



OASD/NII | DOD CIO

# CCRP Overview

## April 2009

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# Agenda

- CCRP Mission and Initiatives
- CCRP Partnerships
- CCRP Impacts
- Summary

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- **CCRP Mission and Initiatives**
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# NII-DoD CIO and CCRP Missions

- OASD/NII | DOD CIO Mission
  - Lead the Information Age Transformation that enhances the DoD's efficiency and effectiveness
- CCRP Missions
  - Understand the National Security implications of the Information Age
  - Provide leadership for the C2 Research Community
  - Support DoD organizations' transformational efforts
  - Support Professional Military Education
  - Work with coalition/interagency partners in developing new approaches to coalition command and control and understanding NCO/NEC

***Accomplishing these missions requires working with others to understand and leverage the power of information, new approaches to command and control, and network-centric operations.***

# CCRP Initiatives

## Research

- C2 Implications of the Information Age
- New N-C / Edge Approaches to C2
- C2 Metrics & Maturity Models
- Network Centric Value Chain
- Agility, Focus, and Convergence
- Complex Endeavors
- Collective C2

## Community Leadership & Coalescence

- Symposia Workshops & Seminars
- Chair NATO Research Groups
- Publications and Web site
- International C2 Journal
- Focus, Agility and Convergence Team (FACT)
- Keynoting, Mentoring

## Experimentation

- ELICIT and abELICIT
- Support to CD&E
- Empirical Data Clearinghouse
- COBP Experimentation, Campaigns
- Center for Excellence in Experimentation

## Analysis

- COBP C2 Assessment
- Methods & Tools
- C2 and Network Analyses
- Exploratory Analyses
- Case Studies and Lessons

## Education (PME)

- NPS Center for Edge Power
- USMA Network Science Center
- NDU/AWC NCW Course
- Student Scholarships & Awards
- Course Materials & Lectures

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# Partners

## CD&E

- Services
- JFCOM J9
- COCOMs
- NATO ACT
- C2COE
- Allies

## Research

- ONR
- AFRL
- ARI
- ARL
- DARPA
- NATO RTO
- DSTA
- DSTL
- DSTO
- DRDC

## Systems Development

- DISA
- SPAWAR
- CECOM
- ESC
- AF C4ISR Center

## Operational

- COCOMs
- Coalitions
  - ISAF
  - ACT/CFC
- Interagency
- National Guard

## Think Tanks

- IDA
- MITRE
- RAND
- JHU/APL
- TNO
- QinetiQ
- RUSI

## Professional Military Educational

- NPS
- NDU
- IRMC
- AWC
- NWC
- FHS (SWE)
- USMA
- Bundeswehr Muenchen (DEU)
- Portuguese Military Academy
- Singapore Command & Staff College
- Cranfield (UK)

## Industry

## Academia

## OSD/Joint Staff

- ATL
- Policy
- J3, J6, J7, J8

# Partnership: NATO

- 1996 – 1998
  - RSG-19: NATO COBP for C2 Assessment (1998).  
CA, DK, ES, FR, NL, TR, UK, US
- 2000 – 2002
  - SAS-026: NATO COBP for C2 Assessment (Revised) (2002).  
CA, DE, FR, NL, NO, TR, UK, US
- 2003 – 2005
  - SAS-050: NATO C2 Conceptual Model (2006).  
AU, CA, DE, DK, IT, NL, PT, SE, UK, US
- 2003
  - SAS-051: Lecture Tour on COBP for C2 Assessment.  
DE, NL, UK, US
- Mar 2006 – Present
  - SAS-065: NATO Network Enabled Capability C2 Maturity Model  
(N2C2M2) AU, BE, CA, CH, DE, DK, IT, NL, NO, PT, SE, SK, UK, US,  
NATO ACT and C2COE
- June 2008 – Present
  - SAS-079: Symposium on C2 for NATO Network Enabled Capability.



