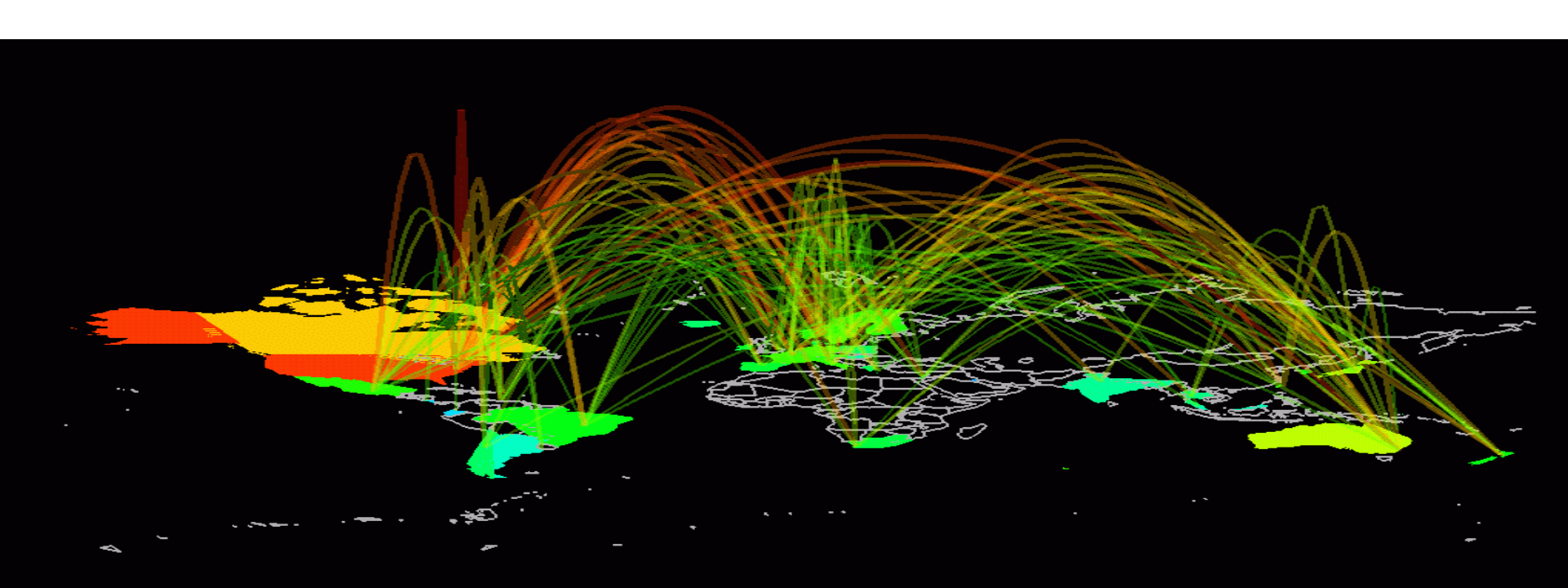


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# Modular Structures in a Multinational Force Headquarters

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ICRTS 2004 Paper134



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# Introduction

- Organisational concepts research
- Background to Modular Capability Expansion (MCE) research
- Modularity concept
- Subject Matter Expert (SME) human factors interviews
- Applied Research Technology Demonstrator (ARTD) investigative experiment
- Implications of multinational forces for modularity

# The information age environment

- Complex and dynamic
- Range of operations across spectrum of conflict
- Alliance/coalition operations
- Adversaries not clearly defined and operate unconventionally
- Appropriate response requires flexible, adaptable, innovative and organic military organisation

# Meeting environmental challenges

- Technology supports organisational processes of gathering, processing and disseminating knowledge
- Technology as *enabler* of a wider process change whereby knowledge is exploited to enhance capability
- Technology enables new organisational forms
  - communication technologies enable new ways of organising
  - information technologies allow more flexible processes

# Organising to function effectively in chaotic environments

- Need for adaptive/flexible organisation BUT need for robustness and reliability
  - e.g. HROs - remain reliable by ensuring requisite variety of organisation matches variety of environment
- MCE concept achieves stability-flexibility balance - additional capability provided by modular expansions
- Continual redesign is necessary to combat environmental challenges!

