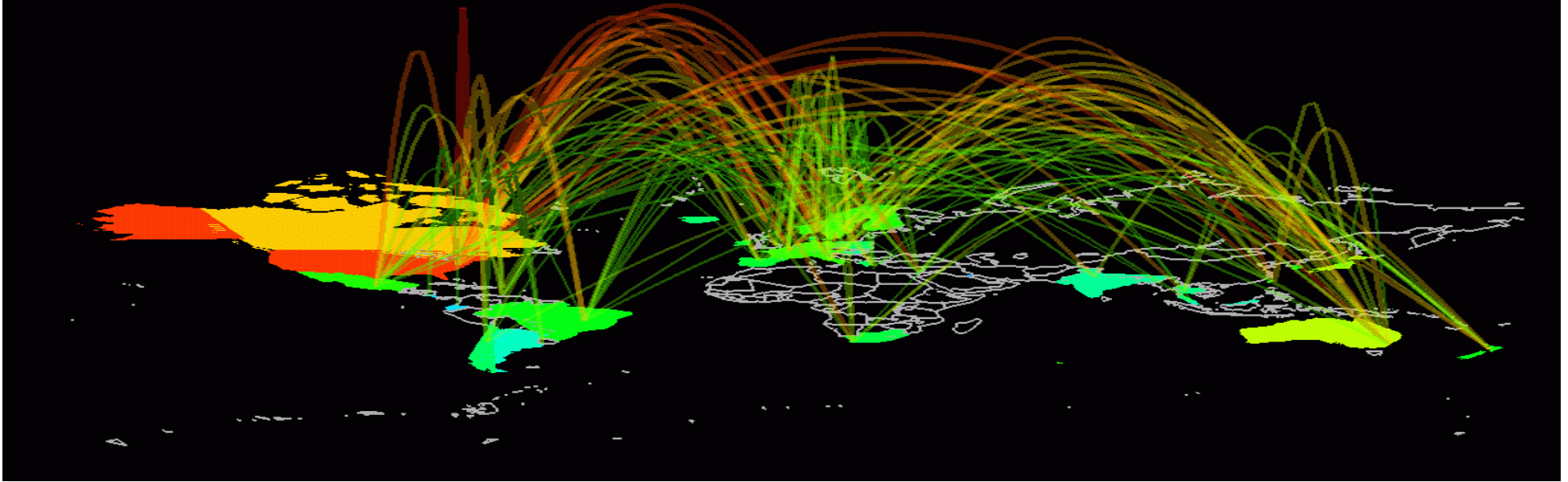QinetiQ

VISUAL: ORGANIZATIONAL STRUCTURES AND PROCESSES TO CATER FOR A WIDE SPAN OF C2 FOR COALITION OPERATIONS

The future of military HQ:
An exploration of the organisational design implications of modularisation

A presentation to the 8th ICCRTS:
Mal Christie, Claire Macklin and Justin Fidock (DSTO)

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) collaborative experiment

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

(JDCC, 2001; Mintzberg, 1979; Phillips and Louvieris, 2002)

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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

(Almen, Anderson, Lagerlof and Pallen, 2000; Kirk, 1999; Marsh and Burke, 2002; Phillips and Louvieris, 2002; Phillips and Louvieris, 2003; Sengupta and Jones, 2000; Symon 2000a, 2000b; The Economist, 2001)

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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!