# Partnership: U.K.

- Relationship initiated in 1994 and includes:
  - Bi-lateral workshops
  - U.K. MOD-initiated technical discussions on NCW/NEC
  - Interactions with U.K. Doctrine Center
  - U.S.-U.K. leadership of NATO working groups
  - Working relationship with Dstl
  - U.K. defense industry: QinetiQ and BAE
  - CCRP speakers at MOD/Dstl conferences and workshops
  - General Sir Rupert Smith support for Confrontation Analysis experiments in NATO and JFCOM
  - CCRP speakers at RUSI
  - ELICIT Experimentation
  - C2 Maturity in Lines of Development
- U.K. contributions to CCRP publications
  - Co-authorship of *NATO Code of Best Practice for C2 Assessment*
  - *Confrontation Analysis: How to Win Operations Other Than War*
  - *The Big Issue: Command and Combat in the Information Age*
  - *Complexity Theory and NCW*
  - *The Agile Organization*
- Formal documents influenced:
  - Ministry of Defense Architectural Framework (2005)
  - Future Air and Space Operational Concept (2005)
  - Agile Task Forces (2007)
  - Agile Command (2008)

# Partnership: JFCOM (1)

- Initial relationship established when Atlantic Command became JFCOM (1999)
- Beginning in 2000, JFCOM MIPR for joint funding of two FTE from CCRP to support experimentation and metrics
- Director, J9 requested *Code of Best Practice: Experimentation* because military officers lacked knowledge needed for quality experiments (2001)
- CCRP conducts classes and advises J9 personnel on metrics within experimentation (2001-present)
- Using the Information Age Metrics Working Group (IAMWG) as experts, the CCRP designed and supported a JFCOM experiment on Situation Awareness technologies (2002)
- JFCOM staff members join IAMWG for monthly meetings and networking
- Director, J9 requested *Code of Best Practice: Campaigns of Experimentation* because personnel in his command had difficulty building coherent campaigns (2004)

# Partnership: JFCOM (2)

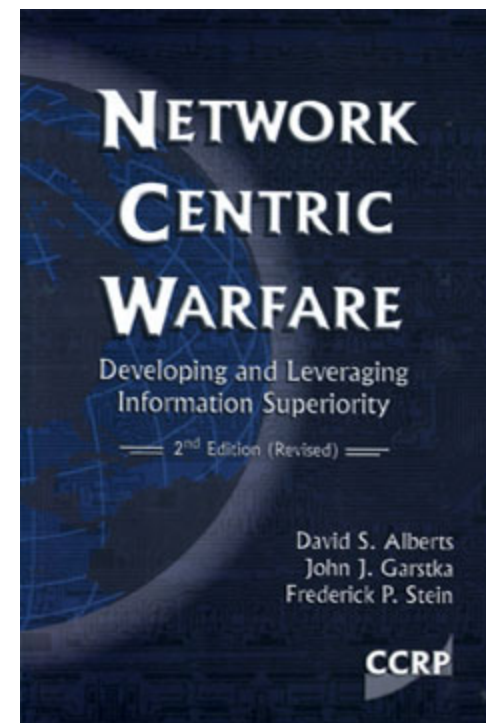
- CCRP organizes seminars and collaborates with Urban Resolve and Multinational Experiment teams on metrics (2004-present)
- CCRP requested to collaborate with Deputy Director J9 and senior staff to design a Joint Innovation and Experimentation campaign plan (2006-present)
- CCRP published *The Logic of Warfighting Experiments* drafted by senior staff member of J9 (2006)
- CCRP expert is assigned the role of JTF Commander in Urban Resolve experiment with heavy coalition and interagency participation
- J9 decided to fully fund CCRP experts in experimentation and metrics (2007)
- JFCOM and Allied Command Transformation requested the CCRP provide a keynote speaker for their annual Concept Development and Experimentation Conference (2007)
- JFCOM provided Keynote Speaker for 13<sup>th</sup> ICCRTS and has initiated dialog on Concept Development and research coordination (2008)

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# From the Chairman...

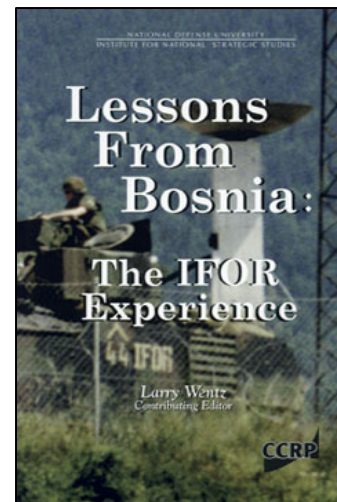
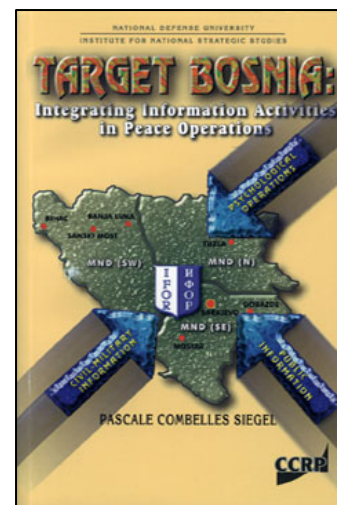
*“This publication will assist the joint warfighting community in taking the necessary steps to pursue the change associated with the ongoing revolution in military affairs. The emerging evidence for network-centric warfare as the intellectual basis for Joint Vision 2010 ....My Director, J-7 is distributing the book to the Joint Staff and the Professional Military Education community.”*