# Modular Capability Expansion (MCE)

- **Initial Work**
- Provide answers to the question 'How do military HQ organisational structures adapt to changes in the socio-political and military environment?'
- Proposed that a modular capability could be attained by the use of 'Plug and Play' agent architectures. These would provide an information-mediating function.
- This mediating function would be able to organise a hierarchy of information in terms of saliency and criticality and direct this information to the appropriate decision maker.

# MCE

- Critical Command Post Attributes study
- Study the organisational attributes that will contribute to the HQ of the future
- **Modularity** - A Core Warfighting C2 Module augmented by a Joint C2, Multinational C2 or an Other Ops C2 Module (Thackray, 2001)

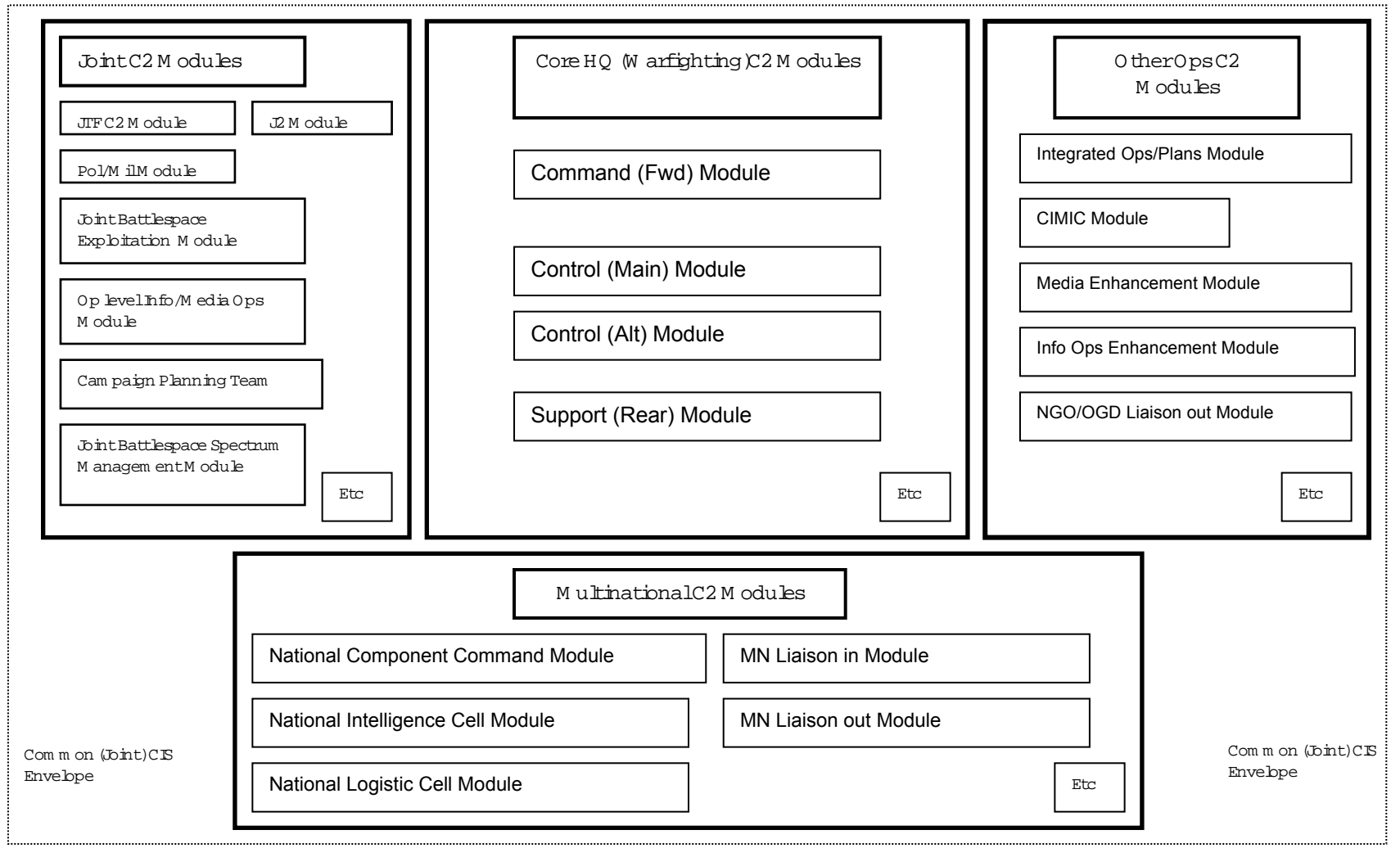
*'The ability of a HQ's C2 function to flexibly change its configuration, size, location and function accordant with the operational environment it faces by appending or removing specialist modular teams.'*

