

[dst1]

Scientific Support to the Development of the UK's Future C2 Concept

Georgia Court

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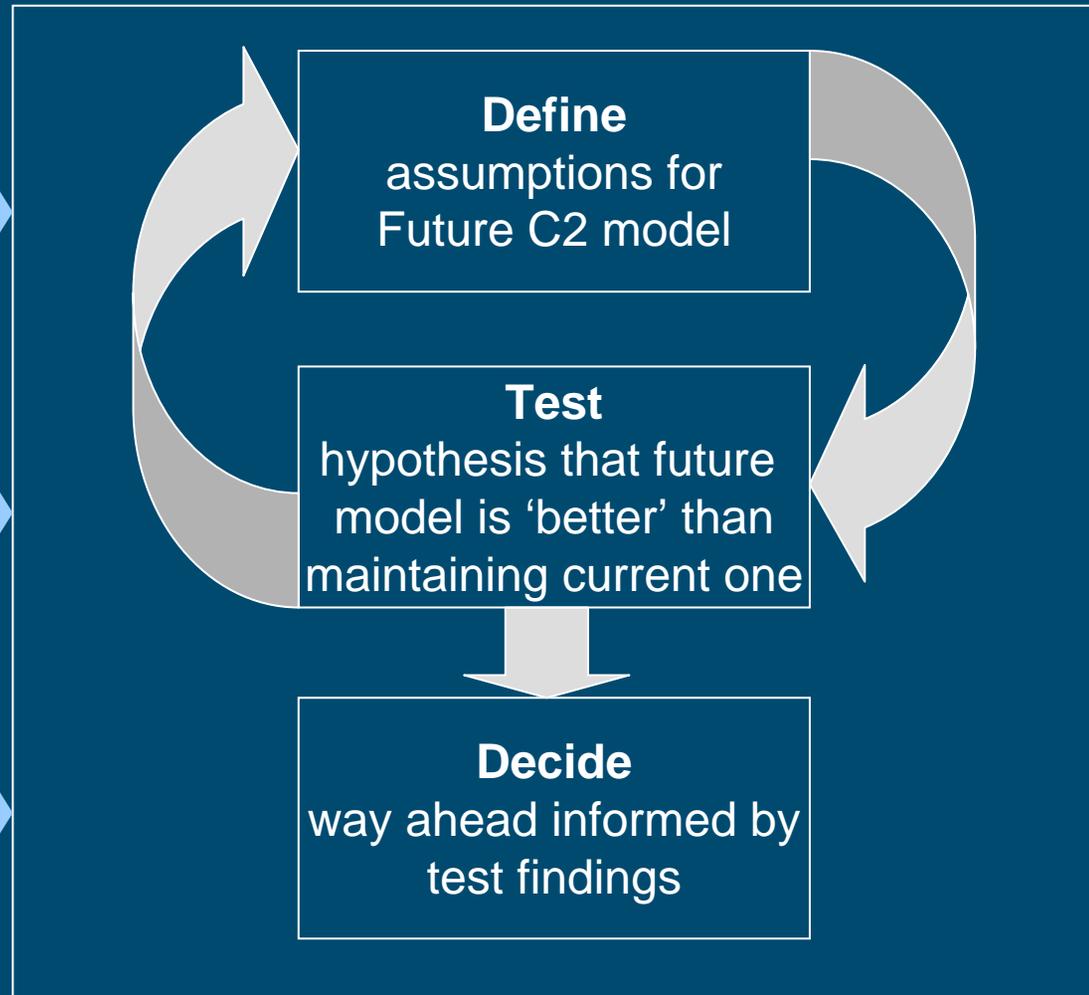
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Background

VCDS
Workshop
1 June 06

Science +
Military
Judgement

Command
Concept



So where do we start testing?

	Commanders & staff co-located (in JOA)	Commanders & majority of their staff separated (but in JOA)
Current Model	Case A	Case B
Task-based Model	Case C	Case D

Initial Cases

Step One: What Evidence Exists?



