

Module 6: Review and Way Forward

Network Enabled Command and Control
Short Course

Dr. David S. Alberts
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Agenda

- Review
 - nature of 21st Century endeavors
 - status of military transformation
 - basics of Focus and Convergence
 - maturity model and requisite maturity
 - harmonizing C² and F&C
- Way Forward
 - assessment of progress to date
 - exploring the F&C Approach Space
 - co-evolution – the laggards
- Course Summary

21st Century Missions

21st Century Missions are *Complex Endeavors*

Complexity in the Task and Environment

+

Complexity of 'Self'

=

Complex Endeavor

Task and Environment

Humanitarian Assistance

Peace Keeping

Counter Terrorism

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

Disaster Relief

Counter Insurgency

Stability Operations

Complexity of Self

- Self = A large number of heterogeneous, independent entities that differ significantly with respect to:
 - Culture, values and norms;
 - Perspectives and perceptual filters
 - 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.

21st Century Mission Challenges

1. Missions cannot be adequately predicted
2. Ignoring the complexity of situations ensures failure
3. Adversaries exploit seams and weaknesses avoiding strengths
4. A plan is nothing; planning is everything
5. Civil-military coalitions and broader effects spaces are essential for success

Uncertain - Complex - Dynamic

21st Century Mission Challenges

1. Missions cannot be adequately planned in advance
2. Ignoring the complexity of the environment and the adversary's intent
3. Adversaries are becoming more sophisticated and well-resourced
4. Adversaries are becoming more agile and more resilient
5. The effects space is social, political, economic, as well as military

Uncertain-Unpredictable-Complex-Dynamic

This requires agility.

The effects space is social, political, economic, as well as military

This requires a civil-military coalition.

Uncertain - Unpredictable - Complex - Dynamic

Status of NEC Transformation

- The intellectual foundation has been developed to first order
- There is a commitment by senior leadership
- NEC concepts and capabilities are being incorporated in policy, planning, and acquisition guidance
- Increased Investments in Infostructure are being made
- Program of Experimentation has been established
- Proofs of Concept are emerging
- New Doctrine is under development
- NEC has become a Global phenomena

Transforming National Defense



National Security Strategy

Promote stability and tackle security challenges with a 'whole of government' approach, so that our troops are not alone in the fight



National Defense Strategy

We will conduct network-centric operations with compatible information and communications systems, usable data, and flexible operational constructs.

Beyond battlefield applications, a network-centric force can increase efficiency and effectiveness across defense operations, intelligence functions, and business processes...

Transforming to a network-centric force requires fundamental changes in process, policy, and culture.



National Military Strategy

...creation of a collaborative information environment that facilitates information sharing, effective synergistic planning, and execution of simultaneous, overlapping operations... on demand to defense policymakers, warfighters and support personnel.

Transforming National Defense



National Security Strategy

Promote stability and security challenges with a 'whole of government' approach, so that our troops can win the fight

21st Century challenges



National Defense Strategy

We will conduct network-centric operations, leveraging information and communication technologies, data, and flexible operational concepts.

Beyond battlespace, a network-centric force can increase effectiveness across defense operations, missions, and business processes...

Transforming to a network-centric force requires fundamental changes in process, policy, and culture.

Transform to a Network Enabled Force



National Military Strategy

...creation of a collaborative environment that facilitates information sharing, planning, and execution across overlapping operational areas, overlapping policy makers, warfighters, and personnel.

Facilitate information sharing and collaboration

On the Road to NEC

(avoid the pitfalls)

- We need to

Avoid the Pitfalls – Seize the Opportunities

- Avoid the Pitfalls
 - Need to adequately protect our information infrastructure
 - Need to better understand the complexity of both information and social networks
 - Need to learn how to dynamically manage infostructure
 - Need to prepare for disruption and degradations in our infostructure
 - Need to understand how to develop appropriate trust
 - Need to learn how to shape our information domain in a “pull” environment

On the Road to NEC

(seize the opportunities)

