14th ICCRTS

International Command and Control Research and Technology Symposium

C2 and Agility

June 15-17, 2009
Omni Shoreham Hotel
Washington, D.C.

Department of Defense
Office of the Assistant Secretary of Defense
Networks and Information Integration
DoD Chief Information Officer

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Focus & Convergence for Complex Endeavors
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ELICIT Update

June 17, 2009

Agenda

- What is ELICIT?
- ELICIT in use
- ELICIT is now web-based
- Agent-based ELICIT (new)
- ELICIT Community of Interest

What is ELICIT?

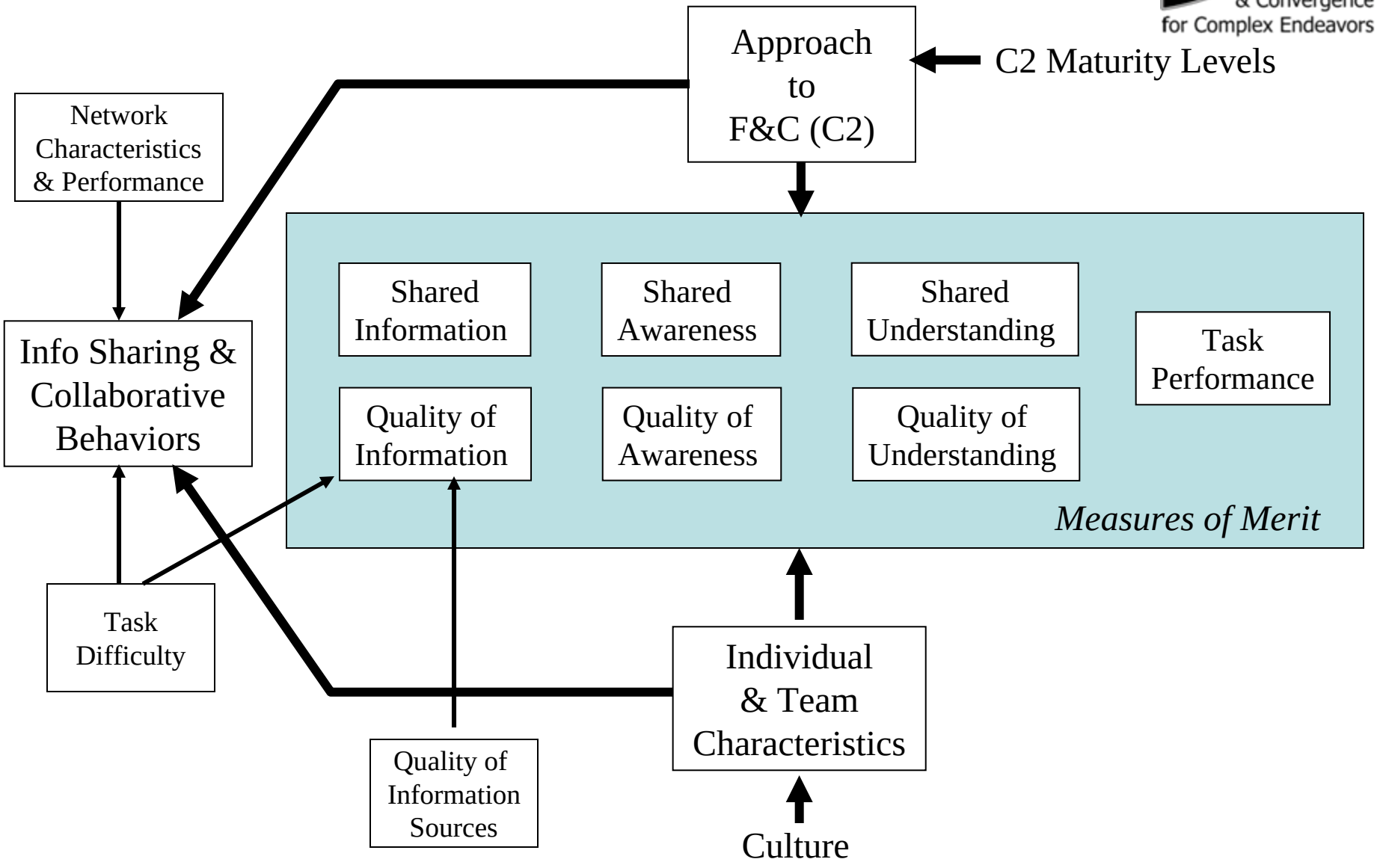
- ELICIT = Experimental Laboratory for Investigating Collaboration, Information-sharing, and Trust
- U.S. DoD (OASD/NII) Command and Control Research Program (CCRP) sponsored the design and development of the ELICIT platform to facilitate experimentation focused on information, cognitive, and social domain phenomena
- ELICIT is an experimentation environment supported by software tools and instructions / procedures

