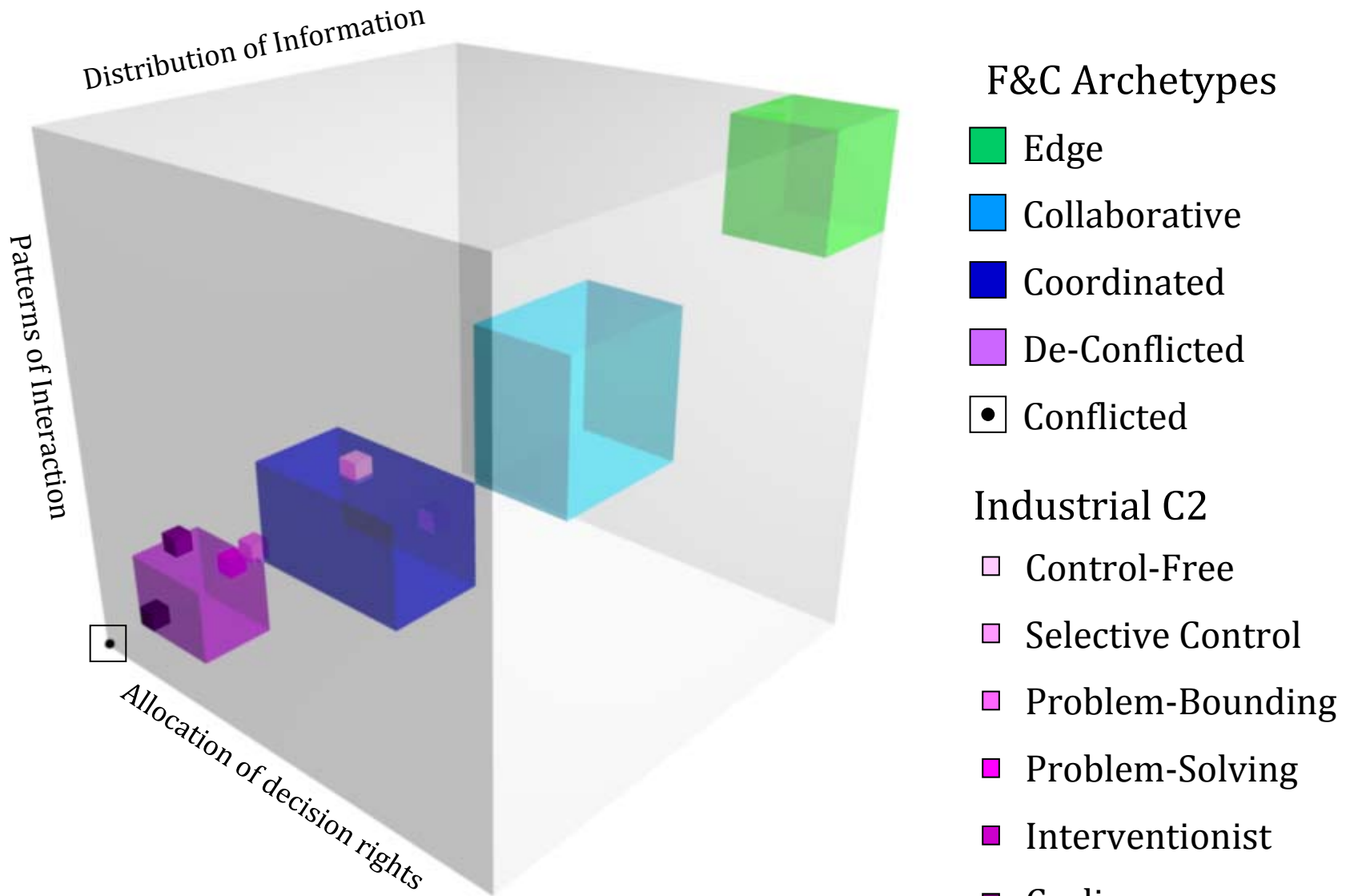
**Control-Free = CF**  
**Selective Control = SC**  
**Problem-Bounding = PB**  
**Problem-Solving = PS**  
**Interventionist = I**  
**Cyclic = C**