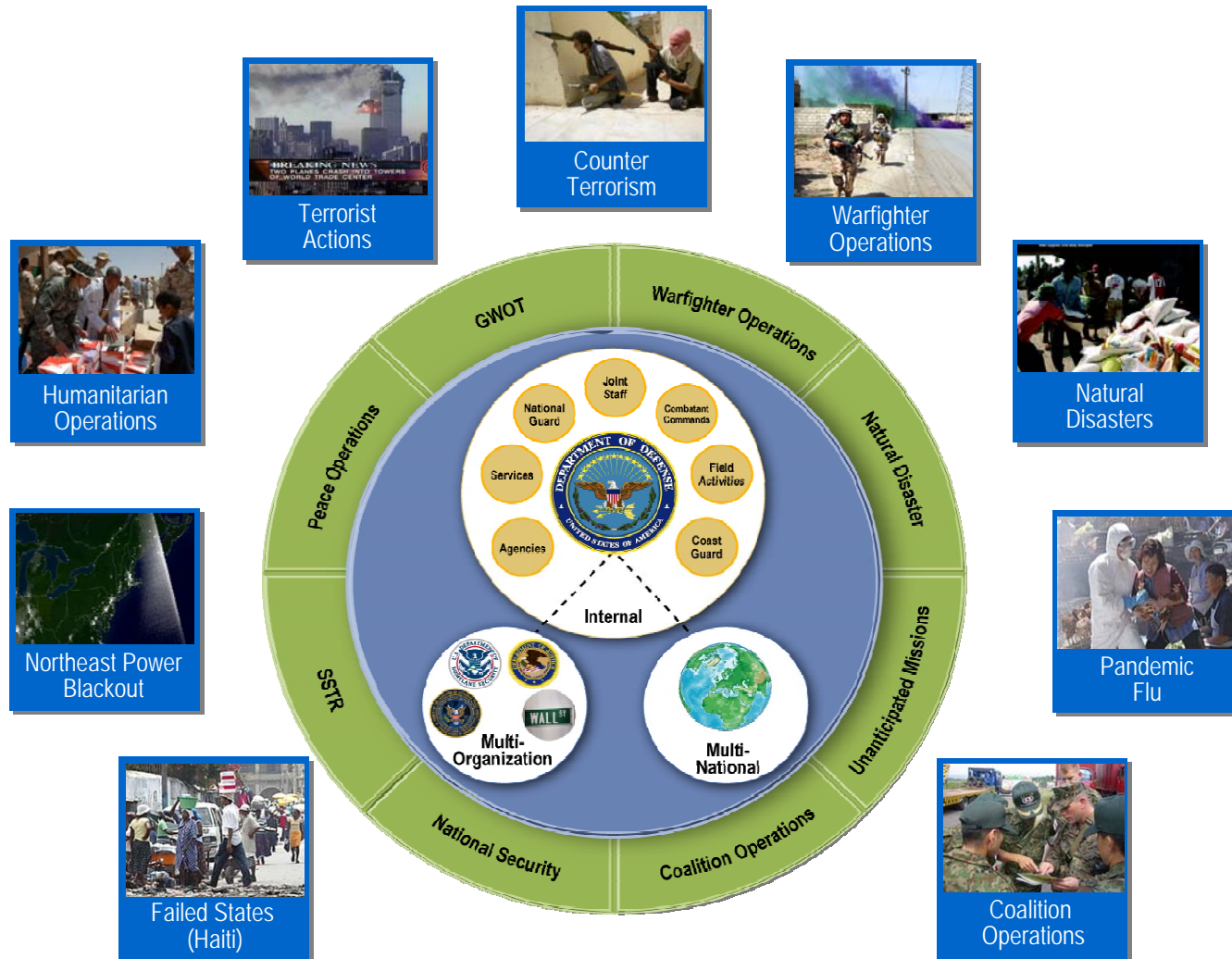
- We need to

Avoid the Pitfalls – Seize the Opportunities

- Seize the Opportunities
 - Need to experiment, experiment, experiment
 - Need to encourage more information sharing and collaboration
 - Need to develop new, “power to the edge” approaches to collective command and control
 - Need to think in terms of mission capability packages (co-evolved DOTMLP)
 - Need more responsive acquisition processes
 - Need to tackle cultural impediments to progress
 - Need to understand this is a journey not a destination
 - Need to instrument reality and analyze the results