# .... to the developers of Doctrine

- From the author of the Army doctrine publication “IO in a Peace Enforcement Environment”

- *“I found two documents to be very useful: Target Bosnia: Integrating Information Activities in Peace Operations and IFOR C4ISR Experiences. If you would send us all the publications you have.... it would substantially improve our products.”*



# Publications and Events

- Over 40 books published since 1994
  - More than 4 million books downloaded
  - More than 100,000 books distributed in hardcopy
  - Customers from 87 countries
- International C2 Journal
  - 2 issues published
  - 3 additional issues in progress
- Symposia, workshops and seminars
  - More than 3,900 attendees at the symposia
  - More than 800 attendees at the IAMWG meetings
  - Focus, Agility and Convergence Team (FACT) initiated in 2008
  - 34 countries participating in events
- Web site
  - Over 5 million hits per year

***CCRP publications and events provide an opportunity to focus the research community on topics important to NII-CIO.***

# Impact: Joint Futures Documents

- Joint Operations Concepts (2003)
- Joint Force Command and Control Concept to Guide Standing Joint Force Headquarters Development (2003)
- Joint Forcible Entry Operations Joint Integrating Concept (2004)
- Net-Centric Environment Joint Functional Concept (2005)
- Command and Control Joint Integrating Concept (2005)
- Net-Centric Operational Environment Joint Integrating Concept (2005)
- Major Combat Operations Joint Operating Concept (2006)

**The above reference CCRP publications, including *Network Centric Warfare, Understanding Information Age Warfare, Power to the Edge, Code of Best Practice for Experimentation, and Effects-Based Operations.***



# Impact: C2 JIC

- USAF Major at Naval Postgraduate School exposed to CCRP literature
- Writes NPS thesis on CCRP-recommended topic “Operational Trust: A New Look at the Human Requirement in Network Centric Warfare”
- Submits paper to International Command and Control Research and Technology Symposium (ICCRTS)
- Attends ICCRTS and wins Best Student Paper Award
- Promoted to Lt. Col. and assigned to JFCOM Concept Development Program
- Attends CCRP workshops on Transformation
- Becomes lead author on Joint Integrating Concept for C2 (C2 JIC)
  - Draws from CCRP-influenced Net Centric Environment Joint Functional Concept
  - Draws from CCRP-influenced Joint C2 Functional Concept
  - Draws from CCRP books on future C2
- C2 JIC approved by Joint Staff and OSD as policy document on initial review
- Briefs ICCRTS on C2 JIC and its implications for U.S. policy

# Impact: Policy, Strategy, and Reference Documents

- Joint Force C2 Concept to Guide SJFHQ Development
  - Cites *UIAW*, *NCW*, *NCW Report to Congress*, *IAT*
- NCOW Reference Model
  - Highlights *EBO*, *IAT*, *UIAW*, *NCW* and *PTTE* as recommended reading
- GIG Architecture v2
  - Cites *Behind the Wizard's Curtain*, *EBO*, *IAT*, *NCW*, *UIAW*
- DoD Net Centric Data Strategy
  - Calls out data concepts described in *PTTE*
- DoD Computing Infrastructure Strategy
  - Envisions an *agile* computing infrastructure, defining agile as in *PTTE*: robust, resilient, responsive, flexible, innovative, and adaptable
- DoD NetOps Strategy
  - Defines a net-centric approach to NetOps, based on shared information, awareness and understanding, and collaborative decisionmaking

# Impact: Training and Education

- U.S. DoD
  - CCRP books used in many PME courses (NDU, NPS, USMA, USNA, USAFA, AFIT, JSC, AWC, NWC, MCU, Army CSC)
  - Lessons Learned books used by deploying forces to acquaint themselves with unfamiliar missions and situations
  - Founding sponsor of Center for Edge Power at NPS
  - Founding sponsor of Network Science Center at USMA at West Point (discussions underway to extend to USNA, USAFA)
  - Created C2 Research Chair at NPS
- Internationally
  - Users from over 120 countries have accessed CCRP publications online
  - More than 25 nations regularly participate in CCRP symposia and workshops

