



System Modeling Approach To Network-enabled Defense

Dr. Tuija Kuusisto

Ltn. Col. Rauno Kuusisto, PhD

2006 CCRTS



Jan 17, 2006



Network-enabled Defence (NED)

The Network-enabled Defence is a working title related to the further development of the FDF Territorial Defence Doctrine.

NED describes how future networks with improved and integrated information and weapon systems can enable Command and Control of Joint and Territorial operations and enable Interagency Collaboration in securing vital functions of the Finnish society in Total Defence. (Admiral Kaskeala 2005)

Joint and Territorial Operations



Interagency Collaboration in Total Defence



Jan 17, 2006



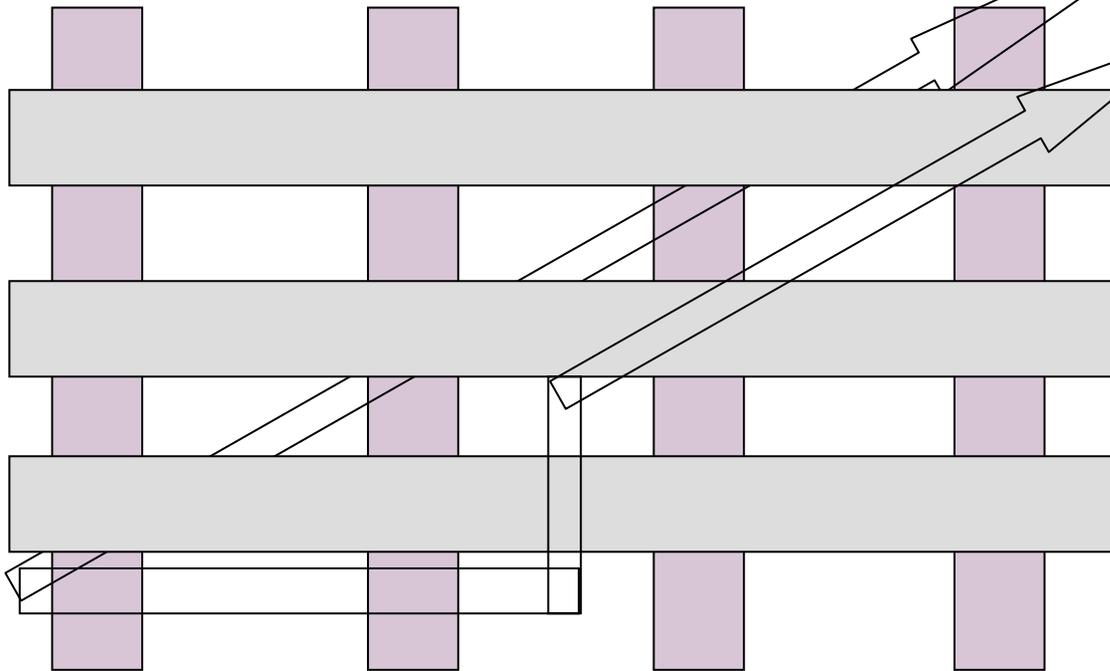


Structure, Activities and Information Flow aspects on NED

Network-enabled Defence

Structure - organization

Information



**Activities –
processes**

(based on Kuusisto et al. 2006)