- A **Module** is:

*'A specialist distributed or co-located team that supports the core Command Team in their operational decision making activities.'*



Generic Modular HQ Structure

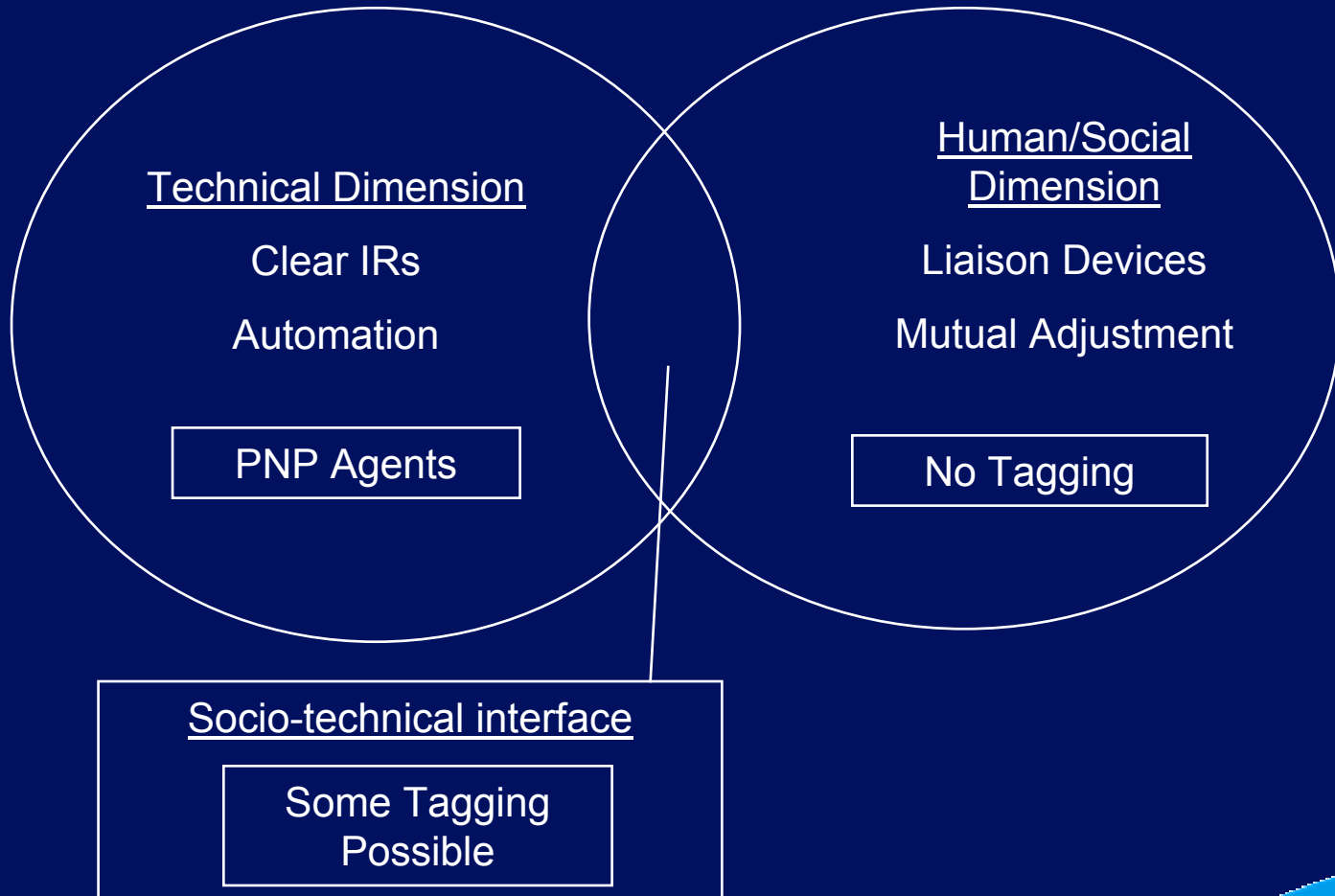


Modularity (Thackray, 2001)