# Partnership: NORTHCOM

- Command perceived a lack of experimentation and relevant expertise (2005)
- Became aware of CCRP expertise through professional networking, downloaded relevant books and ordered hard copies (early 2006)
- Contacted CCRP through Web site (March 2006)
- 1<sup>st</sup> meeting in DC with two NORTHCOM personnel (April 2006)
- 2<sup>nd</sup> meeting in DC to design workshop and review possible experiments (July 2006)
- Focused workshop at NORTHCOM (November 2006)
  - NORTHCOM experimentation team
  - Stakeholders: military and interagency
  - Recognized need for redesign of experimentation plans and established buy-in from stakeholders
- NORTHCOM conducts experiments (December 2006 to June 2007)
  - Civil Air Patrol married with DoD Sensors for Homeland Security
  - JTF National Incident Management System
- NORTHCOM activities (2009)
  - Reviewed experimentation reports
  - Workshop to assess campaigns of experimentation in support of HS & HD JOC

# Experimentation (1)

CCRP's multi-faceted experimentation-related activities include:

- Create awareness of the need for and role of experimentation in the process of transformation
- Provide COBP and courses related to experimentation and analysis
- Provide appropriate hypotheses, metrics, and instruments
- Center of Excellence in experimentation partners with others to conceive, design, and conduct experiments and analyze experimentation results
- Provide experimentation platforms to encourage/facilitate experimentation related to information sharing, collaboration, & trust
- Create/maintain clearinghouse of C2-related experimentation data
- Design/conduct exemplar experiments and analyses

# Experimentation (2)

- Recognition of the CCRP as an authoritative source on experimentation and metrics
  - Requests for technical assistance by key DoD, Allied organizations
  - 400,000+ COBPs ordered/downloaded
  - COBP mandated in several countries
  - NCO Conceptual Framework
  - NATO C2 Conceptual Reference Model
  - NATO NEC C2 Maturity Model
- Seniors in JFCOM, ACT, COCOMs, and Services relying on CCRP publications to promote quality experimentation
  - Directors of J9 requested Codes of Best Practice and used them intensively
  - CCRP provided quality control observers on behalf of Director of Research and Experimentation at Allied Command Transformation (ACT)

# Experimentation (3)

- Workshops and training courses on Experimentation
  - JFCOM, NORTHCOM, PACOM
  - USMC, U.S. Navy, U.S. Air Force, U.S. Army
  - MORS, AFCEA, NDIA, IAMWG
  - Allied Command Transformation
- Acceptance of Experimentation as an important and legitimate approach to future C2 and future missions across DoD, NATO, and other military partners
- Developing partnership with ATL related to improving Joint Experimentation
- Rapidly growing international experimentation employing ELICIT as the experimental platform of choice

# Fostering C2 Research: ELICIT

- ELICIT (Experimental Laboratory for Investigating Collaboration, Information-sharing, and Trust), launched in 2006 is an instrumented platform available to researchers willing to share experimental data.
- 30+ members of COI
- 50+ trials have been executed or are currently planned at the following institutions
  - U.S. Military Academy
  - Naval Postgraduate School
  - Portuguese Military Academy
  - Defense Research Development Canada
  - Singapore Command & Staff College
  - Army War College
  - National Defense University
  - German Bundeswehr Muenchen
  - Boston University
- abELICIT: An agent-based version designed for exploratory analysis (Available 2009)
- ELICIT data used to validate NATO NEC C2 Maturity Model

***Focused, empirical research that converts network-centric hypotheses into actionable understanding***



# Key Concepts Pioneered

- NCW / NCO / NEC
- Power to the Edge
- Co-evolution of Mission Capability Packages
- Domains: Physical, Informational, Cognitive, Social
- EBO/EBAO
- Campaigns of Experimentation (Concept-based)
- C2 Approach Space
- C2 Maturity Models
- Model-Experiment-Model Paradigm
- Agility: Robust, Resilient, Responsive, Innovative, Flexible, Adaptive
- C2 and Complexity
- Complex Civil-Military Endeavors
- Focus and Convergence
- Edge Organizations
- Collective C2

# Changing Threats and Missions (1)

- Non-Traditional Missions
  - Workshops on C2 Peacekeeping (1994)
  - *Command Arrangements for Peace Operations* (1995)
  - Workshops on Operations Other Than War (1995)
  - *Interagency & Political Military Dimensions of Peace Operations: Haiti* (1996)
  - *Coping with the Bounds: Speculations on Nonlinearity in Military Affairs* (1998)
  - *Target Bosnia: Integrating Information Activities in Peace Operations* (1998)
  - Workshop on Sensemaking to Respond to Unfamiliar Missions (2001)
  - *Effects Based Operations* (2003) and *Complexity, Networks and Effects Based Approaches to Operations* (2006)
- Coalition Issues
  - *Coalition Command and Control* (1994)
  - *NATO Code of Best Practice for C2 Assessment* (2002)
  - U.S.-U.K. Workshop on the Need for Agility Across Missions (2003)
  - *Planning: Complex Endeavors* (2007)
  - NATO NEC C2 Maturity Model for complex endeavors (2009)