Jan 17, 2006





Research Question

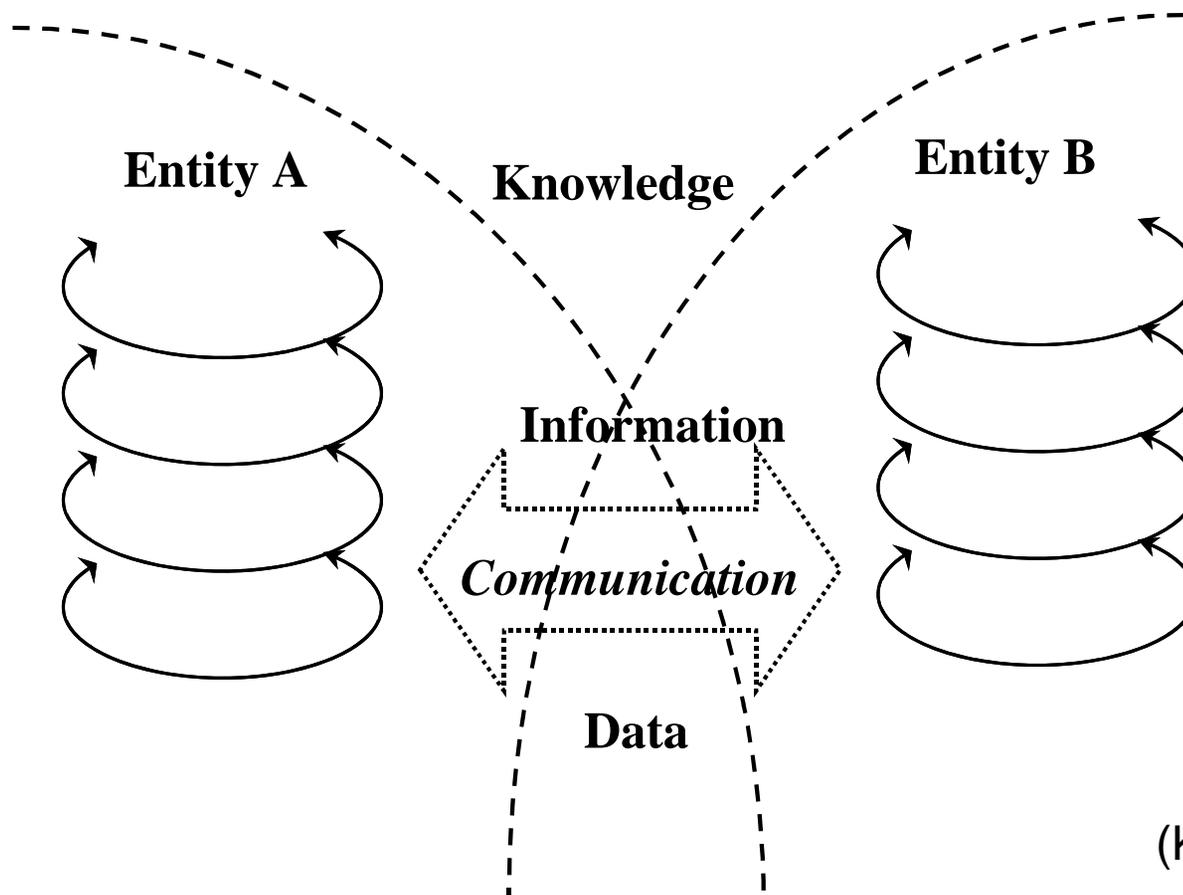
What is the information flow aspect on the command and control of NED?



Jan 17, 2006



Information Refining Process



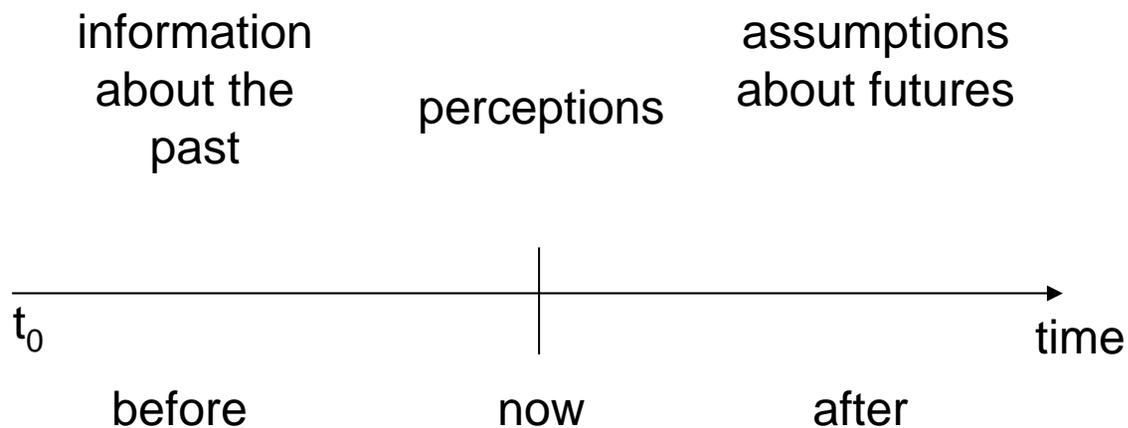
(Kuusisto 2004)