(Roberts, 1993; Nadler and Tushman, 1997; Sengupta and Jones, 2000; Phillips and Louvieris, 2002; Almen et al 2000; The Economist, 2001; Marsh and Burke, 2002)
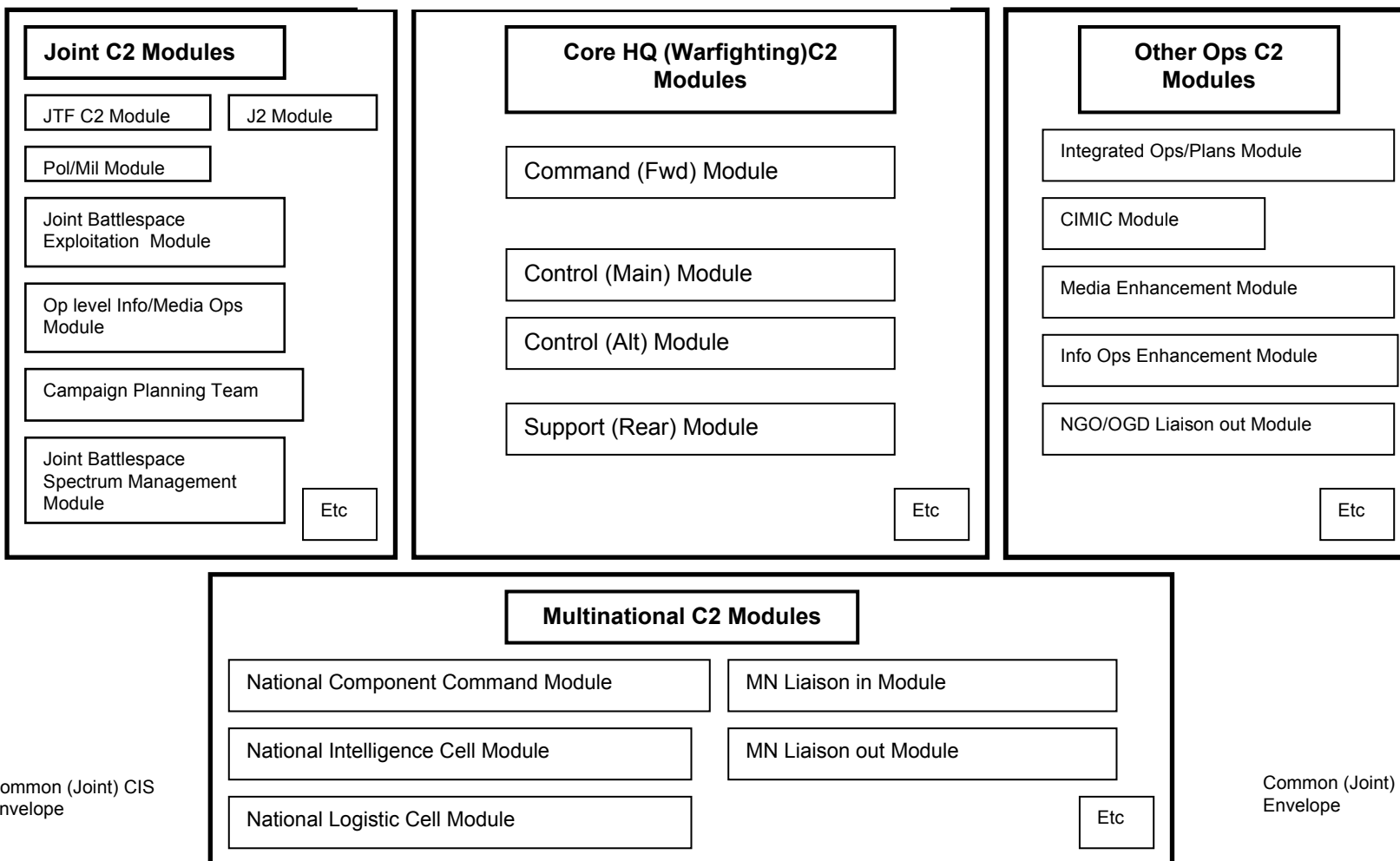
Modular Capability Expansion (MCE)

- 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.

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- Continuing Work

- 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)