Information Sharing

A Simple Concept, A Challenging Task

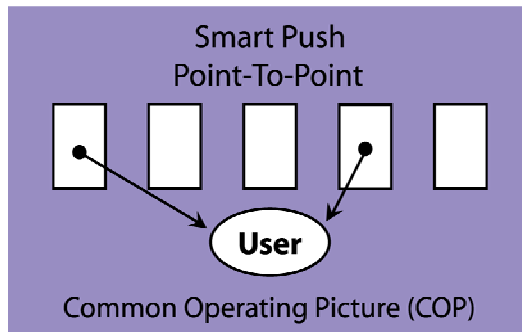


Finally an Information Age Approach to Information

Fundamental Shift:

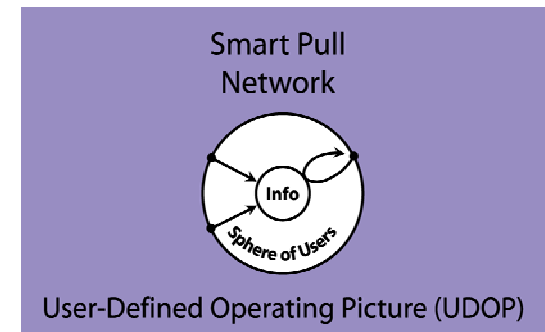
- Requires ENTERPRISE, not stovepipes
- Requires ACCESS, not exclusivity
- Requires TRUST
 - Trust in the System (availability)
 - Trust in the Information (assurability)
 - Trust in the Participants (identity)

Legacy Approach Segregated Stovepipes



User “gets what he gets”

Information Age Transformed Approach: Shared Space

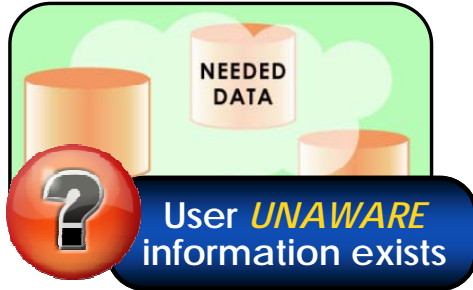


*User “takes what he needs”
and “contributes what he
knows”*

***Confront Uncertainty
with Agility***

Information Age Data Strategy

Challenges



Goals

Visible

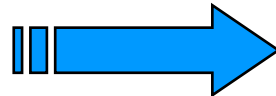


Actions

- Advertise Information
- “Tag” Data



Accessible



- Web Enable Sources
- Remove Impediments
- “Need to Share”



Understandable



- Shared Vocabularies
- Communities of Interest

Securing the Information Environment

Confronting a Persistent Adversary

- The Cyber Threat:
 - Unconstrained by borders / boundaries
 - Multiple paths of attack – little / no indications or warning
 - Huge increases in targeted incidents on the Internet
- The Aggressors:
 - Responsive to our defensive measures
 - Elusive, innovative - improving their command & control
 - Increasingly immune, adaptive, enduring
 - Insider threat – intention or not; a major concern
- The Target:
 - Information – more valuable / profitable
 - Personal, business & govt. data/intellectual property at risk
 - Data theft, identity theft, loss, fraud, and deception

Mission Assurance :

A New Approach to IA

- Mission Assurance
 - Allow leaders to complete missions under any threats
- People
 - Educate, training, exercise
- Accelerate Network Defense Initiatives
 - Deploying PKI / CAC, patch management, host-based security
- Cross-Domain Solutions
 - Aligning policies, processes, governance to drive assured sharing
Certification & Accreditation
 - Intel and DoD working together to transform / integrate
processes
- GIG Info Assurance Initiative (GIAP)
 - Managing IA as a capability across the enterprise
- Protecting Data At Rest (DAR)
 - #1 concern among top security issues (2006 FBI survey)