Jan 17, 2006





Information and Time



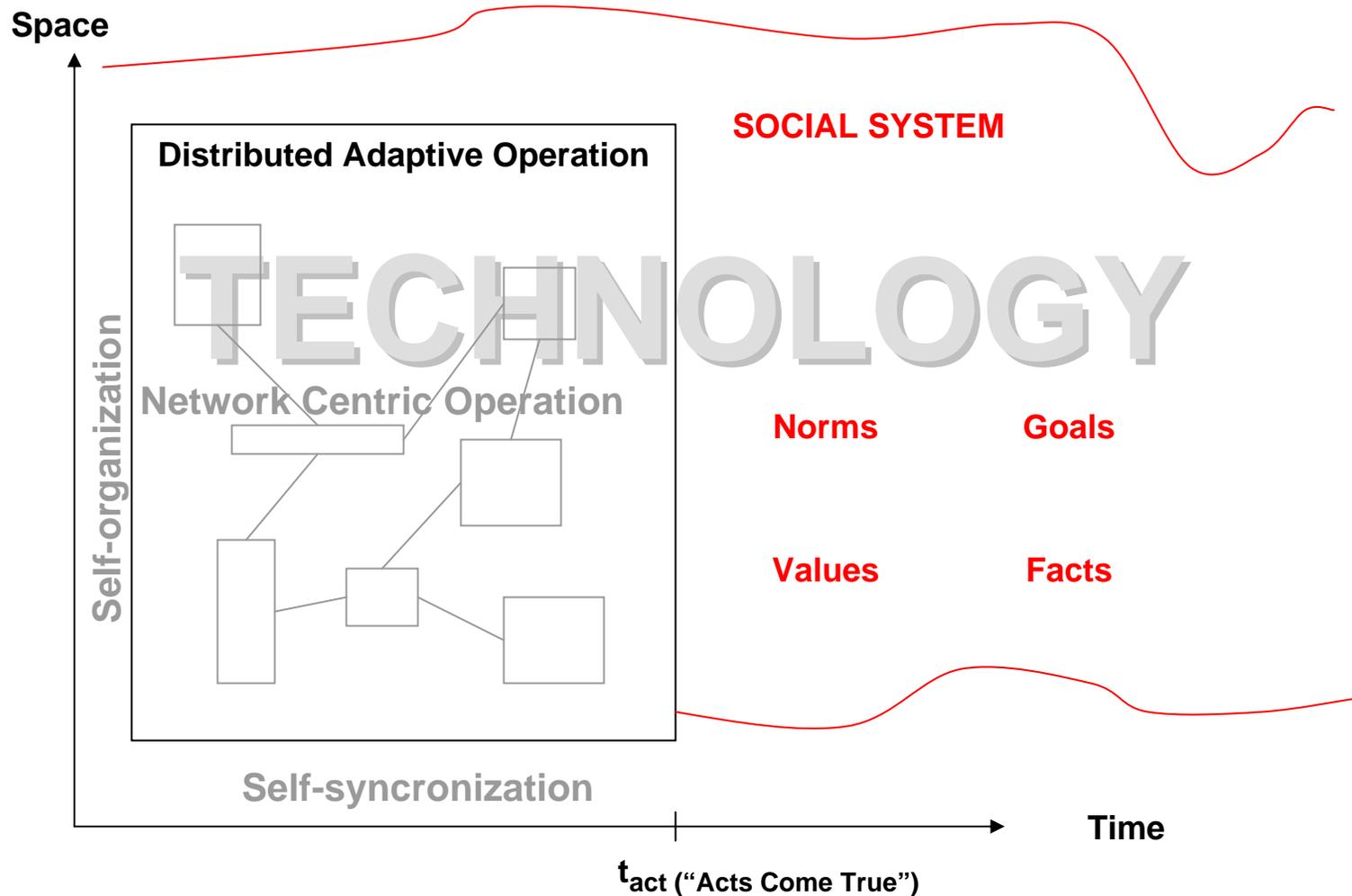
(Kuusisto et al. 2004, based on Bergson 1911, Damasio 1999)