ELICIT Applications

- ELICIT has been used by researchers to investigate the cognitive and social impacts of C2 approaches and organizational structures (e.g., information sharing, trust, shared awareness, and task performance)

- ELICIT has been used by educators to facilitate discussion of command and control concepts, approaches, and processes (e.g., alternative structures, information flows, and distributions of information)

Variables of Interest



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International Use of ELICIT

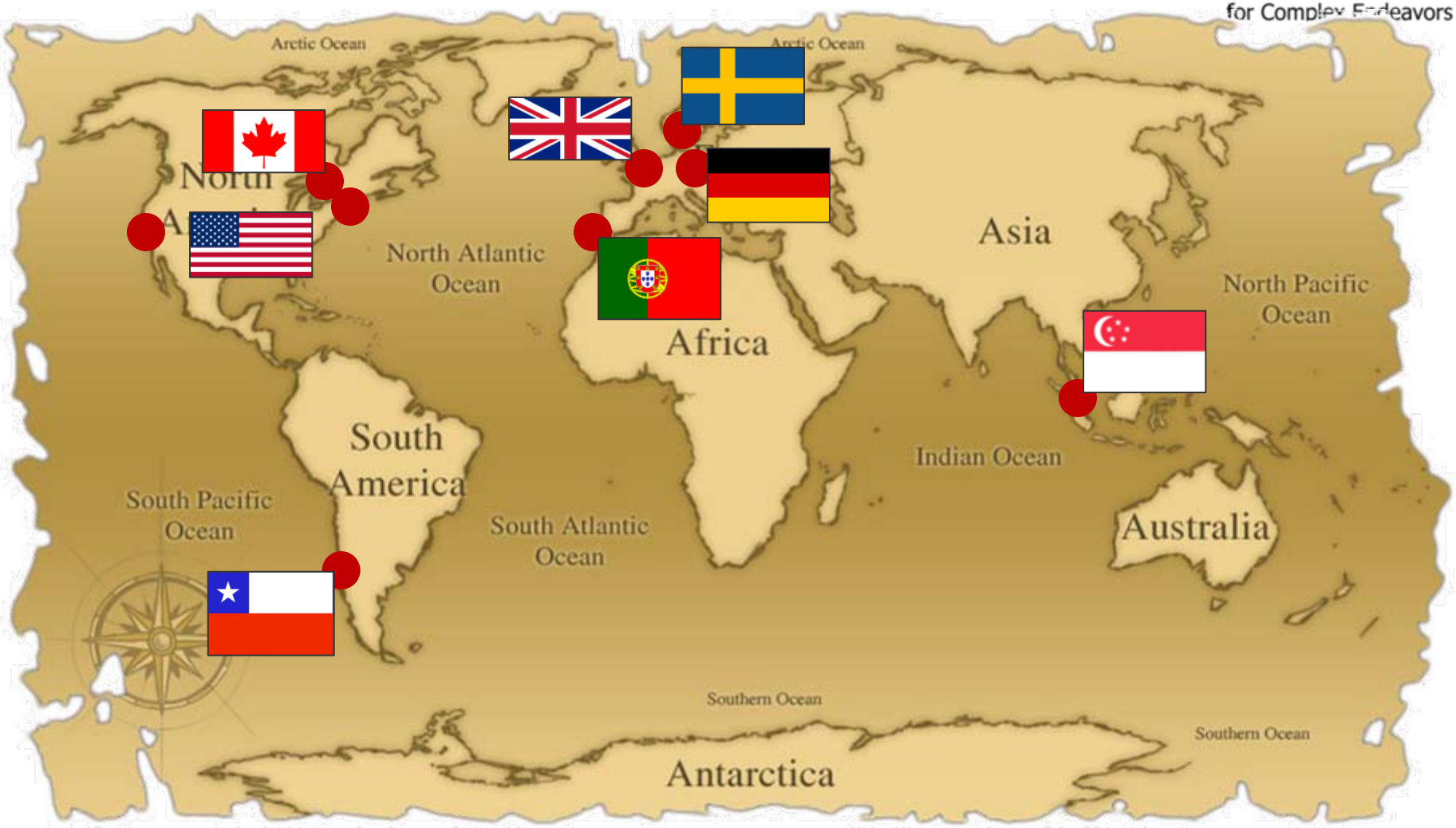


Image: www.worldtimezones.com/content/worldmap

ELICIT Users

ELICIT is a well proven environment that has been used by academia, government, and industry around the world:

- Boston University (undergraduates)
- York University (students)
- George Mason University (graduate students)
- U.S. Military Academy (faculty and cadets)
- Naval Postgraduate School (faculty and M.S. and Ph.D. students)
- Portuguese Military Academy (cadets)
- Portuguese Training (mid-career civil and military personnel)
- Singapore Military Academy (students)
- Naval War College (Strategic Studies Group)
- Defence Academy of The United Kingdom (civilians and military)
- National Defense University and Army War College (students)
- UK MoD Analysts
- Military Polytechnic Academy, Army of Chile

ELICIT in ICCRTS

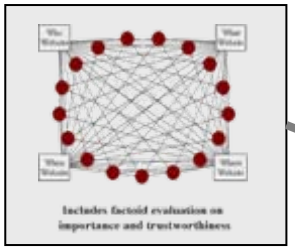
- Past papers
  - 12th ICCRTS: 3 papers
  - 13th ICCRTS: 6 papers
- Best paper award from 13th ICCRTS
  - **Exploring Alternative Edge versus Hierarchy C2 Organizations using the ELICIT Platform with Configurable Chat System**
    Ee Chong Ng (DSO National Laboratories), Peter Thunholm (National Defence College, Sweden), Mervyn Cheah (Future Systems Directorate), Kin Yong Tan (Future Systems Directorate), Nency Chua (Defence Science and Technology Agency)
- Current papers
  - **Trust-Mistrust as a Design Contingency: Laboratory Experimentation in a Counterterrorism Context** (Naval Postgraduate School) *Track 7, Monday 1:00 – 1:30 PM*
  - **Emergent Leadership on Edge Organizations: Building Trust and Cooperation in the context of ELICIT experiments** (Portuguese Military Academy) *Track 5, Tuesday 2:30 – 3:00 PM*
  - **Exploring the Effects of Individual Characteristics on Organizational Performance using the ELICIT Experimentation Platform** (Evidence Based Research, Inc., Parity Communications) *Track 6, Tuesday 4:00 – 4:30 PM*
  - **Instantiation of a Sensemaking Agent for use with ELICIT Experimentation** (Evidence Based Research, Inc., Parity Communications) *Track 6, Wednesday 1:00 – 1:30 PM*

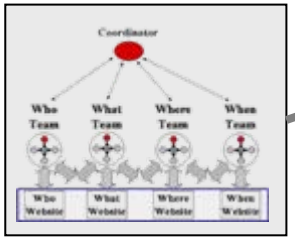
Portuguese Experimentation with ELICIT

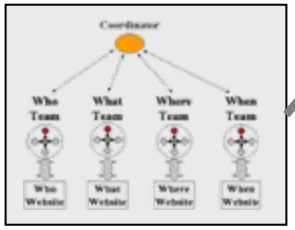
- PT Participation in SAS-050 (C2 CRM) and SAS-065 (N2C2M2)
- Introduced to ELICIT in 2006:
  - Network-Centric Collaborative environment
  - Includes real-people
  - Easy to setup and deploy → simple but rich
  - Controlled environment
- 13th ICCRTS Paper (Manso and Nunes): ELICIT to C2 CRM Mapping, which included:
  - C2 Approach Space
  - NCW Value Chain

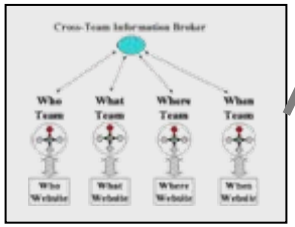
Some of C2 CRM and N2C2M2 Variables can be observed in ELICIT