\* Command Approach for Theater Level Only



# Industrial Age C<sup>2</sup> v. F&C Archetypes



# F&C Archetype Characteristics

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

# F&C Archetype Patterns of Interaction

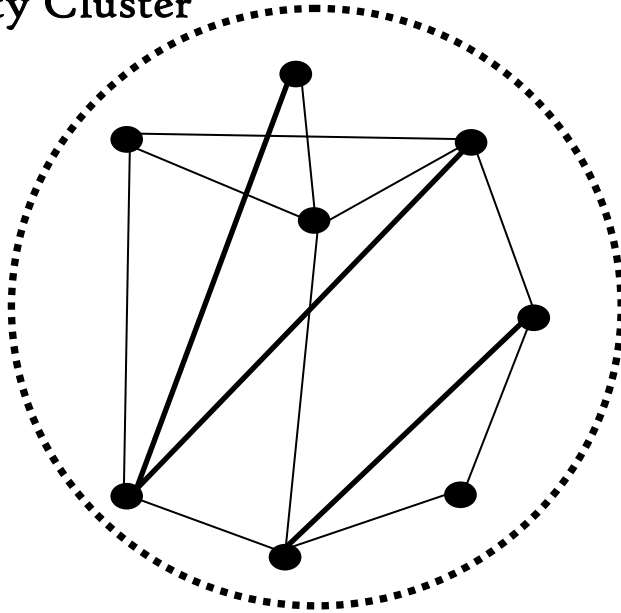
<b>Edge</b>	Endeavor Objective(s) and Tasks	Complete	Tailored and Dynamic
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<b>Collaborative</b>	Mixture, Largely Task-Related and Some Entities	Rich	Continuous or Nearly Continuous
<b>Coordinated</b>	Mixture, Largely Entities and Some Task-Related	Limited	Periodic
<b>De-Conflicted</b>	Entity Organizations	Minimal	Episodic

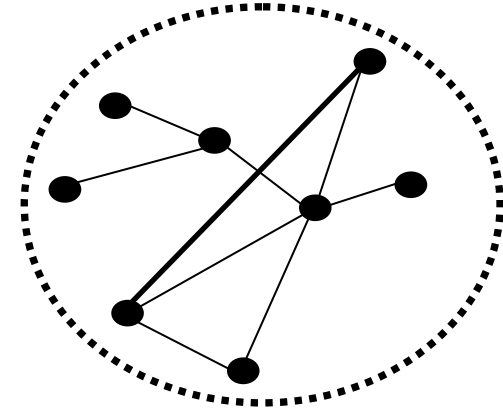
<b>Conflicted</b>	Entity Organizations	None	None
<b>Approach</b>	<b>Cluster Attractor</b>	<b>Degree of Inter-Cluster Connectivity</b>	<b>Frequency/Continuity</b>

# Conflicted F&C

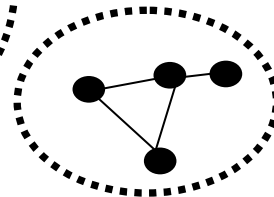
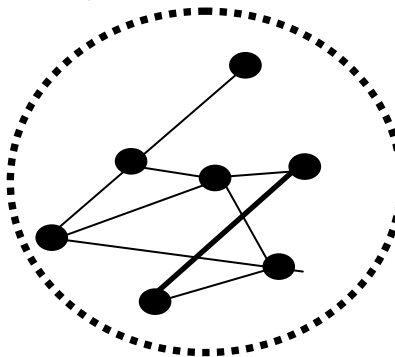
Entity Cluster



Entity Cluster

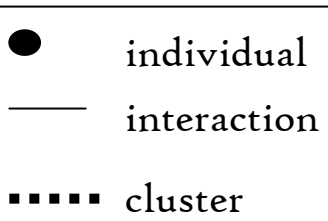
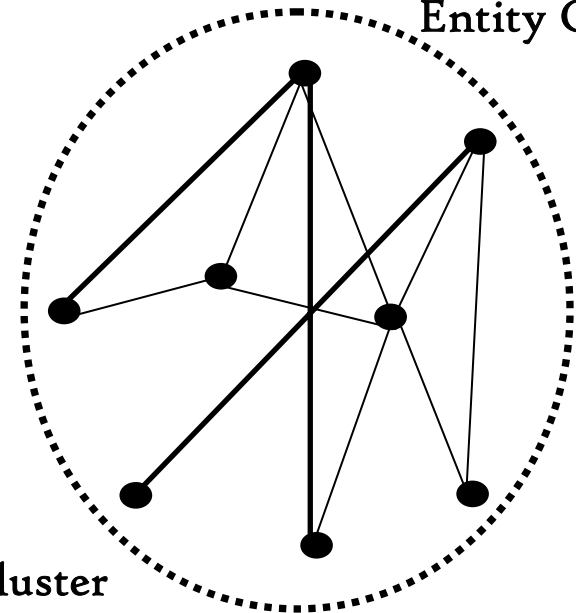