Jan 17, 2006





NED as a System





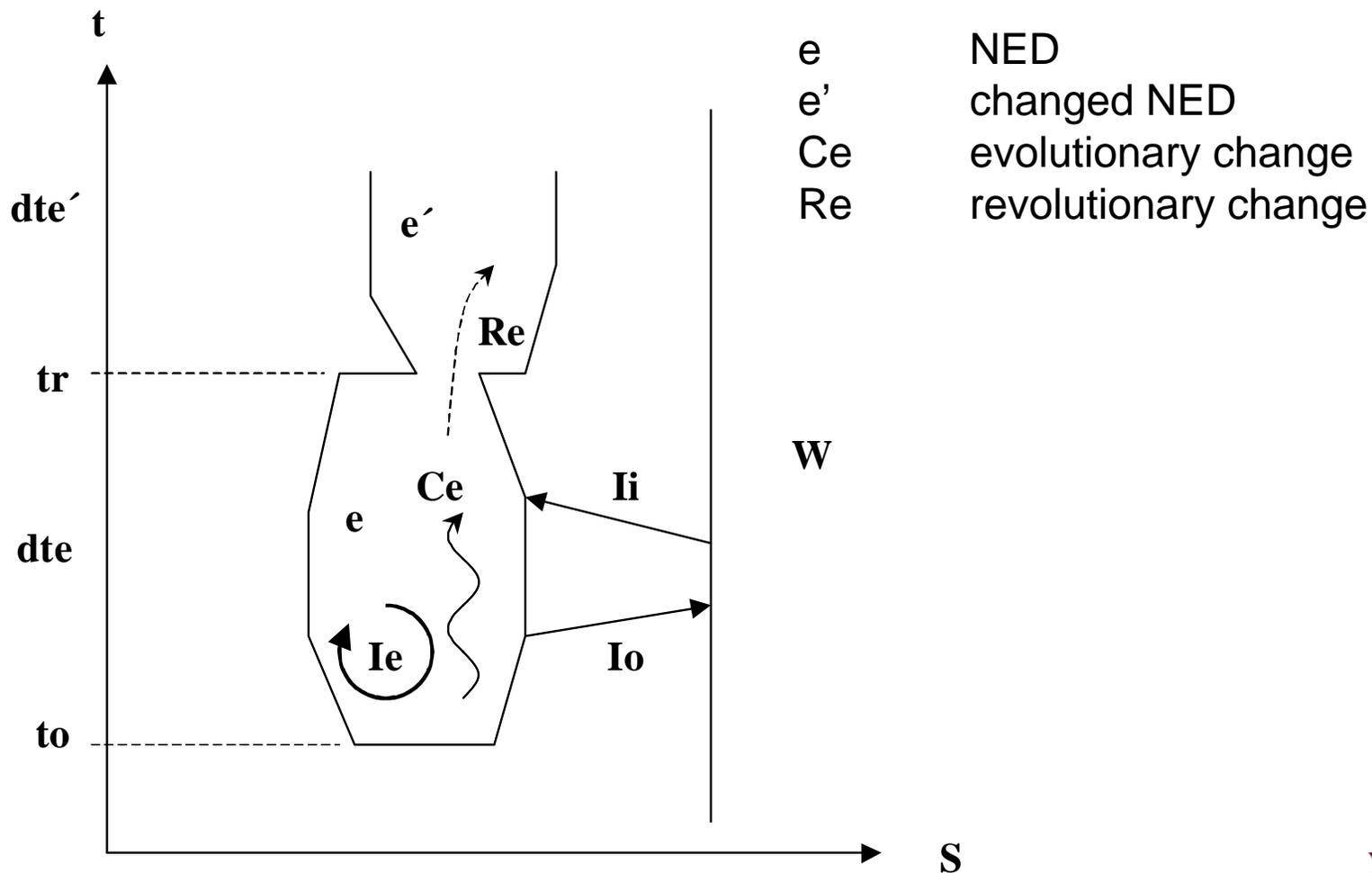
NED System

- Self-synchronization covers only the activity aspect on a system while self-organization covers the structure, activity and information flow aspects on a system
- A self-synchronizing, network centric operation is arranging its actions in time, space and purpose to produce maximum relative combat power at a decisive place and time
- A self-organizing, adaptive operation is locally inducing long-rang order and able to adapt and change within a changing environment without the need for a guidance outside the operation
(based on Alberts et al. 2001, Moffat 2003, DoD 2005)
- The adaptation and interaction of self-organizing, adaptive operations and self-synchronizing network centric operations lead NED system to evolve.