Manipulation on Experiments









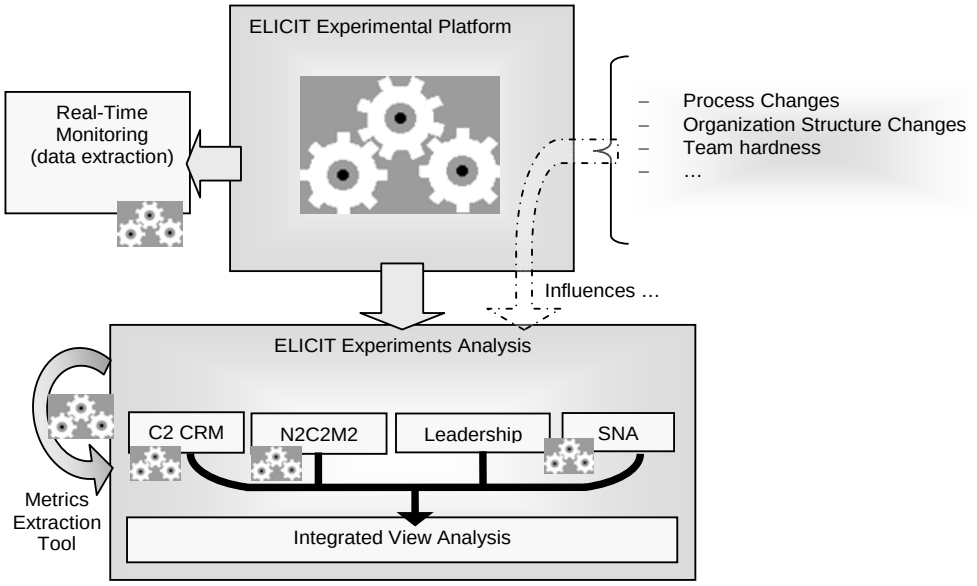
- C2 Approach
  - Decision Rights Allocation
  - Patterns of Interaction
  - Information Distribution
- Network Characteristics
- Task Difficulty
- Info Sharing and Collaboration
  - Influenced by instructions
  - Knowledge Sharing on higher maturity levels

Affects

Information Position, Shared Information, Information Sharing, Quality of Awareness, Quality of Shared Awareness, Task Performance, Agility