# Changing Threats and Missions (2)

- Information Age Warfare
  - *The Mesh and The Net* (1994)
  - *What is Information Warfare?* (1995)
  - *Defensive Information Warfare* (1996)
  - *Unintended Consequences of the Information Age* (1996)
  - *Information Age Anthology: Vols. I, II, III* (1997-2000)
  - *Information Warfare and International Law* (1998)
  - *Target Bosnia: Integrating Information Activities into Peace Operations* (1998)
  - *Information Campaigns for Peace Operations* (2000)
  - *Understanding Information Age Warfare* (2001)
  - *Power to the Edge* (2003)
  - *Understanding Command and Control* (2006)
  - *Simulation Modeling for The Information Age* (on-going)

# Adapting to Change

- U.S. C2 Joint Integrating Concept (JIC) specifying the need for Interagency, Coalition, International Organization (IO), Non-Governmental Organizations (NGO), and Industry partnerships
- JFCOM Broadening Participation in Multi-National Experimentation Series to include more countries, interagency partners, and some NGOs
- U.S. Services: the USMC's MAGTF C2 Concept (2006) derives from the JC2 and Net-Centric Functional Concepts
- DISA Recognition that the GIG and other IT Infrastructure must have mechanisms to deal with non-DoD and non-U.S. partners
- DARPA including political, economic, social and informational arenas in tool development – Integrated Battle Command, Integrated Crisis Early Warning System (ICEWS), Conflict Modeling Planning and Outcomes Experimentation (COMPOEX), Information Propagation, Impact and Persistence (IPIP) Seedling
- NATO acceptance of political-military mission space in planning and implementing the NATO Response Force (NRF) and developing Provincial Response Teams in Afghanistan
- Individual Nations accepting the need for broader mission capability packages to include coalition, interagency, NGO, and IO partners
  - Australia, Belgium, Canada, Germany, Italy, Netherlands, Norway, Portugal, Singapore, Slovakia, Spain, Sweden, Switzerland, Turkey, United Kingdom