Interaction Makes NED System to Change over Time



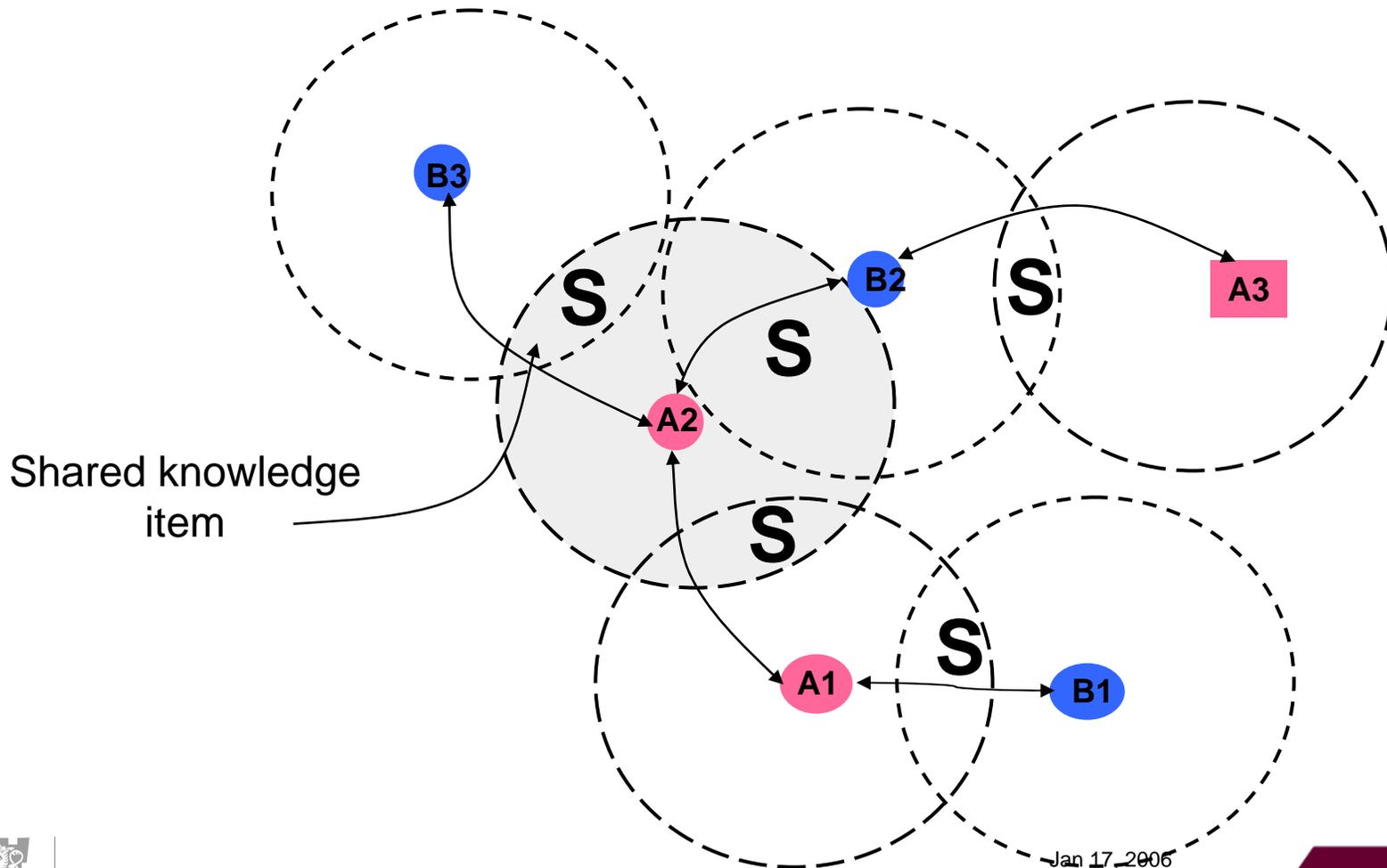
Jan 17, 2006

(Kuusisto & Helokunnas 2003)