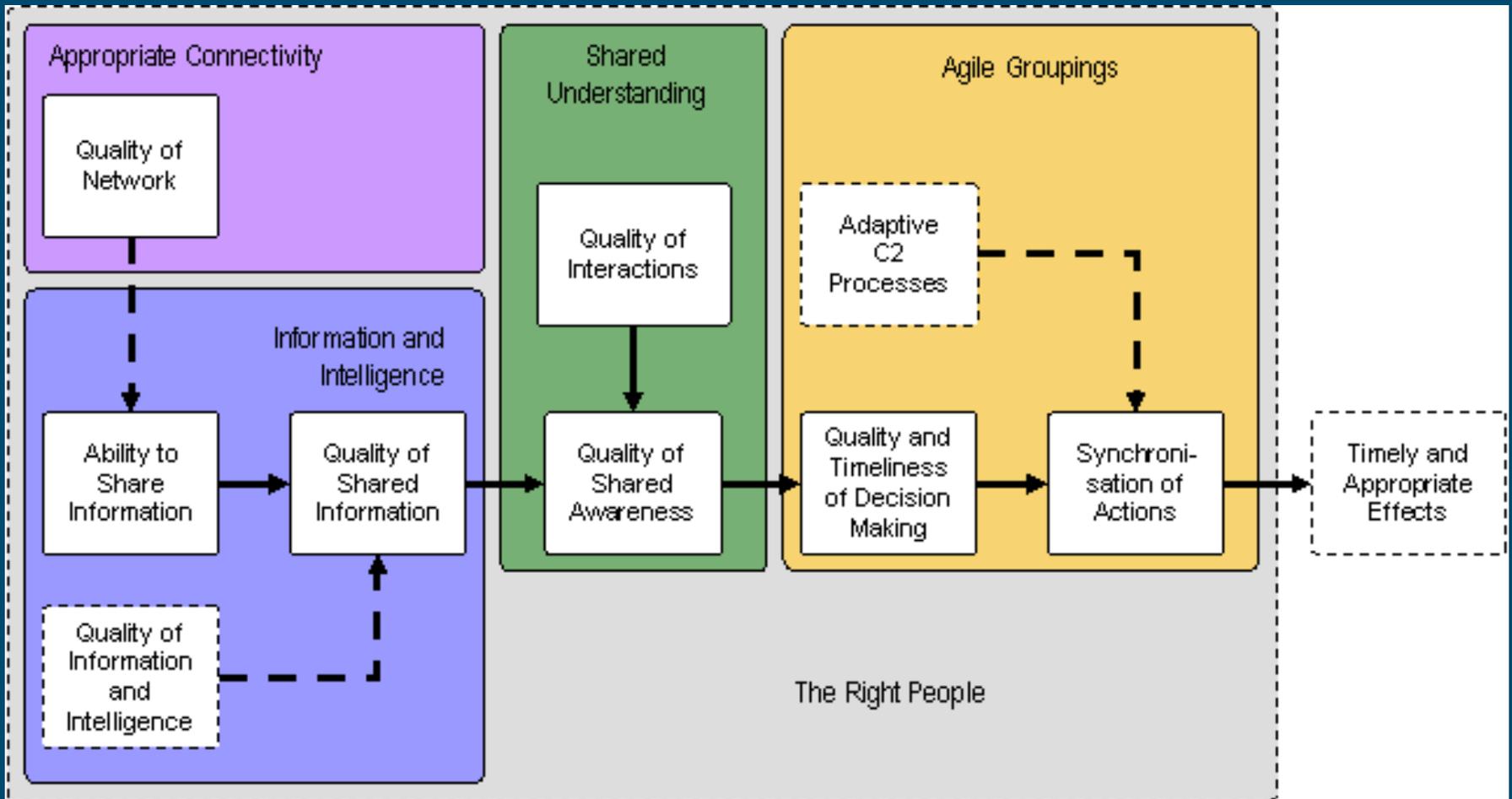
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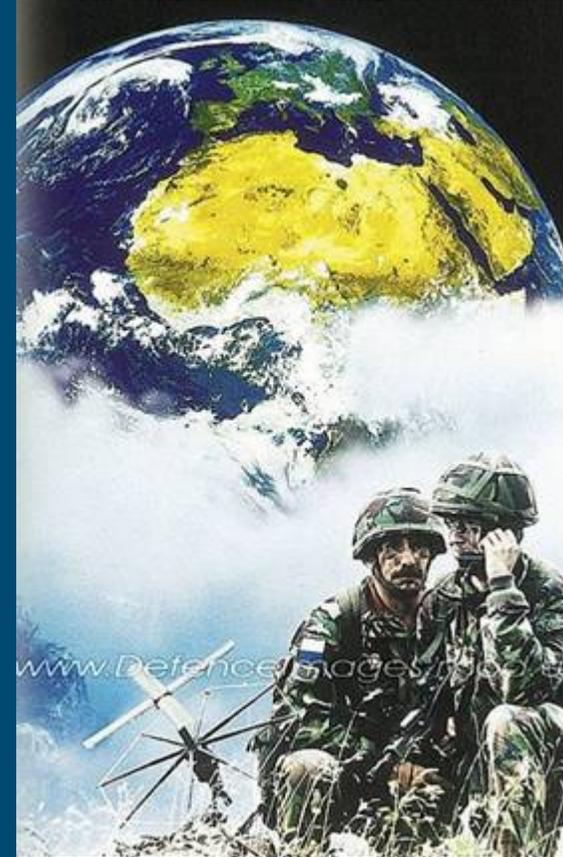
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NEC benefits map