- Modular augmentation can be achieved by an MCE system using PNP agents or prior to deployment in the Force Preparation phase
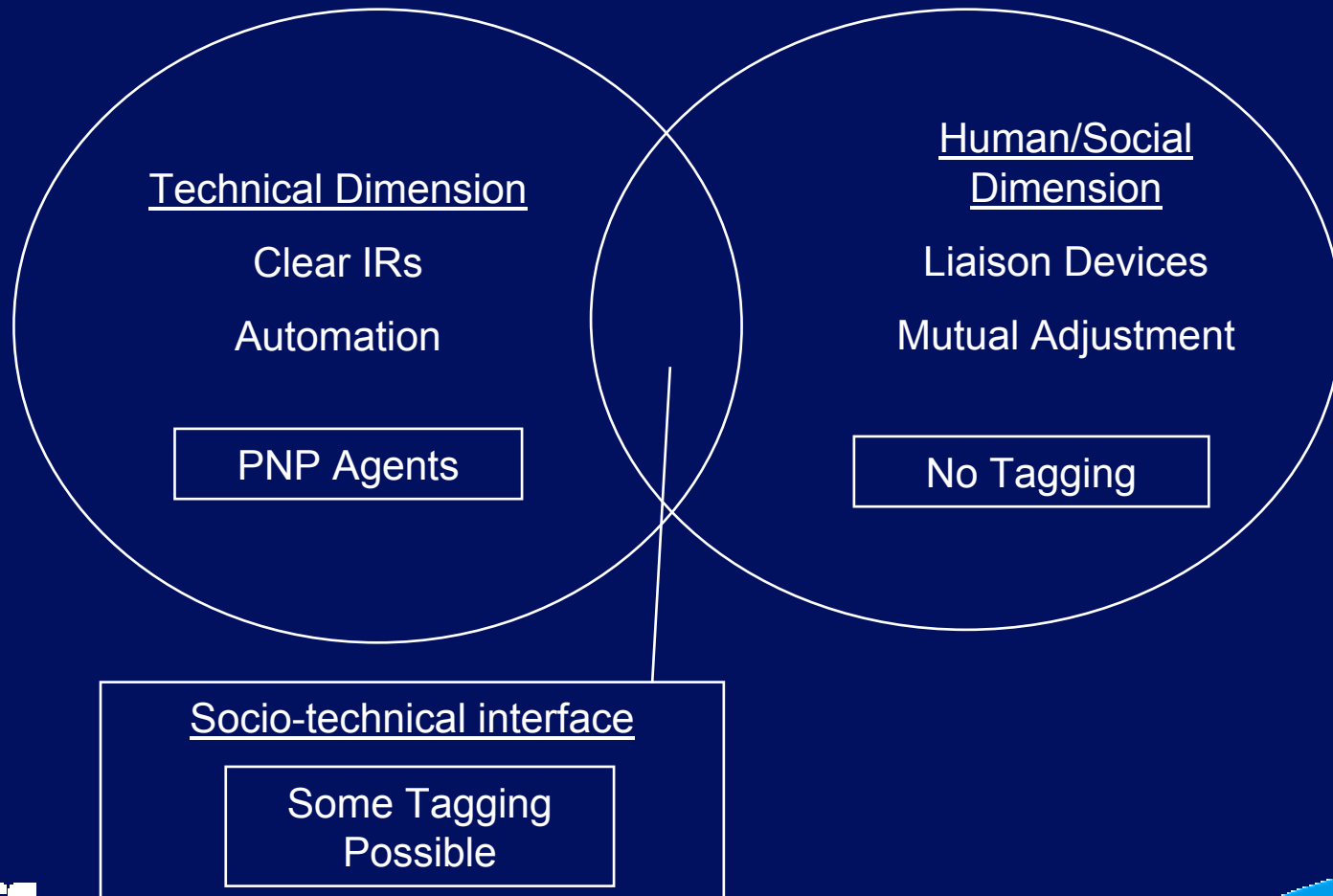
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Generic Modular HQ Structure

Joint C2 Modules

| JTF C2 Module | J2 Module |

Pol/Mil Module

Joint Battlespace Exploitation Module

Op level Info/Media Ops Module

Campaign Planning Team

Joint Battlespace Spectrum Management Module

Etc

Core HQ (Warfighting)C2 Modules

Command (Fwd) Module

Control (Main) Module

Control (Alt) Module

Support (Rear) Module

Etc

Other Ops C2 Modules

Integrated Ops/Plans Module

CIMIC Module

Media Enhancement Module

Info Ops Enhancement Module

NGO/OGD Liaison out Module

Etc

Multinational C2 Modules

National Component Command Module	MN Liaison in Module
National Intelligence Cell Module	MN Liaison out Module
National Logistic Cell Module	Etc

Common (Joint) CIS Envelope

Common (Joint) CIS Envelope

Modularity (Thackray, 2001)

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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.

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Information-mediation function

Technical Dimension

Clear IRs

Automation

PNP Agents

Human/Social Dimension

Liaison Devices

Mutual Adjustment

No Tagging

Socio-technical interface

Some Tagging Possible

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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)

- Customer Deliverable - 30 Aug 02

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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

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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.

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HF issues in MCE - SME interview findings

- <u>Issues & Implications</u>

<u>Organisational</u>	<u>Doctrinal</u>	<u>Cultural</u>	<u>Strategic</u>
Workload & Information Overload	Training for Reachback / Modularity	Delegation of DM	Spectrum of Conflict
SOPs & Generic Interface	Effects-based Assets	Information and Personal / Professional Trust	Manpower / Augmentation
NGO/OGD/IO	Network Deconfliction	Personality of Module Commander	Information Sharing
Brigading	Mission Command	Reachback - Picture 'Richness'	Flattened Hierarchy / Structure
Information Exchange	Media	Attentional Lock	
Reachback 'Connection-Time'		'Cap Badge' Rivalry / Competition	

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ARTD collaborative experiment

- Conducted at the Applied Research Technology Demonstrator (ARTD) between the 2nd -5th December, 2002