***All items influenced directly by the CCRP.***

# Agenda

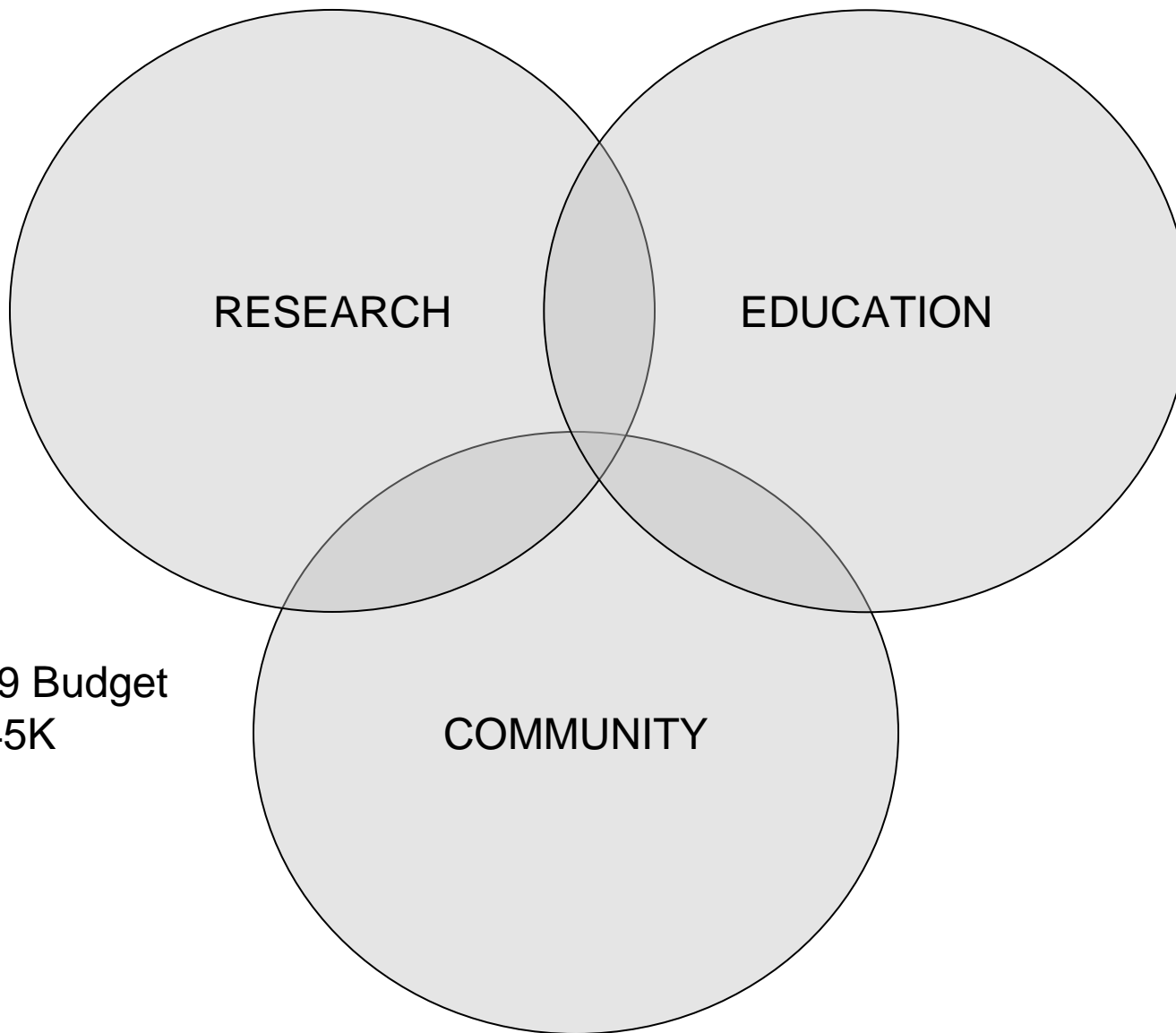
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# Summary

- CCRP pursues a highly leveraged set of C2 initiatives aimed at
  - Understanding the implications of the Information Age
  - Developing the intellectual foundation for new approaches to C2
  - Improving our capability to conduct C2 experiments and analyses
  - Conducting exemplar experiments and analyses
  - Collaborating with coalition partners on cutting edge issues
  - Building a C2 COI
- CCRP Products and Services are widely used and well-respected
  - Books & Journal
  - Codes of Best Practices
  - Center of Excellence in Experimentation
  - Conceptual Models, Metrics, and Frameworks

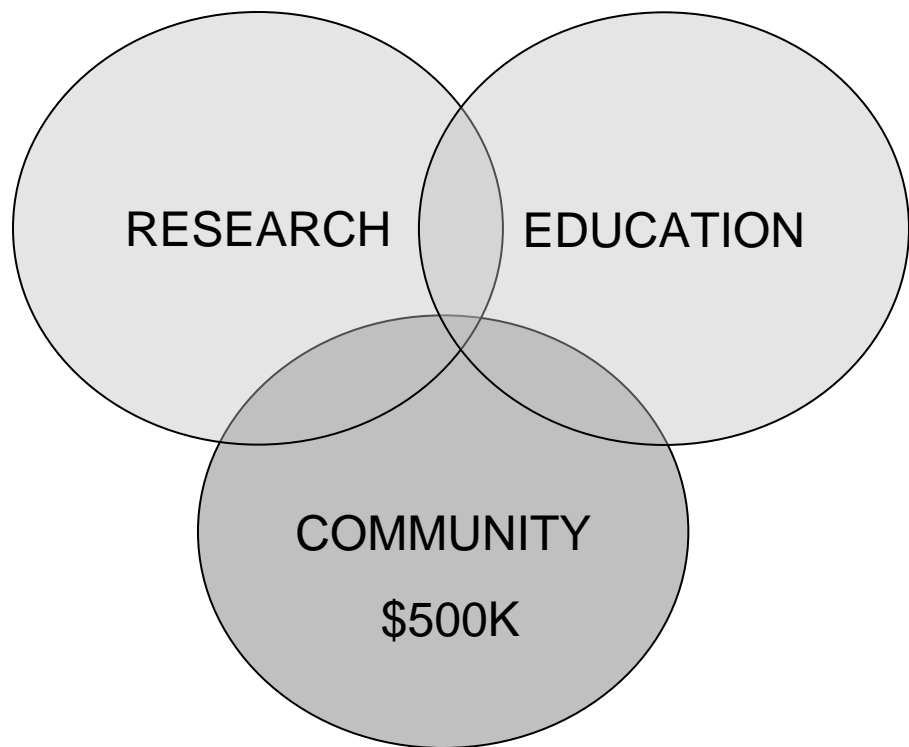
***CCRP has had a very big impact with a very small budget***