Quality of Network

- An experiment considered separating the JTF Commander from the main HQ. The experiment found a “chat” facility was key for maintaining SA.
 - Importance of informal communications shown elsewhere



Quality of Shared Information

- An experiment considered the effect of information redundancy:
 - enables checks on team members
 - but can lead to everyone thinking someone else is dealing with it
 - high redundancy = more information gathered
 - effects stronger with low cohesiveness



- Experiment separating the Commander from the main HQ found that staff adapted by changing their own information sharing behaviour.

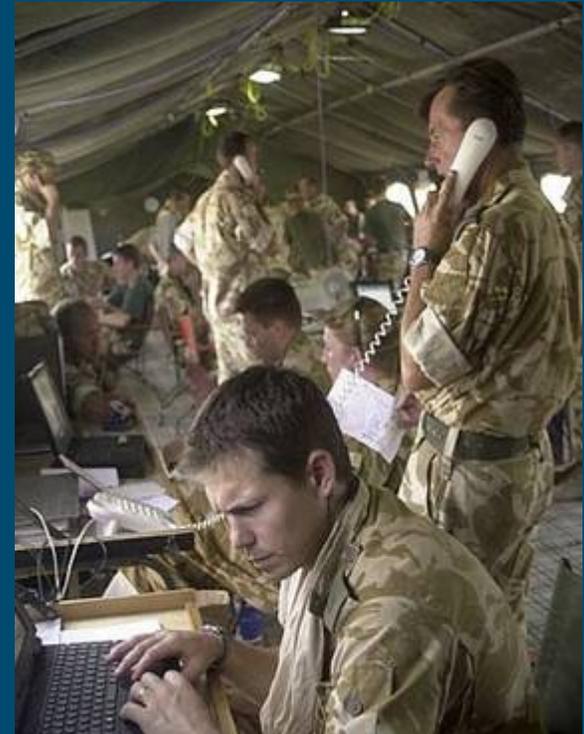
Quality of Shared Understanding

- Separation → differences in SA
- MNE03: proximity was not important in understanding command intent
- Experiment locating commander in forward HQ found:
 - commander's own SA was slightly negatively affected in the case with just one staff officer