- 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

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Experimental design
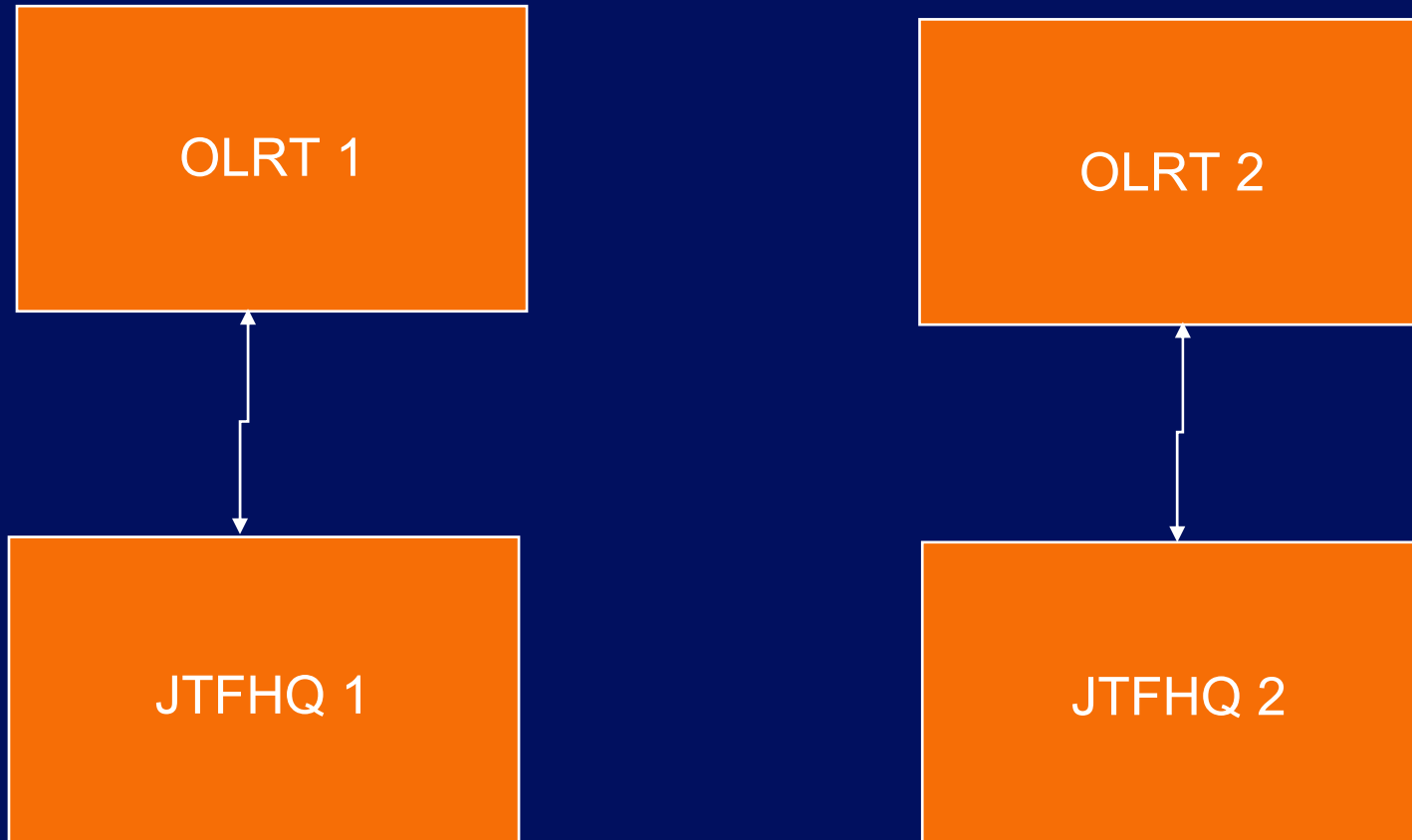
Findings

- 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

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Findings (continued)

- Individuals requiring all relevant information to be displayed at the same time found the screen cluttered and unworkable

- 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

Conclusions

- A modular organisational structure may provide the inherent flexibility / reliability required in a future deployed HQ.

- It provides for HQ either to be concentrated in one location or distributed across the battlespace or to change dynamically between being tactical HQ to operational level as required by the operational environment.

- A module can be a co-located team or a distributed team. For example, it may have one or two members deployed as part of the HQ and the rest of the team located in the rear of the battlespace or back in the UK.

- The role of the module is to support the Commander in his/her operational decision-making activities.

- MCE could provide the training ground and developmental test-bed for Network Enabled Capability

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Modular Capability Expansion (MCE)

Questions

Contact: mjchristie@QinetiQ.com

cmmacklin@QintiQ.com

Justin.Fidock@dsto.defence.gov.au

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