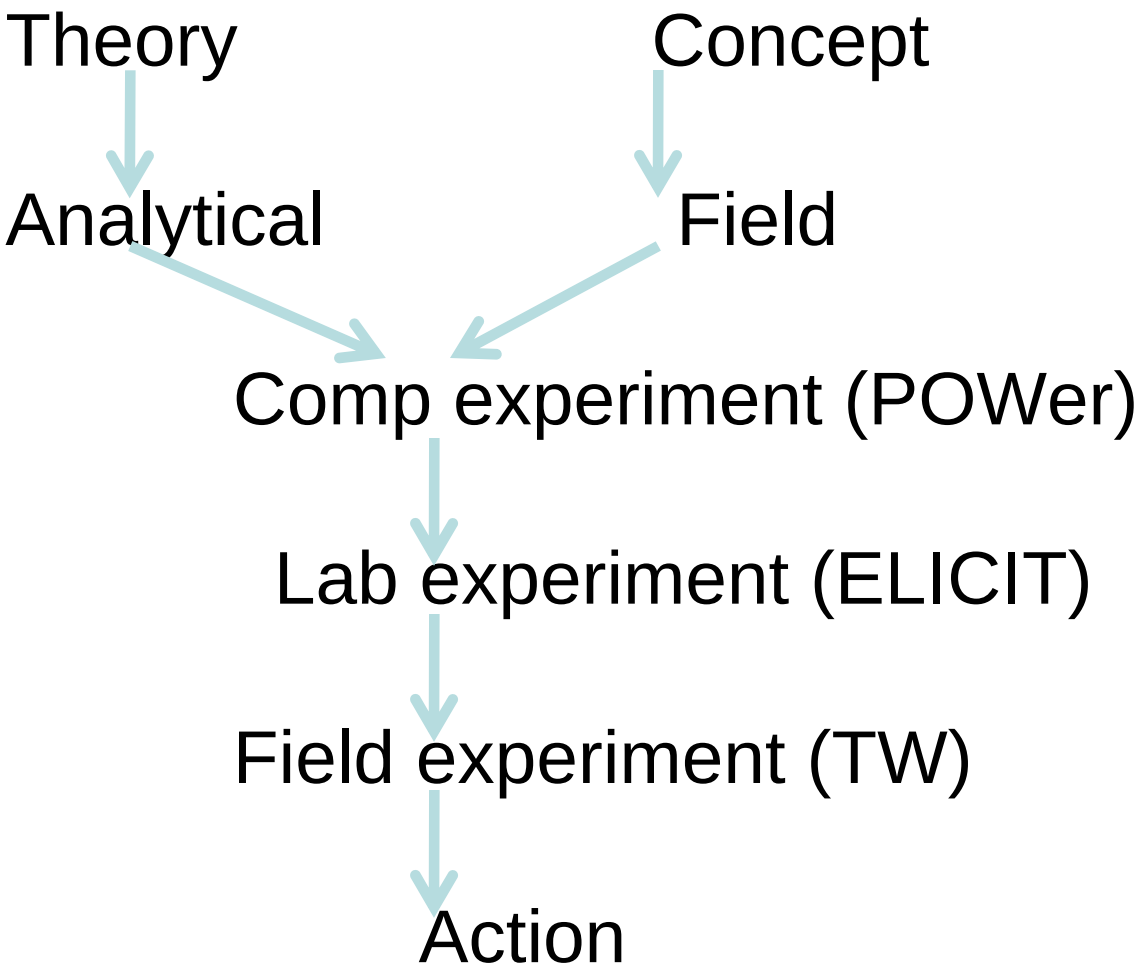
Portuguese Experimentation with ELICIT

- Exploited Research Areas:
  - Leadership
  - Social Network Analysis
  - C2 CRM (CCRP and SAS-050)
  - N2C2M2 (SAS-065)
- Project includes development of analysis tools.
- ELICIT runs in Portugal:
  - 2007: 6 runs conducted
  - 2008: 8 runs conducted
  - 2009: 20 runs conducted



Naval Postgraduate School

- Full life cycle of research methods



NPS ELICIT Experiments

- Leweling & Nissen (2007): speed, accuracy

H H H H	No mental models	Edge MM best
H H E E	Mental models	Hier MM worst
E E H H	Mental models	Learning effects
E E E E	No mental models	Asymmetric

- Powley & Nissen (2009): speed, accuracy

Rigid-high trust	Rigid-low trust	Flex-high best Rigid safest
Flex-high trust	Flex-low trust	Rigid-trust futile

- Next: virtual environments

Use of ELICIT at the Defence Academy of the United Kingdom

Focus & Convergence for Complex Endeavors

Postgraduate Residential Courses

- Guided Weapons Systems
- Information Management Technology
- Military Electronic Systems Engineering
- Weapons & Vehicles
- Systems Engineering for Defence
- Explosives Ordnance Engineering
- Battlespace Technology Course

Aim for use of ELICIT

- A hands-on educational capability to help students experience NEC.
- Demonstrate impact of human as well as technology aspects of Information Sharing.
- ELICIT part of an education package, which included briefings and paper exercises.
- 2 Day programme.
  - Day 1: Difference between ‘systems’ and ‘capability’, NEC as a capability, Characteristics of Hierarchy vrs Edge Organisations.
  - Day 2: ELICIT exercises, including students writing ‘information sharing operating procedures’.

Summary and way ahead

- Partial educational success.
  - Good post-exercise discussion.
- Two days too long.
- Too many runs.
- Need to make the difference between the Hierarchical and Edge organisations more significant.
- ELICIT needs to be changed to integrate more with the educational aims of the course.
- Defence Academy will continue to use ELICIT.

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Web-based ELICIT

- Accessing web-based ELICIT
  - Requires COI membership
  - Research directors can set-up all configuration files
  - Participants access ELICIT directly from any location with their own computers
- Features:
  - Requires no client down-load / set-up
  - Works with Firefox and IE browsers
  - More configurable and easier to configure
  - UI for uploading and downloading files