Quality of Interactions

- Experiments show that teams with shared mental model perform better:
 - can overcome degraded performance caused by fatigue
 - team can rely on implicit coordination - reducing explicit communication
- Person management skills benefit from face-to-face contact
 - spotting fatigue and stress
 - monitoring and feedback



Quality of Decision-making

- Consensus in team decision making has been found to take twice as long when the team is dispersed



- In 1974, the British Army removed Brigade Headquarters from command structure. This was found to be unworkable because:
 - the span of command was too great
 - communications system unable to support

Agile Groupings

- A study found that the ability to prosecute a high priority target through network-enabled fires using any of land, sea and air systems
 - reduced the time taken to prosecute
 - increased the ability of decision-makers to choose the most suitable assets



Summary of Initial Insights

- Case B: evidence base exists showing:
 - critically dependent on the right connectivity
 - negative impact on Headquarters teamworking
 - effect on understanding of command intent inconclusive
 - workload may increase for Commander
- Case C: Little existing evidence apart from impact of ad-hoc teams and positive aspects of greater agility

Step Two: Testing the Hypothesis



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Cases to test

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Initial Cases

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Initial Cases

Step 2: Testing the Hypothesis (1)

- The hypothesis is “Adopting the options for future C2 are better than maintaining the current one”.
- Interviews with relevant decision-makers identified that a number of high-level questions would need to be answered to test this hypothesis:

Step 2: Testing the Hypothesis (2)

1. Is it better in realising military effect than maintaining the current one?
2. How will this impact on overall future force structures?
3. What is the impact on manpower and training requirements?
4. What is the impact on the shape, number and priority of future C4I equipment capabilities?
5. Will the proposed C2 concept allow the military to operate more effectively in a coalition, multi-agency context?

The Work Programme

- The complexity of the questions requires that a number of different methods are used:
 - Man-in-the-loop wargaming – Qu 1
 - Agent-based modelling – Qu 1
 - Stochastic simulation – Qu 1
 - Spreadsheet modelling – Qu 2
 - Human Science research – Qu 3
 - Constructive simulation – Qu 4

WISE - Wargame Infrastructure and Simulation Environment

- Multi-sided formation level stochastic simulation
- Models land, air, naval units and civilian organisations.
- The model incorporates:
 - Route planning and mobility
 - Direct and indirect fire
 - air defence, air manoeuvre and C3I models