Fused OPINTEL + Civilian Information

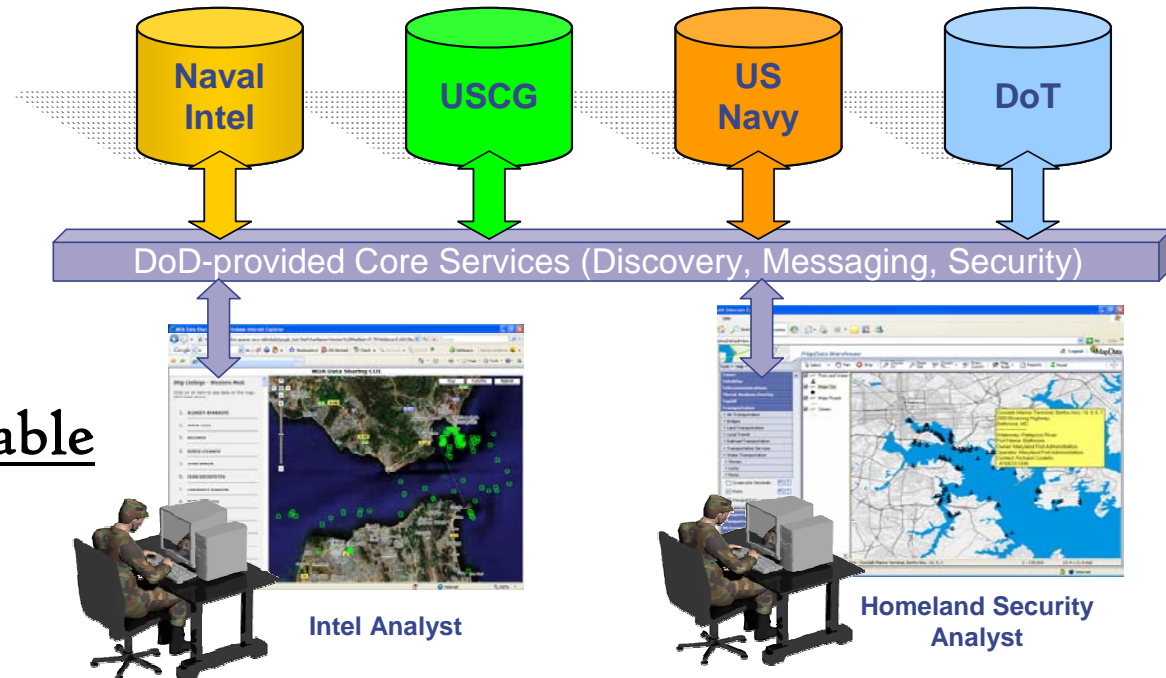
Communities of Interest – Maritime Domain Awareness

- Sources tagged
- Discoverable metadata
- Common vocabulary
- Shared information
- Web services
- User portals

Visible

Accessible

Understandable



Cross-Agency Info Sharing is Happening Today!

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

F&C Maturity Levels

Maturity Levels	Approaches in Toolkit	Situation Recognition	Transition Requirements
Level 5	Edge	Emergent	Fluid
Level 4	Collaborative Coordinated De-Conflicted	3 Regions	Collaborative ↕ Coordinated ↕ De-Conflicted
Level 3	Coordinated De-Conflicted	2 Regions	Coordinated ↕ De-Conflicted
Level 2	De-Conflicted	None	None
Level 1	Conflicted	None	None

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

Need to Harmonize NEC2 and F&C

- While NEC2 offers us opportunities to bring more of our information and more of our assets to bear a new vocabulary is needed to prevent us from myopic exploration of network enabled capabilities
- A new set of criteria needed to assess new approaches to accomplishing the objectives traditionally associated with command and control
- The success of collective action will depend upon our ability to harmonize NEC2 with F&C

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Way Forward

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- exploring the F&C Approach Space
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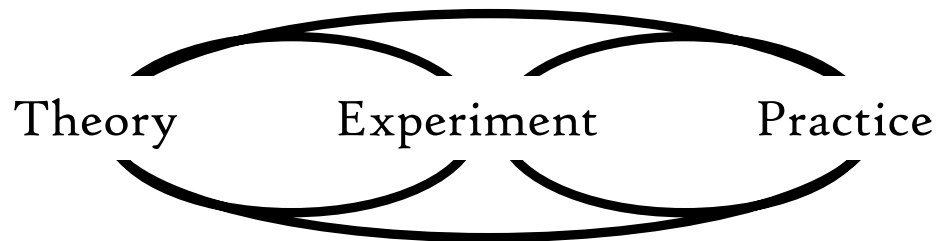
NEC Assessment