Entity Cluster



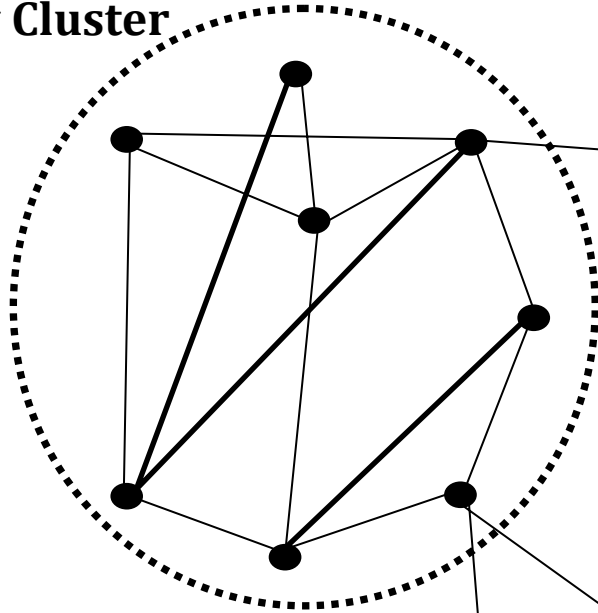
Entity Cluster

Entity Cluster

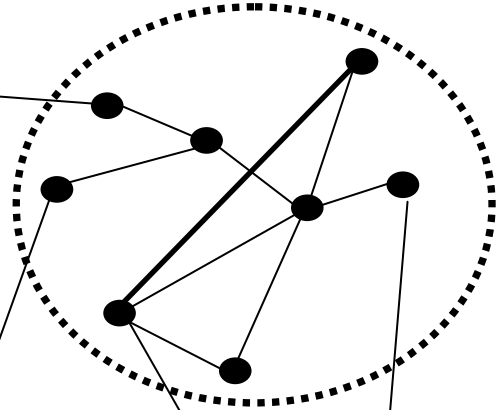


# De-conflicted F&C

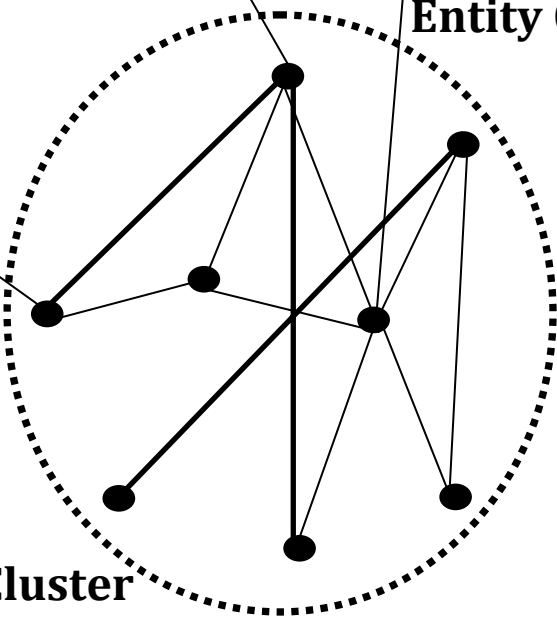
Entity Cluster



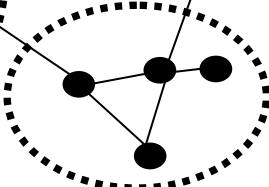
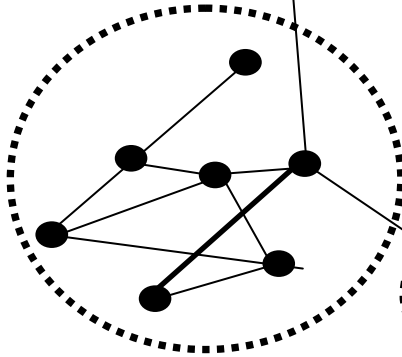
Entity Cluster