# CCRP FY09 Initiatives



CCRP FY09 Budget  
\$1,445K

# CCRP FY09 Initiatives

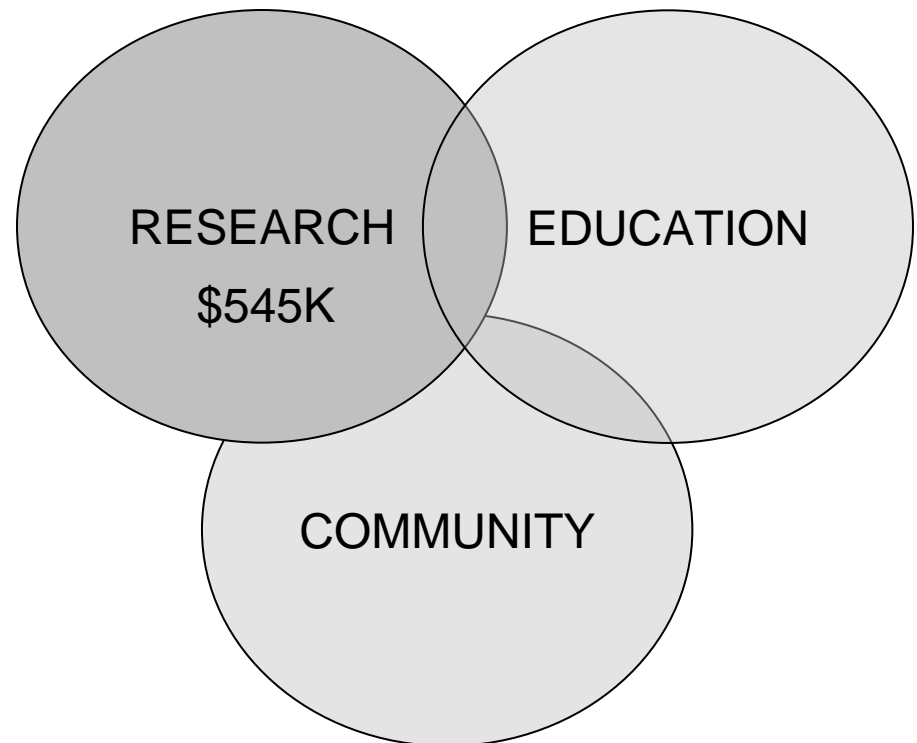


- 14<sup>th</sup> International Command and Control Research and Technology Symposium
- CCRP Publications Program and Website
- International C2 Journal
- Chair, NATO Research Group on NEC C2
- Focus, Agility and Convergence Team (FACT)
- ELICIT Community of Interest (CoI)