Progress Indeed; but Not Enough

- Intellectual Foundation developed to first order
 - *Needs to be rigorously tested and refined*
- Commitment articulated by senior leadership
 - *Needs to filter down*
- Incorporated in policy, planning, and acquisition guidance
 - *Needs to be enforced*
- Increased Investments in Infostructure
 - *Need to catch up on IA; need to leverage existing capabilities*
- Program of Experimentation established
 - *Need to mature, expand experimentation w/ focus on Complex Endeavors*
- Proofs of Concept emerging
 - *Need to be absorbed and leveraged*
- New Doctrine under development
 - *Need to be more innovative – particularly with Focus and Convergence*
- Global phenomena
 - *Need to welcome and work with new partners*

Exploring the F&C Approach Space

- Adopt a new and open mindset
- Use the maturity model to assess capability and progress
- Design and conduct campaigns of experimentation
- Prepare for Complex Endeavors by maturing NEC² and harmonizing with collective F&C
- Conduct rigorous Operational Analyses of on-going endeavors with partners



Adopt a New Mindset

- Recognize the need to move beyond traditional C² approaches
- Recognize that there is no single approach that fits all situations
- Recognize the differences between entity and collective perspectives and the need to harmonize
- Adopt the language of Focus and Convergence particularly when dealing with partners

Using the Maturity Model

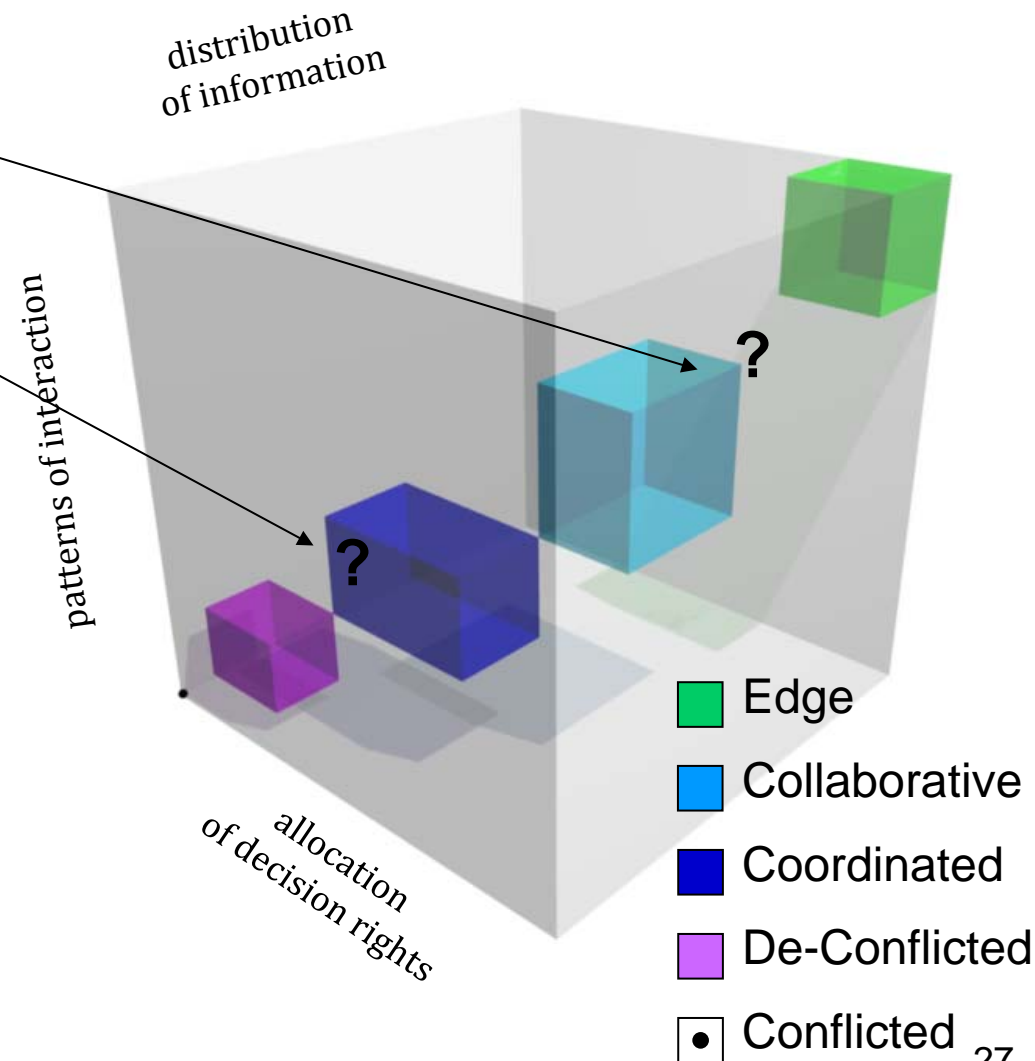
What parts of this space do we need to be able to utilize?