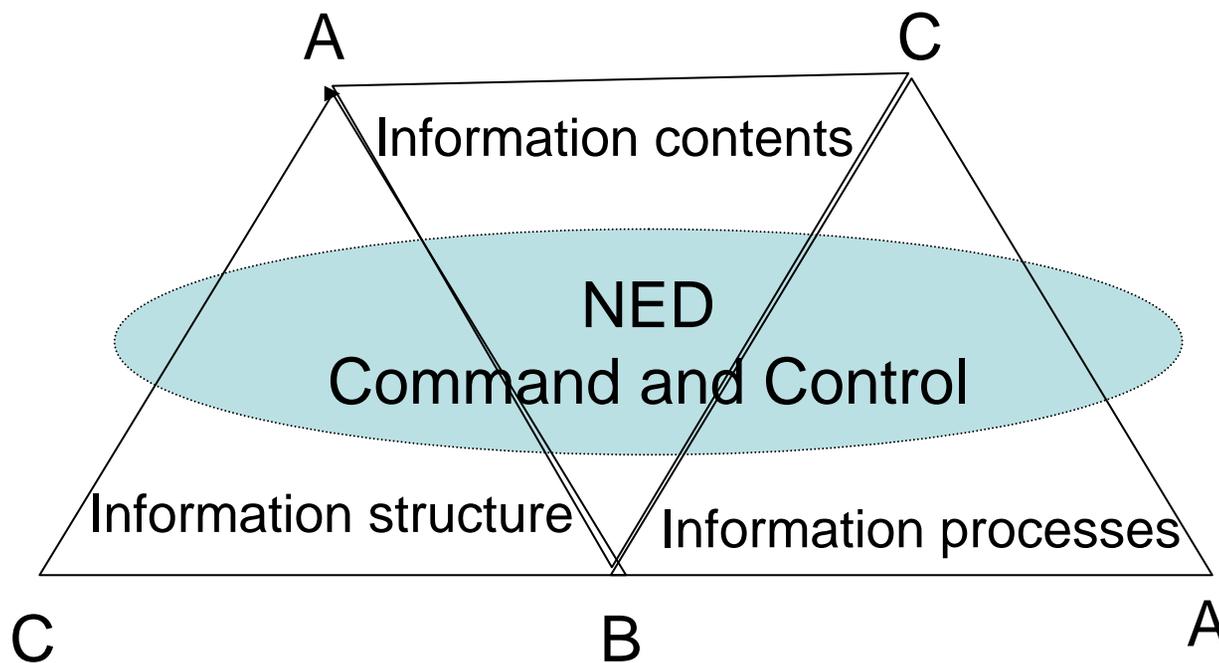


Shared Activities in a Network Require a Shared Item of Knowledge