# Modularity definitions

- *'The ability of a HQ's C2 function to flexibly change its configuration, size, location and function accordant with the operational environment it faces by appending or removing specialist modular teams.'*
- A **Module** is:
- *'A specialist distributed or co-located team that supports the core Command Team in their operational decision making activities.'*
- The **information-mediating function** has three main roles:
  - facilitating the management of information to reduce the likelihood of information overload;
  - ensuring that information is appropriately disseminated; and
  - enabling the relatively rapid plugging in of new modules and unplugging of redundant or compromised modules.

# Information-mediation function



# HF issues in MCE

- What are the Human Factors issues that would need to be addressed for modularity & structural flexibility via MCE to occur in each of the Joint Battlespace Components?
- What are the *organisational, doctrinal, cultural & strategic* factors?
- Considered HF/Organisational Science theory
- Interviewed SMEs in doctrine & concepts for each Component (except SF)
- Modularity investigative experiment

# Military examples of Modularity

- Increase transparency of intent and purpose between JTFC & Components by improving LO role (co-located or virtual)
- MCC requires environmental picture & 'ground truth'
- ACC requires liaison between CC's & JFACHQ (Airspace deconfliction & asset allocation)
- LCC requires the capacity to network in collaborative planning efforts
- Enhance the requirements of Directed Logistics by automatically updating information
- Reachback



# HF issues in MCE - theory findings

- New Control systems require in-built flexibility & usability.
- Shared explicit intent & shared implicit intent in a network-enabled environment.
- Deployed personnel must have trust and confidence in the advice gained from plugged-in sources.
- Teams have a tendency to focus on already known information.
- Liable to make assumptions to compensate for missing information.
- Modular team Commanders play a crucial role in maintaining SA.

# HF issues in MCE - SME interview findings

- Issues & Implications

## Organisational

Workload &  
Information Overload

SOPs & Generic  
Interface

NGO/OGD/IO

Brigading

Information Exchange

Reachback  
'Connection-Time'

## Doctrinal

Training for Reachback  
/ Modularity

Effects-based Assets

Network Deconfliction

Mission Command

Media

## Cultural

Delegation of DM

Information and  
Personal / Professional  
Trust

Personality of Module  
Commander

Reachback - Picture  
'Richness'