Where in this space are we currently able to operate?

How is this affected by planned capability?

What else do we need to do to develop the desired level of maturity?

What factors affect these choices?



Campaign of Experimentation

- Design rigorous campaigns of experimentation using
 - Code of Best Practice for C² Assessment (NATO)
 - Campaigns of Experimentation (DoD CCRP)
 - Logic of Warfighting Experiments (DoD CCRP)
 - Planning Complex Endeavors (DoD CCRP)
 - C² Conceptual Reference Model (NATO)
- Utilize linked person-in-the-loop and agent-abased environments (e.g. ELICIT and abELICIT)
- Seek to engage a variety of disciplines and practitioners

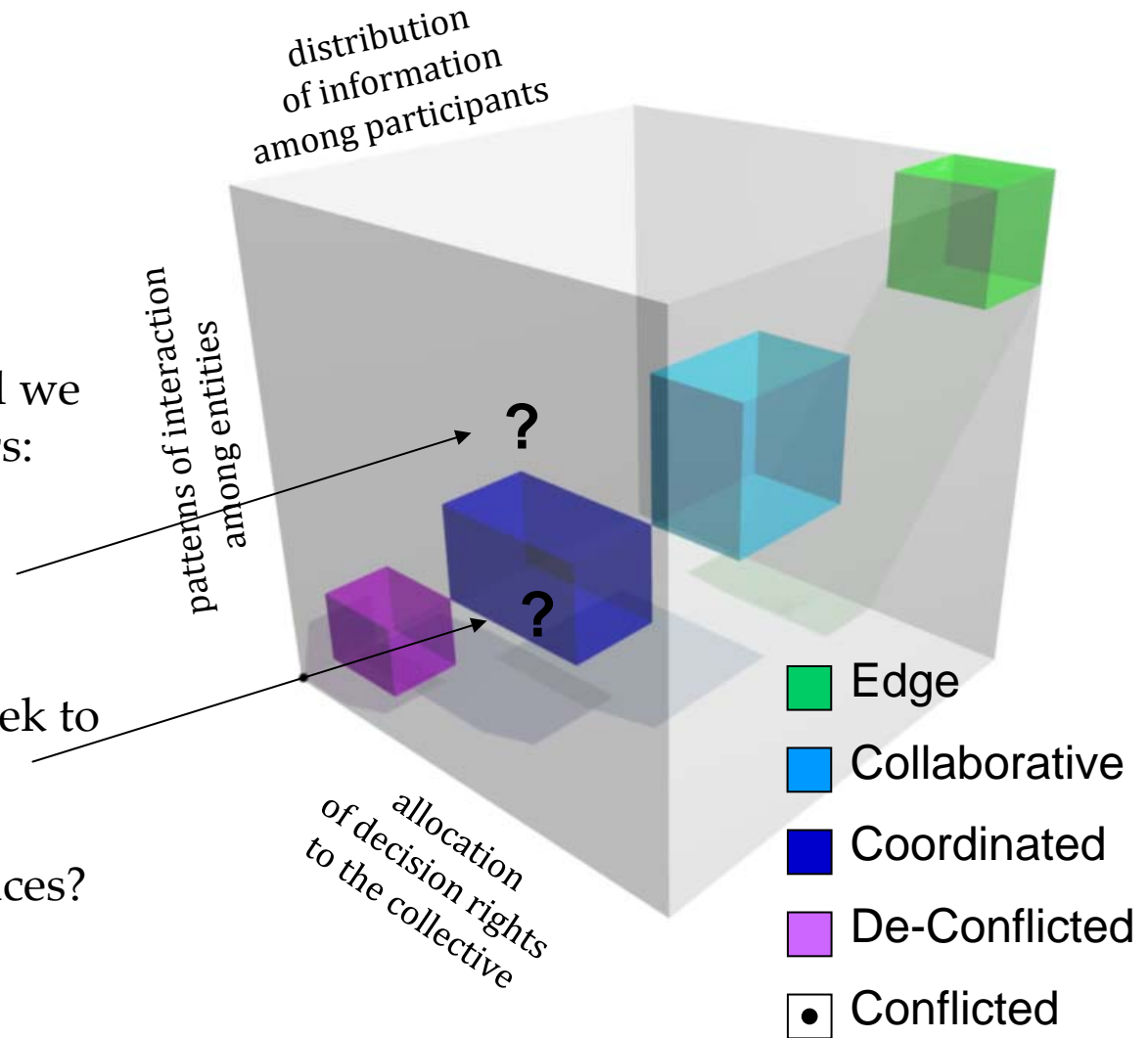
F&C Approach Space

What NEC2 approach should we adopt for Complex Endeavors:

- Allocate Decision Rights?
- Disseminate Information?
- Interact with one another?

What approach should we seek to have the Collective adopt?

What factors affect these choices?



A Military C² Entity in a Collective

Entity Cluster

Task Cluster

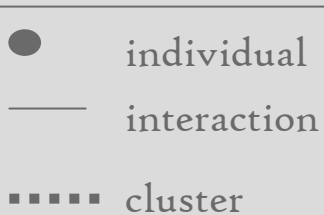
Entity Cluster

