

## The Evolution Towards Decentralized C2

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- Net-Centric decentralized C2 observed among some adversaries
- Top-level US strategic vision provides support for net-centric, decentralized C2
- Some progress towards net-centric, decentralized C2 in the US Military
- Doctrine is not necessarily an obstacle: Mission Command
- But Doctrine is not Enough
- DoD has made progress in web-enabled collaborative technologies
- Technological trajectories



### US Joint Staff's Joint Capability Areas



Logistics

Protection

Force Support

Corporate Management & Support

upper and Control		Net-Centric					
Organize							
Organize Understat Planning Decide	Establish & maintain unity of effort with mission partners Structure organization to mission Foster organizational collaboration <b>nd</b> Organize information Develop knowledge & situational awareness Share knowledge & situational awareness Share knowledge & situational awareness Share knowledge & situational awareness Analyze problem Apply situational understanding Develop strategy Develop courses of action Analyze courses of action Manage Risk Select actions Establish rule sets Establish intent & guidance Intuit	formation Transport   Switching and Routing   Wireless Transmission   Wired Transmission   Enterprise Services   Core Enterprise Services   Information Sharing/Computing   Position Navigation and Timing   Net Management   Optimized network functions & resources   Deployable, scalable & modular networks   Spectrum Management   Cyber Management   Cyber Management   Protect data and networks   Respond to Attack/Event   Building Partnerships   Communicate					
Monitor	Communicate intent and guidance Task Establish Metrics Assess compliance with guidance Assess achievement of objectives Assess guidance	Inform domestic and foreign audiences Persuade partner audiences Influence adversary & competitor audiences Shape Partner with governments & institutions Build capabilities & capacities of partners & institutions 					
	C3, C4						
Battlespace Awareness   Intelligence, Surveillance, & Reconnaissance (ISR)   ISR planning and direction   Collection   Processing/Exploitation   Analysis & Production   ISR Dissemination   Environment   Collect   Analyze   Predict   Exploit							

## C2 "Approach Space" of Alberts & Hayes



Alberts, David, and Richard E. Hayes (2006). *Understanding Command and Control*. ASD-NII, CCRP Publications. www.dodccrp.org



- Experiments show edge organizations tend to solve problems better than hierarchies
- In a hierarchy, information does not automatically migrate to where it is needed
- Team leaders do not naturally act as brokers across stovepipes
  - Four tenets of net-centric warfare (Alberts, 2002)
    - A robustly networked force improves information sharing.
    - Information sharing and collaboration enhance the quality of information and shared situational awareness.
    - Shared situational awareness enables self-synchronization
    - The above dramatically increase mission effectiveness.





Adapted from Brehmer, 14th ICCRTS, (2009)



• Cast in terms of conventional hierarchical descriptors

CLeF	Kow Exaction	Conventional		
1	What is the problem?	National		
1	Who is: us, the enemy, our allies and others?	Strategic		
2	What can we do about it?	Military	1	Strategic
	Who plays and who pays?	Strategic		
3	How and when will we deal with it?	Operational		
	When, where - resources to be used?			Onentional
4	Who? - team formation, preparedness, orchestrate the	Joint		Operational
	effects.			
5	How? – Targets for effects	Tactical		Tactical
6	Actions required - individual	Individual		Tactical
5 6	effects. How? – Targets for effects Actions required - individual	Tactical Individual		Tactic



• Traditional hierarchical command structure





• The "6,000-mile long screwdriver"





- The "Strategic Corporal" in a "3-block war"
- Consistent with Mission Command Concepts





• "Modern" networked force



### Decentralized C2 Observed Among Some Adversaries



IRA = Irish Republican Army ETA = *Euskadi Ta Askatasuna* (a Basque separatist group)

### 21<sup>st</sup> Century Internet/Cellphone-Enabled Groups



- Al-Qaeda (9/11)
  - Bin Laden probably knew plan, blessed operational concept
  - Probably did not know operational details (flight numbers, etc.)
  - Subordinates understood intent & were empowered to carry it out
  - Self synchronization
    - Unity of effort (shared fundamentalist faith)
    - Commander's intent
    - Rules of engagement (collateral damage is the *point*)
  - Knowledge superiority
    - Effective use of information & communication technologies
    - Operational intelligence via cellphone, internet, etc.
- Grassroots Jihadi Networks (Madrid, 2004)
  - Ad hoc grouping with complex leadership web
  - Not always competent but autonomous, agile
  - Shared intent to carry out a terrorist bombing
- "Leaderless Resistance" Cells
  - Right-wing extremist groups in Germany & U.S.
  - Louis Beams: "leaderless resistance"
  - Effective use of Internet as actual C2 medium

## Terrorist Groups not Always Decentralized



- "Traditional" 20th Century Terrorist Groups
  - Provisional IRA
  - ETA
- Often strictly hierarchical & centralized C2
- Sometimes splinter & decentralize under lawenforcement pressure