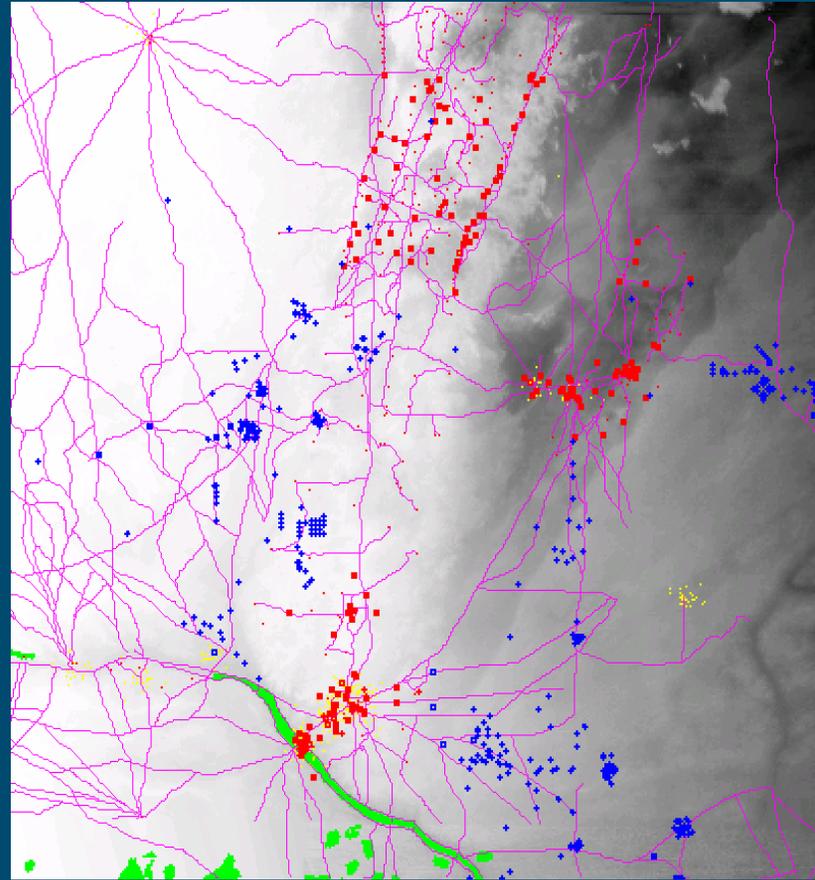


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HiLOCA - High Level Operations using Command Agents

- An agent-based, multi-sided, time-stepped, simulation of conflict
- With the focus on the operational effects of command, control, information and intelligence (C2I2)
- The model operates by simulating entities at the Company / Squadron level