How does the approach to C² practiced by the military entity affect the ability of the Collective to function?

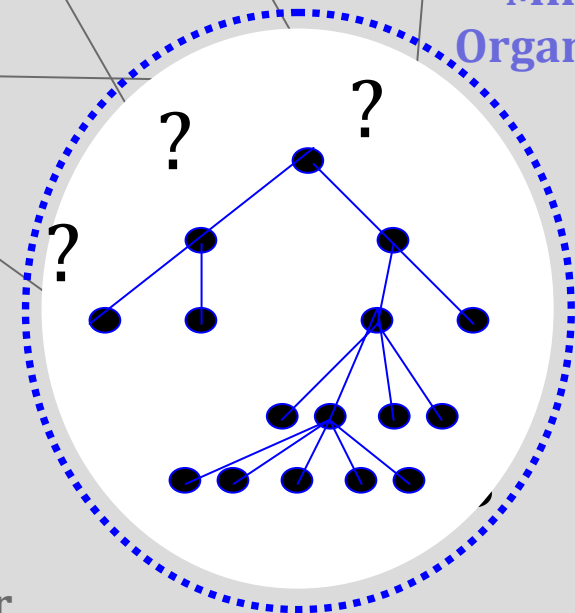
- How does it affect the distribution of information?
- How does it change the patterns of interactions?
- What happens when the military entity does not cede any decision rights to the collective?

Entity Cluster

Military Organization



Entity Cluster



Critical Path Challenges: Challenges Within an Organization

- ‘Command’ – Leadership in edge organizations
- Understanding and establishing trust in network-centric and collective environments
- Living in an information “pull” environment
- Developing Shared Awareness
- Control (self-synchronization) as an emergent property
- Collaborative processes
- Metrics

Critical Path Challenges: Challenges for Collectives

- Widespread Information Sharing
 - Semantic interoperability
 - Security
 - Cooperability
- Encouraging Disruptive Innovation
 - Both collectively and individually
- Vigorous Coalition Experimentation
 - Moving beyond technology demonstrations
 - Moving beyond military only
 - Sharing data and results
- Establish prerequisites for Collective Transformation