Attentional Lock

'Cap Badge' Rivalry /  
Competition

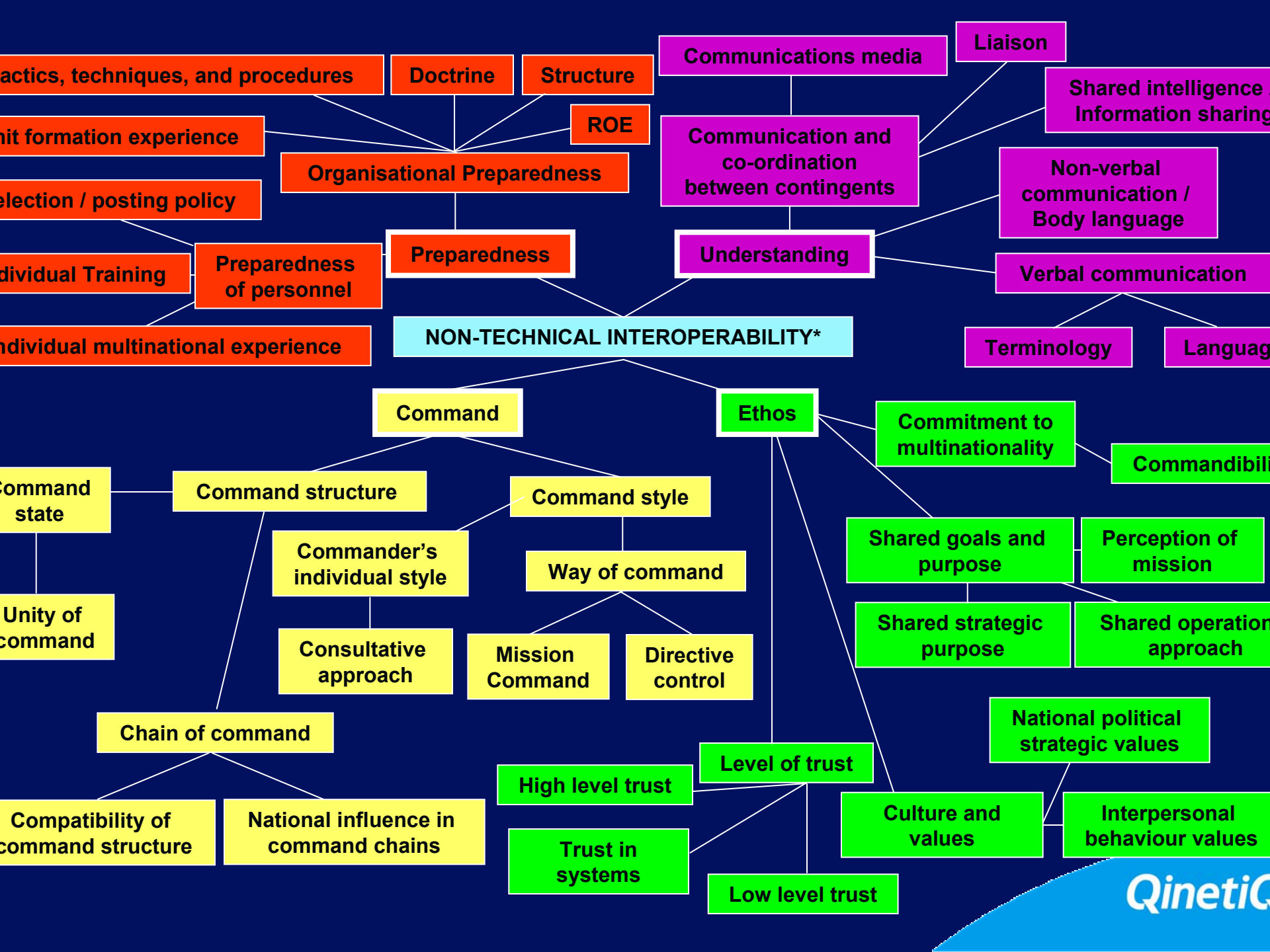
## Strategic

Spectrum of Conflict

Manpower /  
Augmentation

Information Sharing

Flattened Hierarchy  
Structure

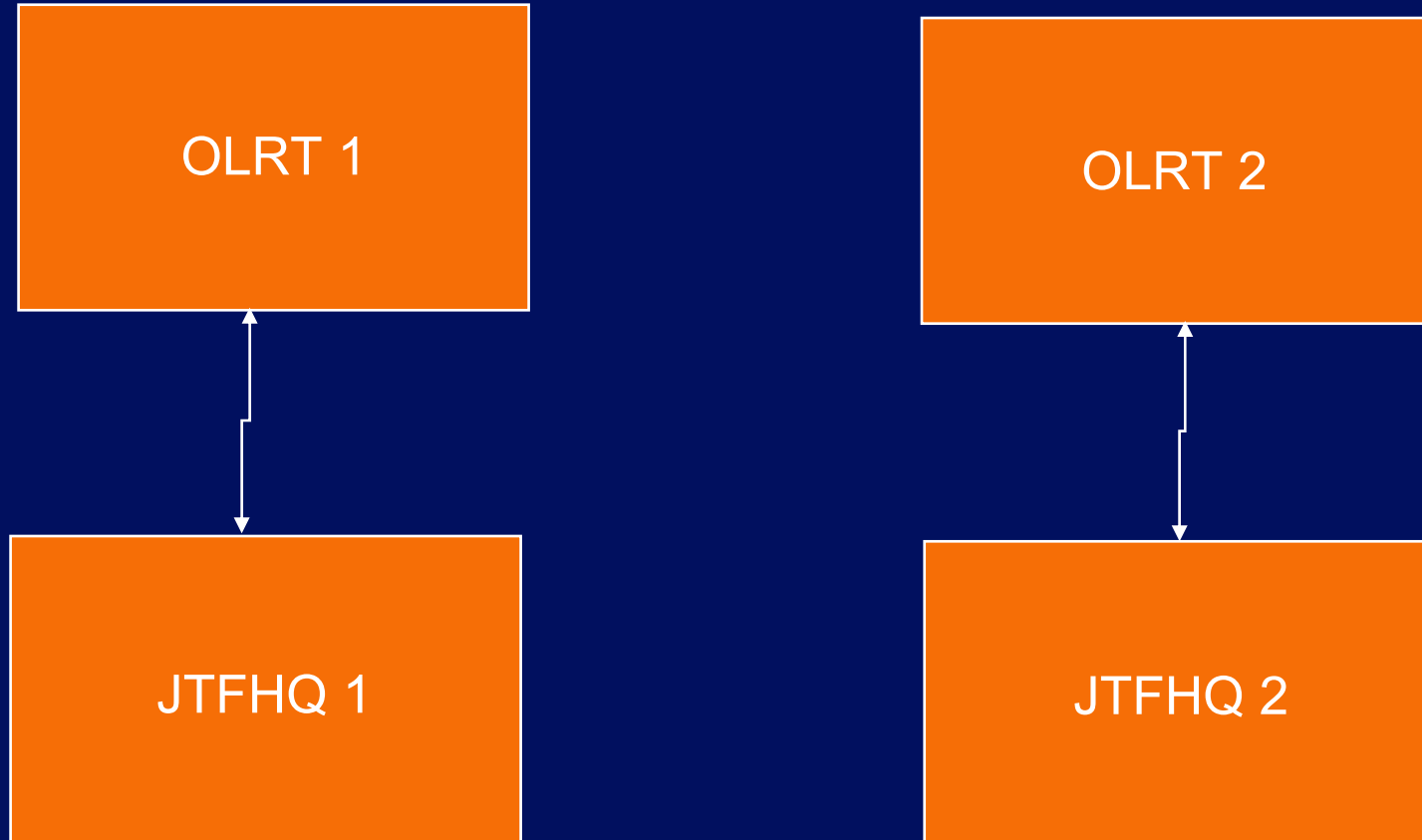




# Modularity Investigative Experiment

- Conducted at MOD's Applied Research Technology Demonstrator (ARTD) - Dstl Portsmouth
- **Aim:** To understand the support required, both organisationally and technically, for a modular capability
- **Objectives:**
  - To understand the information flow problems using current CIS when working in a modular environment
  - To understand the benefits of the enhanced CIS applications in supporting the management of information flow and identify what further support is required in a modular environment
  - To compare the differences between the teams when using current CIS and enhanced CIS in a modular environment