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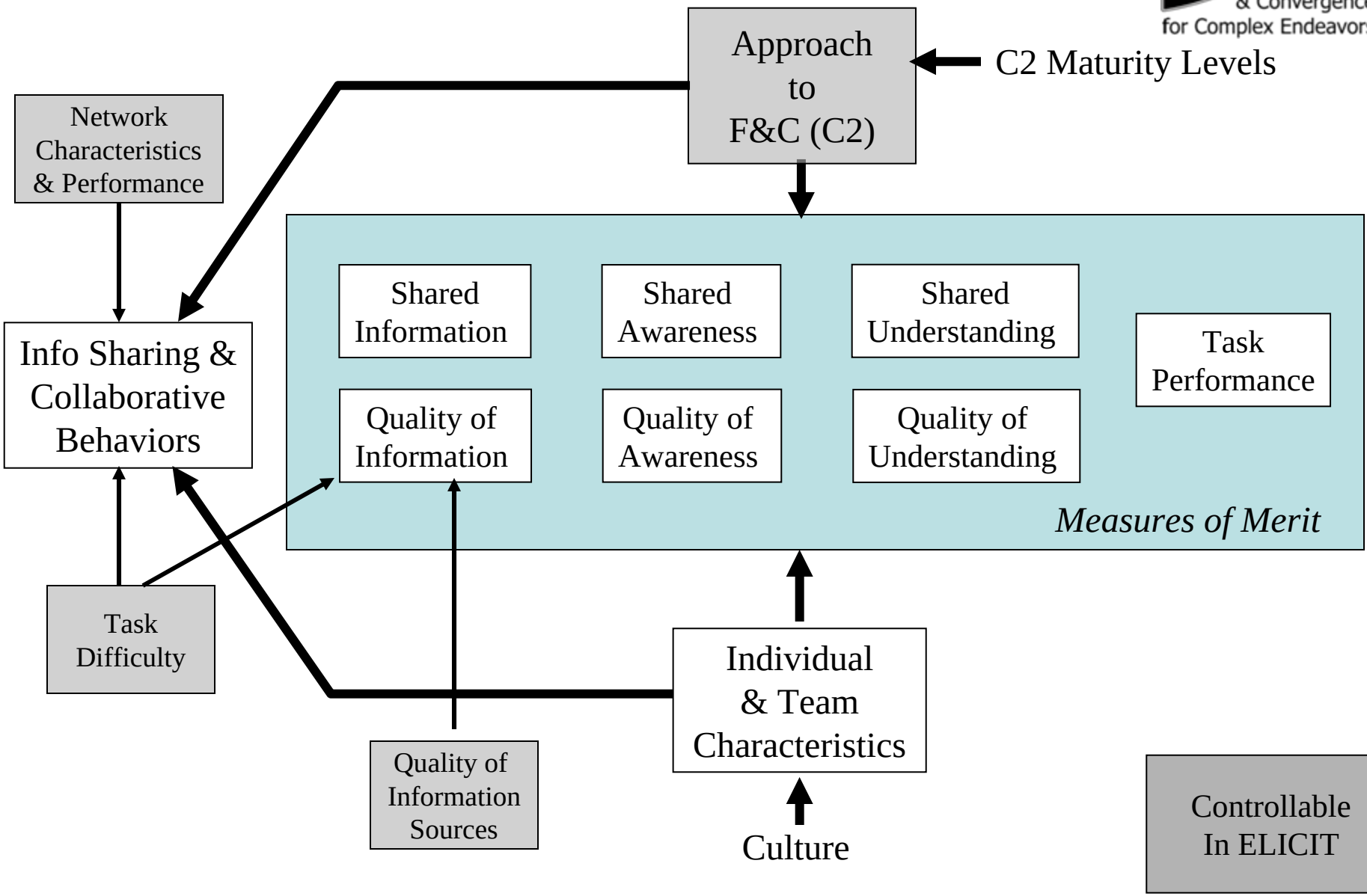
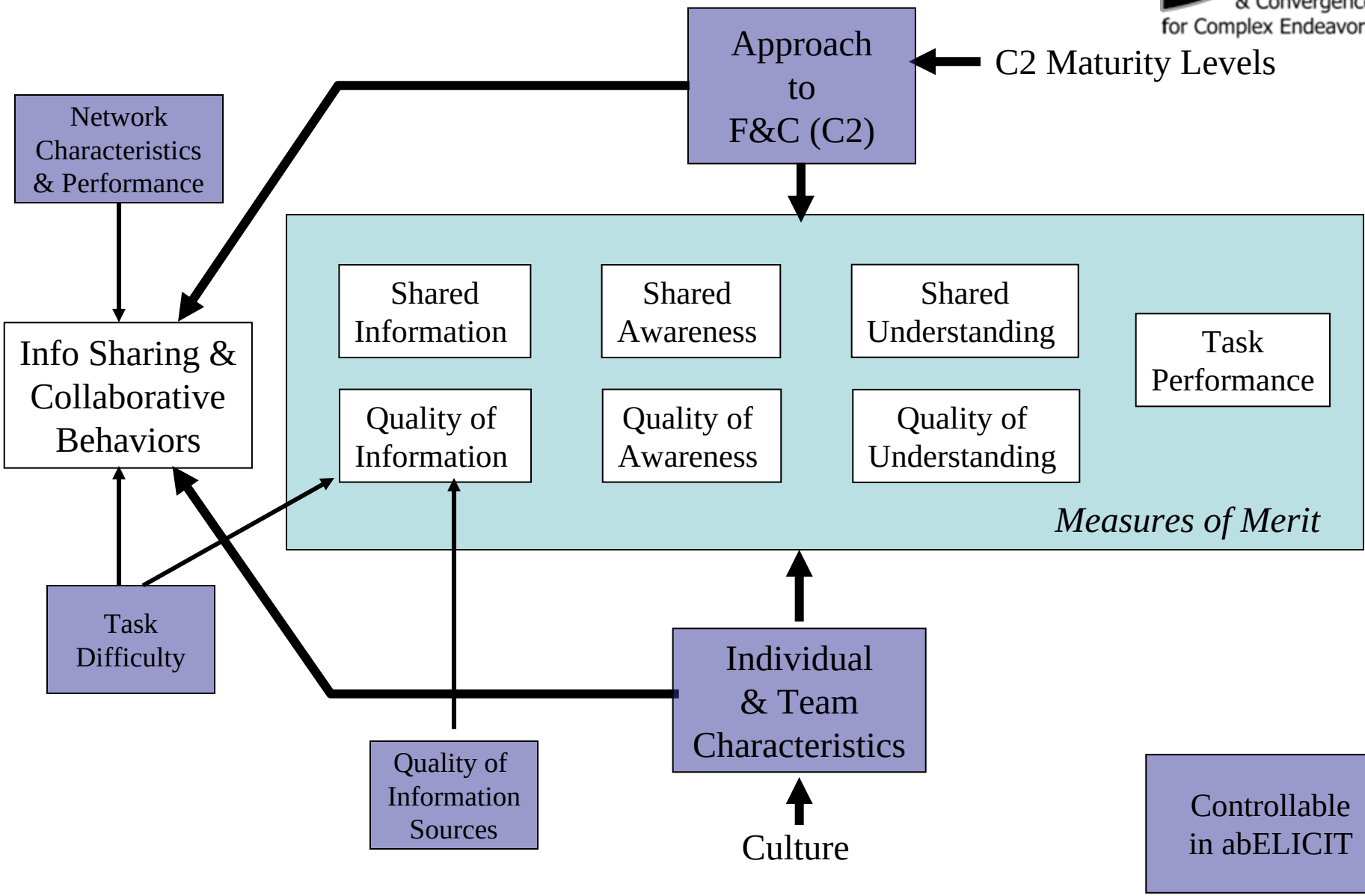
Agent-based ELICIT

- ELICIT was developed as a person-in-the-loop experimentation platform.
- Experimentation with live groups of individuals is time consuming and expensive.
- This limits the number of runs that can be made. This, in turn, limits the exploration of treatment effects.
- Therefore, the CCRP decided to develop agents that could be used in the place of people.
- abELICIT is an all agent-based simulation model that is built upon the ELICIT experimentation platform.
- The ability to mix agents and people is under development.

Controllable in ELICIT



Controllable in abELICIT



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ELICIT Membership and CoI

- The ELICIT software platform, related tools, and the empirical data that have been collected are **available at no cost to members of the ELICIT CoI**.
- Assistance may be provided by CCRP and members of the ELICIT CoI
- ELICIT CoI membership conditions:
  - Conduct baseline runs for *Hierarchy* and *Edge*.
  - Share all the experiments results with the CCRP and ELICIT community.
  - Members are encouraged to craft and present papers at the ICCRTS and International Command and Control Journal.

Interested in ELICIT?

Next Meeting is Thursday, June 18, 2009 at the Omni Shoreham. Sign up at the ICCRTS registration desk!

We are Seeking Potential Collaborators!

To join the ELICIT CoI, go to

www.dodccrp.org/html4/elicit.html

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