Nablus 2002



- Unproven assertion
- But consider Nablus 2002
- Israeli Defense Forces vs loose confederation of organizations
  - Hamas
  - Palestinian Jihad
  - Some forces from Palestinian Authority
  - Street gangs
- Groups were autonomous but appeared to self-

synchronize in battle

- IDF response
  - Formed small networks
  - Gave field commanders autonomy
  - Engaged quickly, withdrew
- Cultural shift

### "Hybrid Enemy:" Hezbollah 2006



- Hezbollah blended conventional & irregular warfare
- "Hybrid"
- Hezbollah C2 had both hierarchical & distributed elements
  - Formal chain of command, with command posts, landlines, encrypted radios
  - But also a distributed network of small units with autonomy
    - Unity of effort, self-synchronization
- IDF fought more conventionally
  - Conventional air operation
  - Somewhat belated ground response
- Hezbollah also had more decentralized & agile media strategy
  - Got message out fast

# Decentralized C2 (where appropriate) is a stated US Goal

### C2 Strategic Plan

Iture C2 capabilities will reflect a paradigm shift in plementing C2 from the traditional centralized approach one that emphasizes a distributed, collaborative, and operative net - enabled environment."

#### quires

"Interoperability, understanding, timeliness, accessibility, simplicity, completeness, agility, accuracy, relevance, robustness operational trust."

### )

"...will seek to acquire and implement an optimum mix of complementary, mutually supportive, and netcentric

national, strategic, operational, and tactical C2 capabi lities."



## C2 Strategic & Implementation Plans

- DoD Command and Control (C2) Strategic Plan
  - Strategic direction and policy guidance to:
    - define, prioritize, acquire, govern, manage, & implement C2 capabilities
- C2 Implementation Plan
- C2 SP + C2 IP together
  - Satisfy (DoDD) O 5100.30, DoD Command and Control
  - To develop and maintain a DoD C2 Roadmap
- C2 SP + C2 IP together
  - = C2 Capability Portfolio Strategic Plan
  - (DoDD 7045.20, Capability Portfolio Management, September 25, 2008).

# US Making Progress Towards Decentralized C2 When Appropriate

- MC Afghanistan experience
- Large battlespace, roughly 200 x 200 miles
- Patrolled by regiment
- 10 years ago would have been whole division
- erational units getting smaller
- Batallion was once the smallest unit
- doing independent operations
- Now companies; Even platoons
- (Afghanistan)
- Mission command Doctrine
- rines continue to experiment
- Marine Corps Warfighting Lab
- Distributed Operations Concept (later
- Enhanced Company Operations (ECO)
- Experiments with more autonomous
- squads & platoons showed increased
- command speed, more effective

- Enablers
  - Technologically simple
  - Voice & Data equipment
  - Associated training
  - Needs
    - Comms
    - C2 S/W
    - Collaboration tools

# US Making Progress Towards Decentralized C2 When Appropriate

pecial Forces--Afghanistan/Pakistan 2001

- A-Teams, each about 20-25 soldiers
- Highly autonomous operation, distributed decisionmaking
- Each team had one person in charge of communicating with other teams
- Tactical Web page

lbot (2004) example

- USAF plane noticed vehicle lights
- Relayed info to webmaster
- Webmaster communicated with dispersed teams
- One team able to investigate
- Got info back to planes
- Plane destroyed Taliban column



# Doctrine not necessarily an Obstacle: Mission Command

comes from *Auftragstaktik*, 19<sup>th</sup> century Prussian concept

ntralized command concept

- mander gives orders in a manner that ensures that
- rdinates understand
- His intentions
- Their own missions
- Context of those missions

on command is not synonymous with net-enabled ntralized C2

But it can provide a fertile soil for edge organizations to grow And it can be facilitated by net-centric technologies



Count Helmuth von Moltke



### <u>Army, U.S.:</u>

"Mission command relies on subordinates effecting necessary coordination without orders. While mission command stresses exercising subordinates' initiative at the lowest possible level, all soldiers recognize that doing so may reduce synchronization of the operation. Thus, commanders accept the uncertainty that accompanies subordinates exercising initiative. Their trust in subordinates they have trained gives them the assurance that those subordinates will direct actions that will accomplish the mission within the commander's intent."