# Experimental design

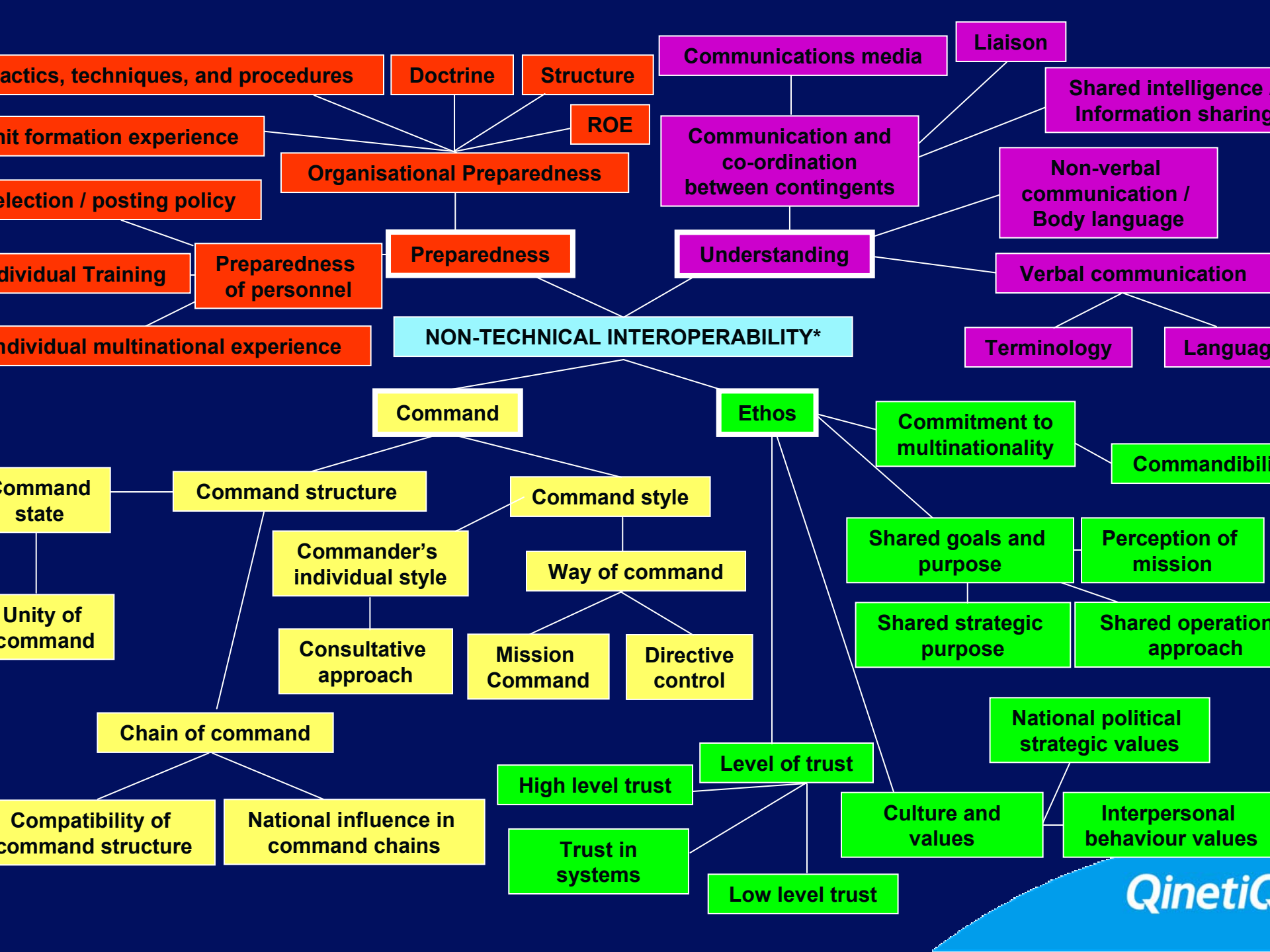


# Findings

- Low cohesion - teams were psychologically discrete entities
- Assumptions were made about the availability of electronic information
- In Condition 1, (Current CIS) poor information management strategies were adopted leading to information overload and task shedding
- In Condition 2, (Enhanced CIS) teams adopted improved information management strategies by assigning to themselves different task functions:
  - Information Manager
  - Visualisation Manager
  - Ops Officer
  - Executive Officer

# Findings (continued)

- Preference for high contact communications modalities:
  - Information sharing between teams mainly took place via the phone and email rather than inputting it into the system
  - Though formal documents were exchanged by email between co-located team members, context information along with further explanation behind the significance of information was shared verbally



# MCE within Multinational Forces

- Assuming technical interoperability and language compatibility.....
- Non-technical challenges of MCE
- Compatibility of structures and roles between contingents
- Virtual co-location: team formation vs psychological distance
- Information sharing
- Modality of interaction
- Trust and cohesion

# MCE within Multinational Forces

- Compatibility of command style
- Liaison:
  - Number of LOs
  - A human process
  - Temporary nature of MCE
  - Intent - amplify the explicit / clarify the implicit
  - Selection - personal qualities / experience
  - Training

# Conclusions

- A modular organisational structure may provide the inherent flexibility / reliability required in a future deployed HQ.
  - Enables co-location / distribution / reachback
  - Enables switching between tactical and operational roles
- BUT - MCE is likely to be vulnerable to a range of non-technical frictions in multinational forces



# Modular Capability Expansion (MCE)

## Questions

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