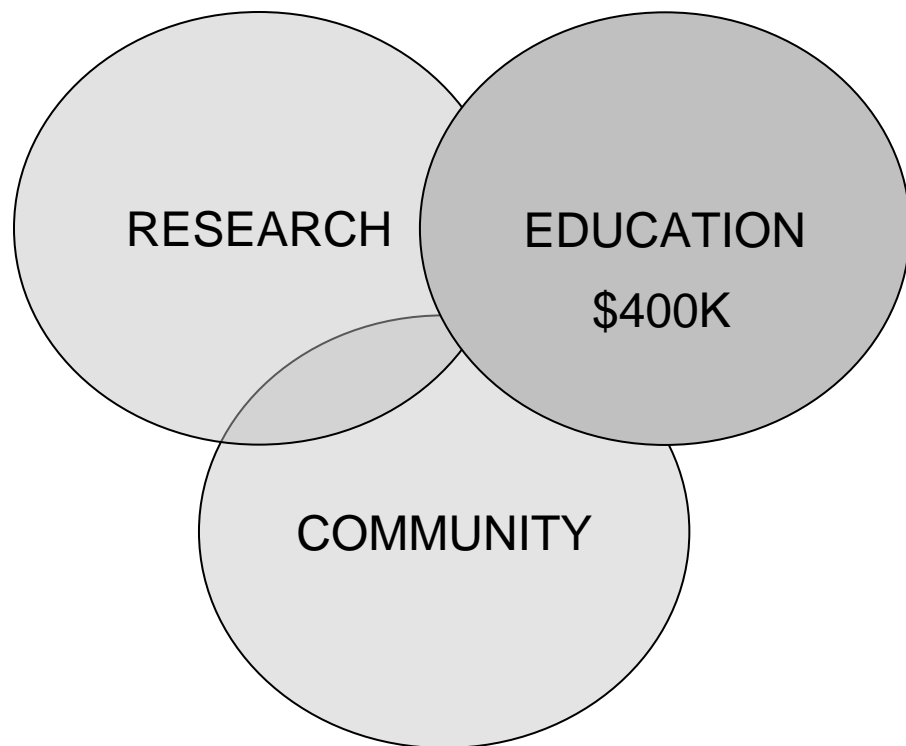


# CCRP FY09 Initiatives

- abELICIT development and calibration
- abELICIT exploratory experiments
- C2 Maturity Experiments
- C2 Maturity Model Case Studies
- C2 – Mgt – Org Theory Rosetta Stone



# CCRP FY09 Initiatives



- NPS – C2 Chair, Center for Edge Power
- USMA - Network Science Center, Technical Chair
- CNO – SSG Future C2 Program
- NDU-AWC NCW Course

# Funded Collaborations

- DoD



**SOCOM** requested CCRP support their efforts to develop and implement a new C2 Architecture building on the C2 Maturity Model and NCW value chain.



**NPS** request we partner with them on Maritime Interdiction Operations Program to design specific experiments and identify specific metrics and help them use COBPs and C2CRM.

**\$ DARPA** funding a project to improve the measurement of Trust and Distrust using ELICIT and fMRI brain images.

**\$ PA&E** funding effort to model irregular warfare building on our views of complex endeavors and the book Planning for Complex Endeavors.

- International

**\$ Singapore** Future Systems Directorate asked for help in implementing their Innovation Hub building on the COBP and key CCRP books.

**\$ Canada** requested CCRP support of a C2 R&D Workshop and that CCRP provide keynote for their national S&T Conference. Advise on research priorities and program of experimentation.



**ELICIT Community of Interest** Canada, Singapore, Germany, Portugal and the UK fund ELICIT-based experimentation and analysis.

# CCRP-NORTHCOM (2009)

- Two years ago, NORTHCOM asked for help creating a capability for experimentation, resulting in:
  - Technical meeting and seminar with lead personnel
  - Provision of CCRP Codes of Best Practice
  - Course in Experimentation taught at NORTHCOM
- Since NORTHCOM has:
  - Conducted two LOE and requested CCRP feedback on the reports
  - Built an experimentation team consisting of J-5 Concept Developers and J-8 Analysts
  - Initiated a Campaign of Experimentation to support revision of the JOC dealing with Homeland Defense and Civil Support
- In 2009 NORTHCOM requested a Peer Review Workshop
  - Included their Experimentation Team, J-7 of the Joint Staff, JFCOM J-9, DHS and CCRP experts
  - NORTHCOM personnel reported major success and intention to follow CCRP recommendations to improve their campaign.

# CCRP Support within DoD (2009)

- Responded to request from CNO's Special Studies Group (SSG) to discuss C2 futures
  - Designed and conducted One day Workshop in Newport, RI
  - SSG expressed strong satisfaction
  - Recent request received to follow up with extended interviews
- Request from National Guard Bureau for support developing an Interagency Campaign of Experimentation
  - Related to NORTHCOM reports of successful workshop and CCRP advice and support over time
  - Endorsed by AT&L office responsible for funding experimentation

# Community Leadership (2009)

- Annual NCW Conference (January)
  - Tutorial on C2 Maturity Model
  - Panel from US, UK, Germany, and Netherlands on C2 Maturity
- Keynote presentation for Singapore Workshop on Experimentation (February)
- Keynote presentation for Annual NATO NNEC Conference (March)
- Keynote for Canadian Annual Science and Technology Conference (April)
- Meet with National Guard Bureau to help design Campaign of Experimentation (May)
- Keynote Conference on C2 Futures (June)
- Provide presentation to Allied Command Transformation Operations Analysts Workshop (June)
- Provide C2 Metrics for Naval Post Graduate School Coordinated Maritime Interdiction Operations Experimentation (April)

- Request to Chair, Exploratory Team on C2 Agility
  - Prelude to possible new Research Group
- Chair, C2 Maturity Model (SAS-065) ends 2009
  - Produced model that is already being used
- Collaborate with ACT and C2 CoE to improve NRF Assessment methods and metrics
- Keynote for NATO NNEC Conference
- In-coming RTO Director request CCRP's recommendations for NATO Research Priorities