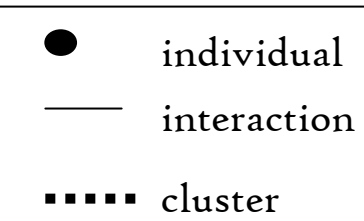
Entity Cluster



Entity Cluster



Entity Cluster

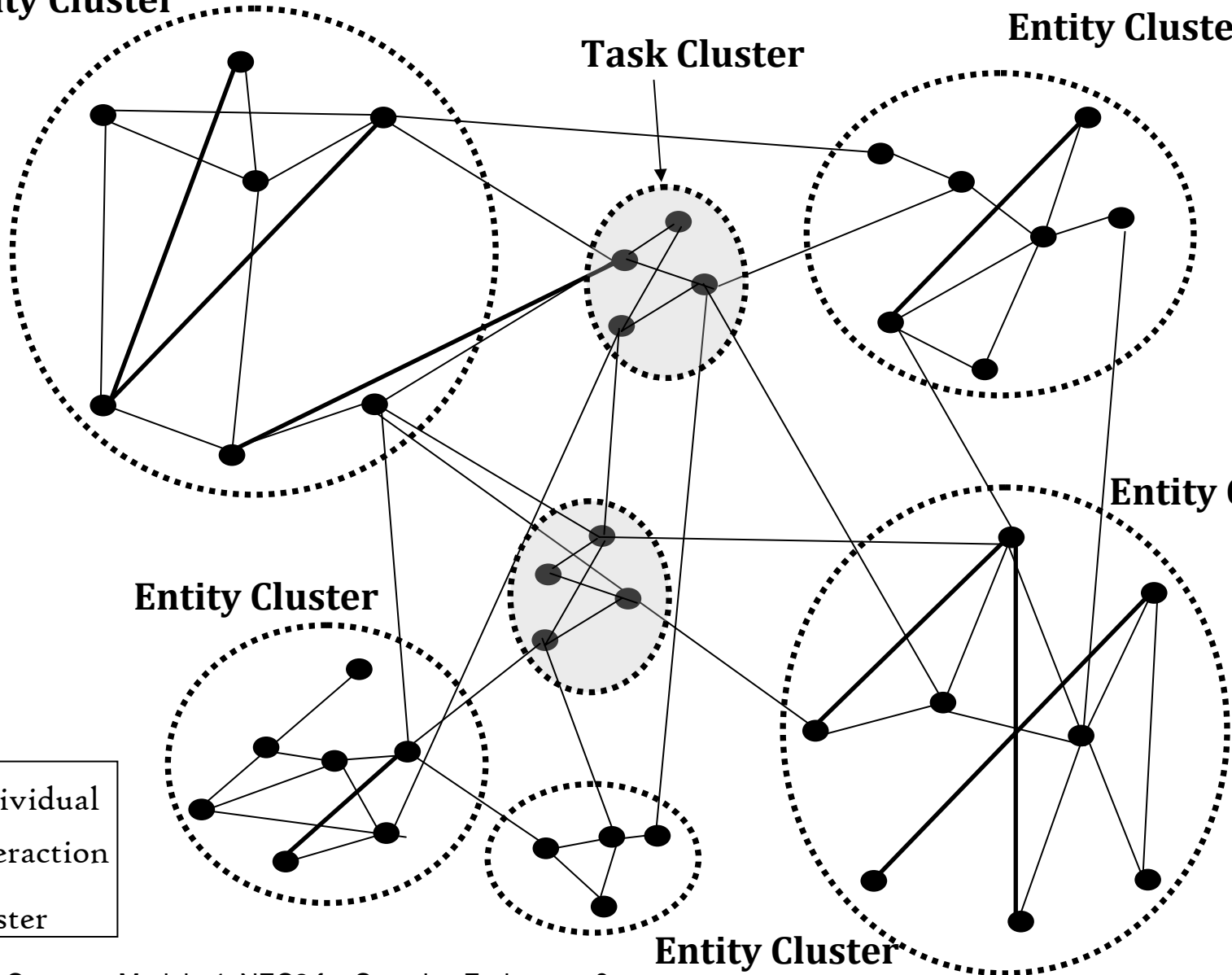


# Coordinated F&C

Entity Cluster

Task Cluster

Entity Cluster



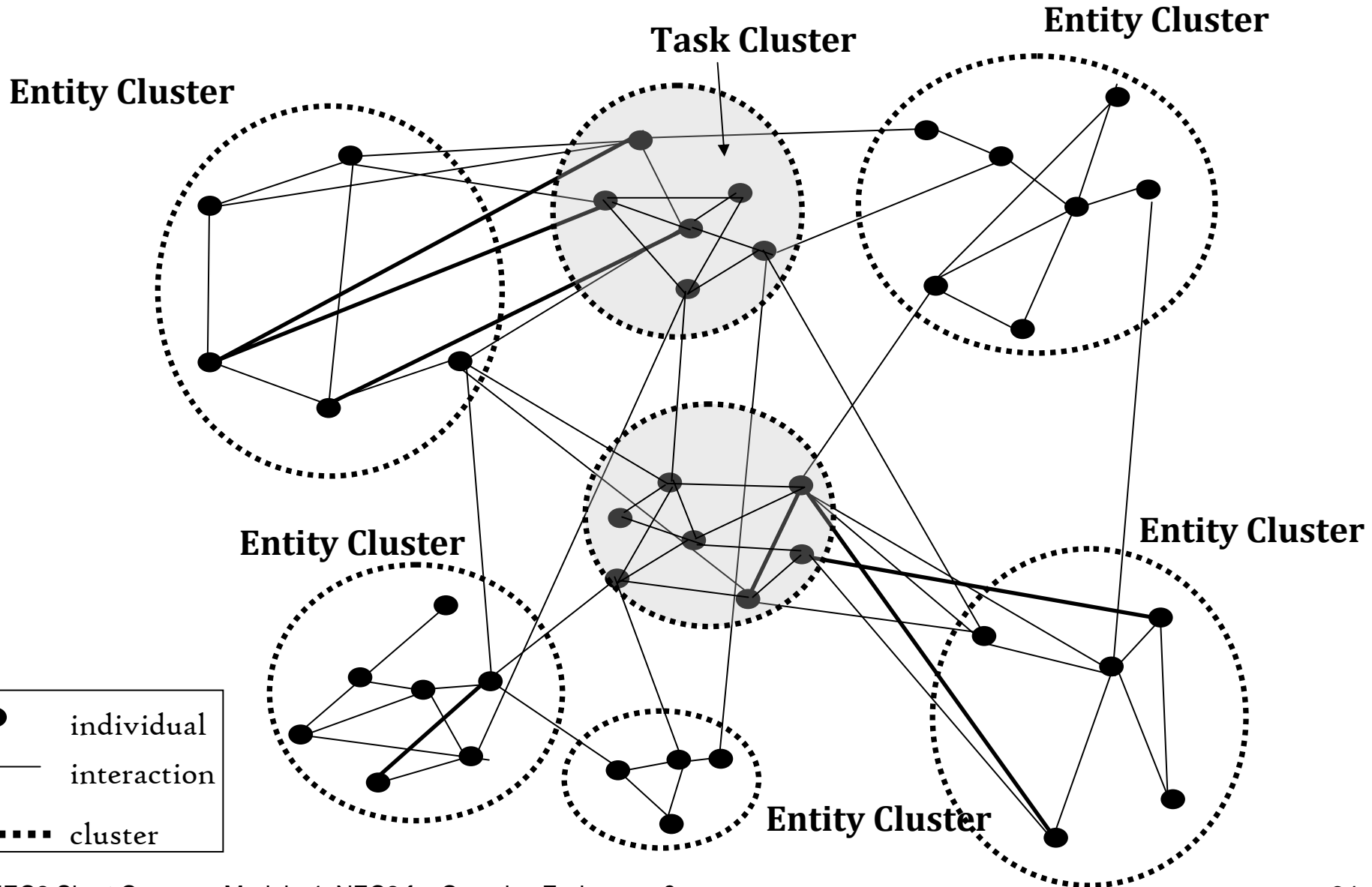
Entity Cluster

Entity Cluster

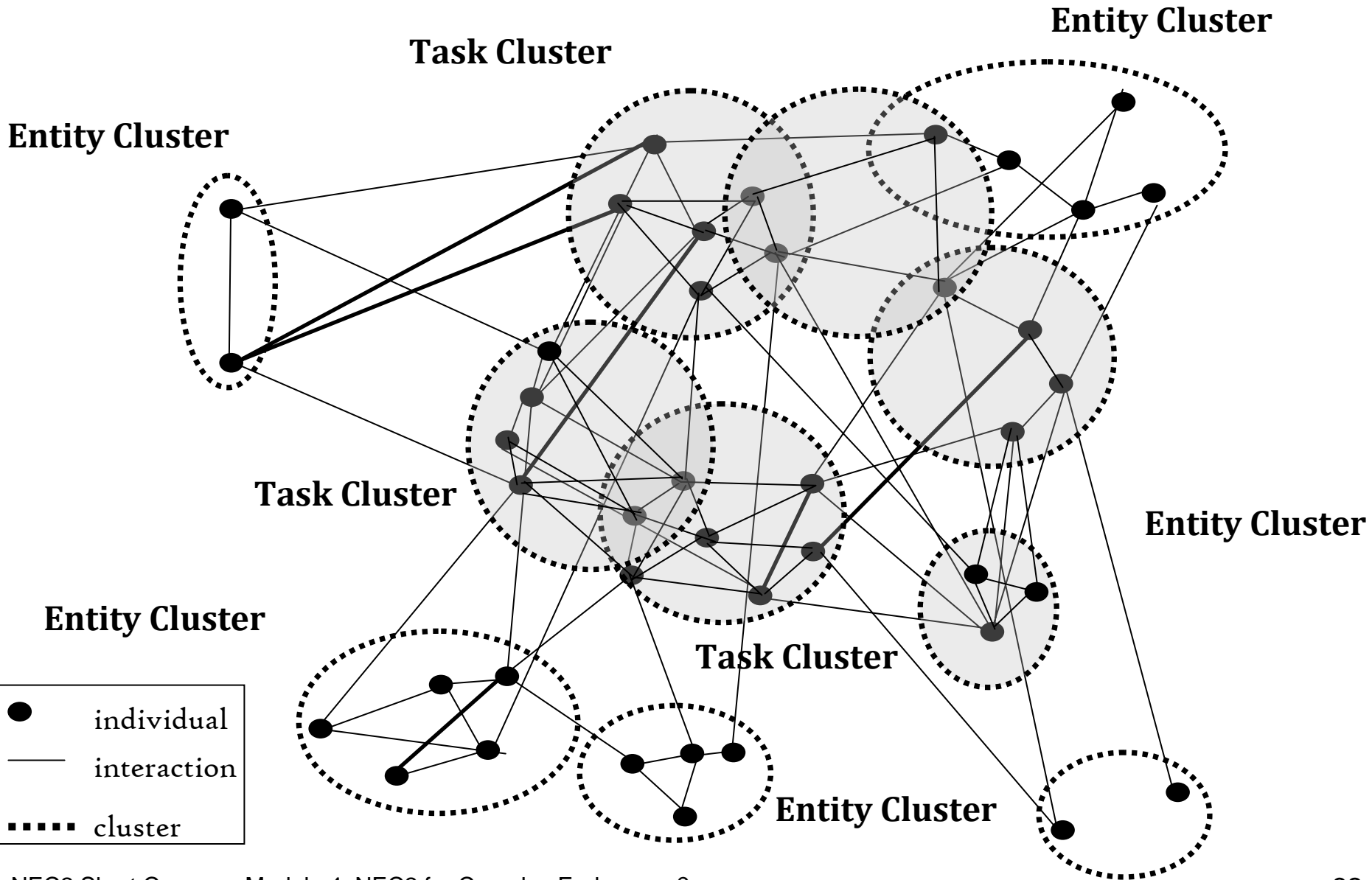
Entity Cluster

- individual
- interaction
- ..... cluster

# Collaborative F&C



# Edge F&C





# Critical Path F&C Challenges

- Focus - leadership in Collectives
- Understanding ways to contribute to a Collective
- Understanding and establishing trust
- Living in a “pull” environment
- Training and Experimentation
- Collaborative processes that include the Interagency and NGOs and PVOs
- Developing Shared Awareness across a Collective
- Convergence – relative effectiveness of approaches

# Review of Module 4

- Is NEC2 the answer to Complex Endeavors?

**NEC2 is only part of the solution**

- If not, what is a promising approach?

**Collective Focus and Convergence**