[U.S. Army Field Manual FM-06, 2003]



#### Land Doctrine, Canada:

"Mission Command ... has three enduring tenets: the importance of understanding a superior commander's intent, a clear responsibility to fulfill that intent, and timely decision-making. The underlying requirement is the fundamental responsibility to act within the framework of the commander's intentions." (CFP 300(3) Land Force Command)

#### Land Doctrine, UK:

"Mission command also contributes to an effects-based approach as it stresses the importance of understanding what effect is to be achieved rather than determining the ways by which it would be achieved. At the tactical level, network-enabled capabilities enhance forward command." (UK ADP



#### ines, U.S.

e Marine Corps' concept of command and control is based on accepting uncertainty as an eniable fact and being able to operate effectively despite it. The Marine Corps' command and control em is thus built around mission command and control which allows us to create tempo, flexibility, the ability to exploit opportunities but which also requires us to decentralize and rely on low-level ative."

sion command and control tends to be decentralized, informal, and flexible. Orders and plans are as and simple as possible, relying on subordinates to effect the necessary coordination and on the an capacity for implicit communication—mutual understanding with minimal information exchange. lecentralizing decisionmaking authority, mission command and control seeks to increase tempo and rove the ability to deal with fluid and disorderly situations."

MCDP 6 (1996)

uipment that permits over control of units in battle is in conflict with the Marine Corps's philosophy is not justifiable."

FMFM 1 (1989)



- Can't just cut & paste doctrine
- Culture is important & can be slow to evolve
- Inculcating mission command took Prussia/Germany a century!
- Higher levels of command:
  - Delegate
  - Not overspecify
  - Not micromanage
- Lower levels:
  - Take initiative
  - Not expect/need detailed orders
- British Army in WW2 was theoretically operating on decentralized doctrine, but did not behave accordingly or reap benefits
- Studies show significant variation in importance accorded to command intent, and in expectations of detailed orders—even in doctrinally decentralized organizations.

### Web-Enabled Collaborative Technologies

### "Web 2.0"

**Big Progress in DoD** 

Examples

- Knowledge Web (Kweb)
- Strategic Knowledge Integration Web (SKIWeb)



## Knowledge Web (Kweb)

- ral Zelibor—USS Carl Vinson, Carrier Battle p 3
- site for shared situational awareness
- Captured value-added information already being created by several command staffs throughout the battle force and displaying it on a single Web site.
- al time-sensitive info via secure chat
- d of command no longer tied to briefing cycle
- re KWeb, lots of time spent on preparing ngs
- Kweb, brief from dynamically updated ages
- meetings concentrated on strategy & tactics r than status updates



- Tested during Global Wargame 2000
- But Carrier Battle Group 3 reached Arabian Sea on eve of 9/11; became Carrier Task Force 50
- Kweb used in OEF; the time it saved allowed more & better contingency planning
- Within weeks after Adm. Zelibor left, much was reversed
- Navy integrated Kweb into larger framework; became more difficult to use
- Use also dependent on commander

## **Strategic Knowledge Integration Web (SKIWeb)**

- Web-based asynchronous collaboration system
- 28,000 DoD users (end 2009)
- Introduced under Leadership of General Cartwright at STRATCOM
  - Blogged & encouraged broad participation
- Foxhole to 4-Star
- People who really knew things first hand could submit without filtering
- Raw first reports were quickly refined and corrected at various levels
- General posted himself and asked questions
- Got responses from much lower levels

System survived Cartwright's departure, but depended crucially on him to get up & running, and catch on

"The metric is what the person has to contribute, not the person's rank, age, or level of experience. If they have the answer, I want the answer. When I post a question on my blog, I expect the person with the answer to post back. I do not expect the person with the answer to run it through you, your OIC [Officer-in-Charge], the branch chief, the exect the Division Chief, and then





- Aake "Classic" C2 better faster Disseminate information e broadly and stimulate interaction patterns
- ransformational: Enable edge operation, when oled with appropriate nizational culture & rules
- e technology may fit in rent categories depending ow used





- *Aake "Classic" C2 better and faster Faster computers, better comms, in classic model*
- Disseminate information more broadly and stimulate new interaction patterns
- E.g. Web enabled collaborative technologies
  - Kweb
  - SKIWeb
- ransformational: Enable true edge operation, when coupled with appropriate nizational culture & rules
- Innovations arise not necessarily in C2 writ small, but from areas of C4ISR
  - Communications technologies for dispersed tactical units in remote environments
    - Eg. Data bandwidth comparable to that available in forward operating bases
    - Without bulky antennas
  - Secure Mobile ad-hoc networks
  - Handheld multimedia devices
  - Organic ISR assets effectively integrated into mobile communications architecture



- Net-centric Decentralized C2 can improve information sharing, collaboration, and situational awareness, thereby enabling self-synchronization and increasing mission effectiveness.
- Net-Centric decentralized C2 is observed among some adversaries
- Top-level US strategic vision provides support for net-centric, decentralized C2
- Some progress towards net-centric, decentralized C2 is observed in the US Military
- Doctrine is not necessarily an obstacle: Mission Command
- But Doctrine is not Enough
- DoD has made progress in web-enabled collaborative technologies
- Technological trajectories
  - A—Make Classic C2 better & faster
  - B—Increase information dissemination and stimulate new interaction patterns
  - C—Transform to edge-like character, with appropriate policies & culture