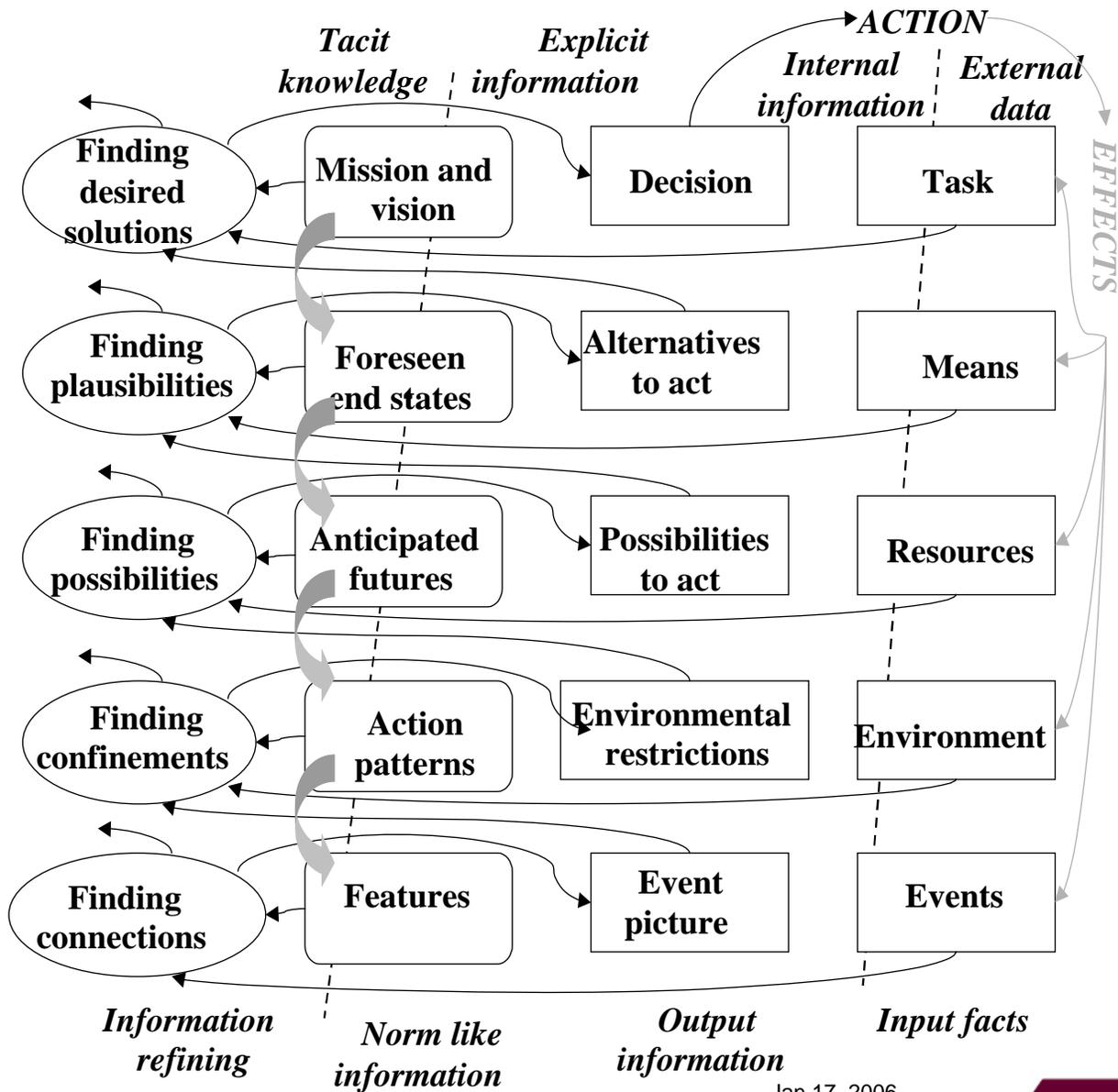
Information Structure, Processes and Information Contents need to be shared in NED Command and Control





A General Model of Situation Awareness and Managing

COMPETENCE VALUES



Jan 17, 2006

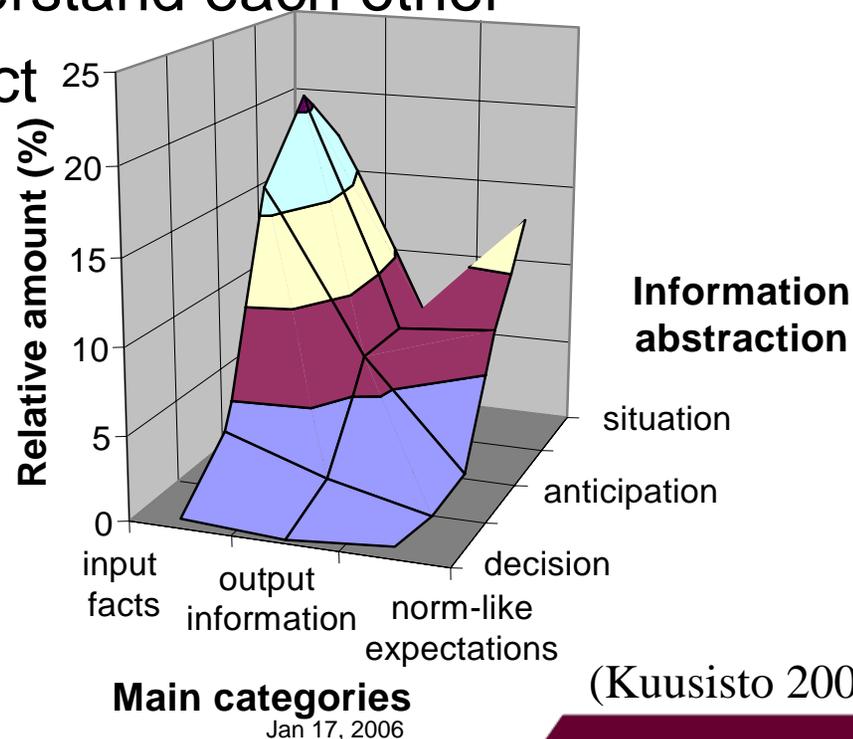
(based on Kuusisto 2004, Kuusisto 2006)

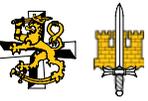




Conclusions 1

- It is not sufficient that the interacting operations in NED share only parts of the contents of incoming facts and output information
- Interacting operations have to share parts of norms like information too to understand each other
- Coverage of C2IEDM object classes:





Conclusions 2

- A prototype based on the general model of situation awareness and managing is under development
- The prototype is a flexible portal supported by content management services and access to a data warehouse
- The prototype visualizes the contents of situation awareness model categories to the user with texts, graphics and maps.
- An advanced user is able to both edit the contents of the categories and publish presentations about situation to senior management.





Reference

- Alberts, D.S., Garstka, J.J, Hayes, R.E., Signori, D.A. (2001) *Understanding Information Age Warfare*, CCRP, USA. 312p.
- Bergson, H. (1911) *Creative Evolution*, University Press of America.
- Damasio, A. (1999) *The Feeling of What Happens: Body and Emotion in the Making of Consciousness*, Harvest Books.
- Kaskeala, J. (2005) "The Finnish RoadMap to Network Enabled Defence", presentation at *Royal United Services Institute (RUSI)* conference, September 21, 2005
- Kuusisto, R. (2004) *Aspects on Availability, A Teleological adventure of information in the lifeworld*, Edita Prima Oy, Helsinki. 124p.
- Kuusisto, R. (2006) "Flowing of Information in Decision Systems", *Proc of HICSS-39, USA*
- Kuusisto, R., Helokunnas, T. (2003) "Experiencing Time in Leading Systems", *Proc. of the 2003 IEEE International Engineering Management Conference, USA*. pp. 415-419
- Kuusisto, T., Kuusisto, R., Armistead, L., (2004) "System Approach to Information Operations", *Proc. of the 3rd European Conference on Information Warfare and Security*. London, UK. pp. 231-239
- Kuusisto, T., Kuusisto, R., Lund, O.-P., Mikkola, T. (2006) "Information Flow Aspect on the High-level Tactical Managing", *Proc. of The International Conference on i-Warfare and Security conference, USA, 2006*, to be published
- Moffat, J. (2003) *Complexity Theory and Network Centric Warfare*, CCRP, USA. 160p.