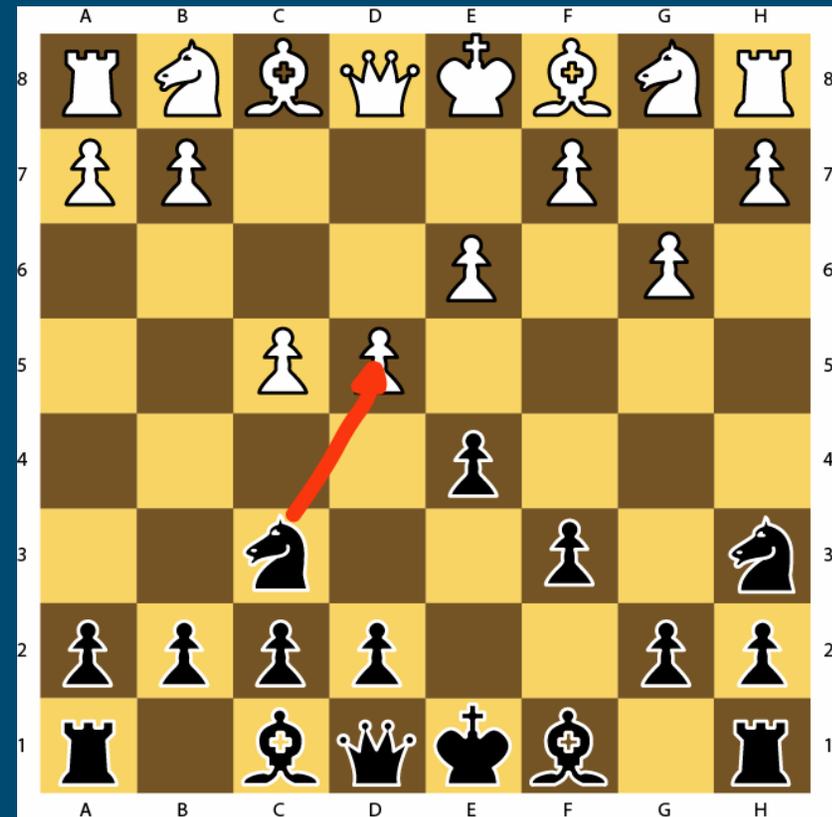
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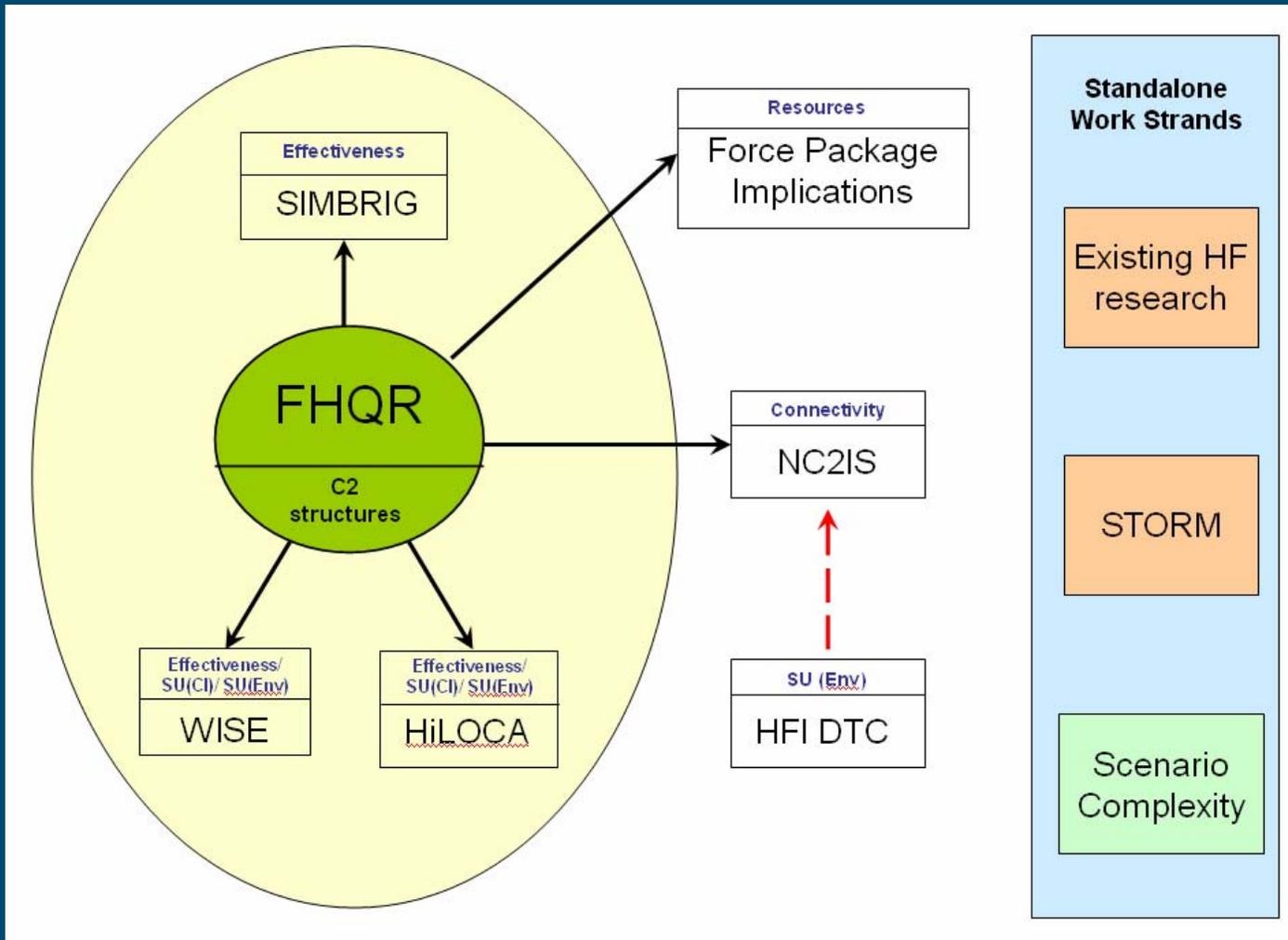
Human Science Research – HFI DTC

- HFI DTC – Human Factors Integration Defence Technology Centre.
- The experimental teamwork task was based on the game chess.
- Each team had 3 players representing Commander and 2 staffs.
- The task required the commander to develop a strategy for winning the game.
- The variable was the type of technology used to facilitate distributed planning, which had four levels.

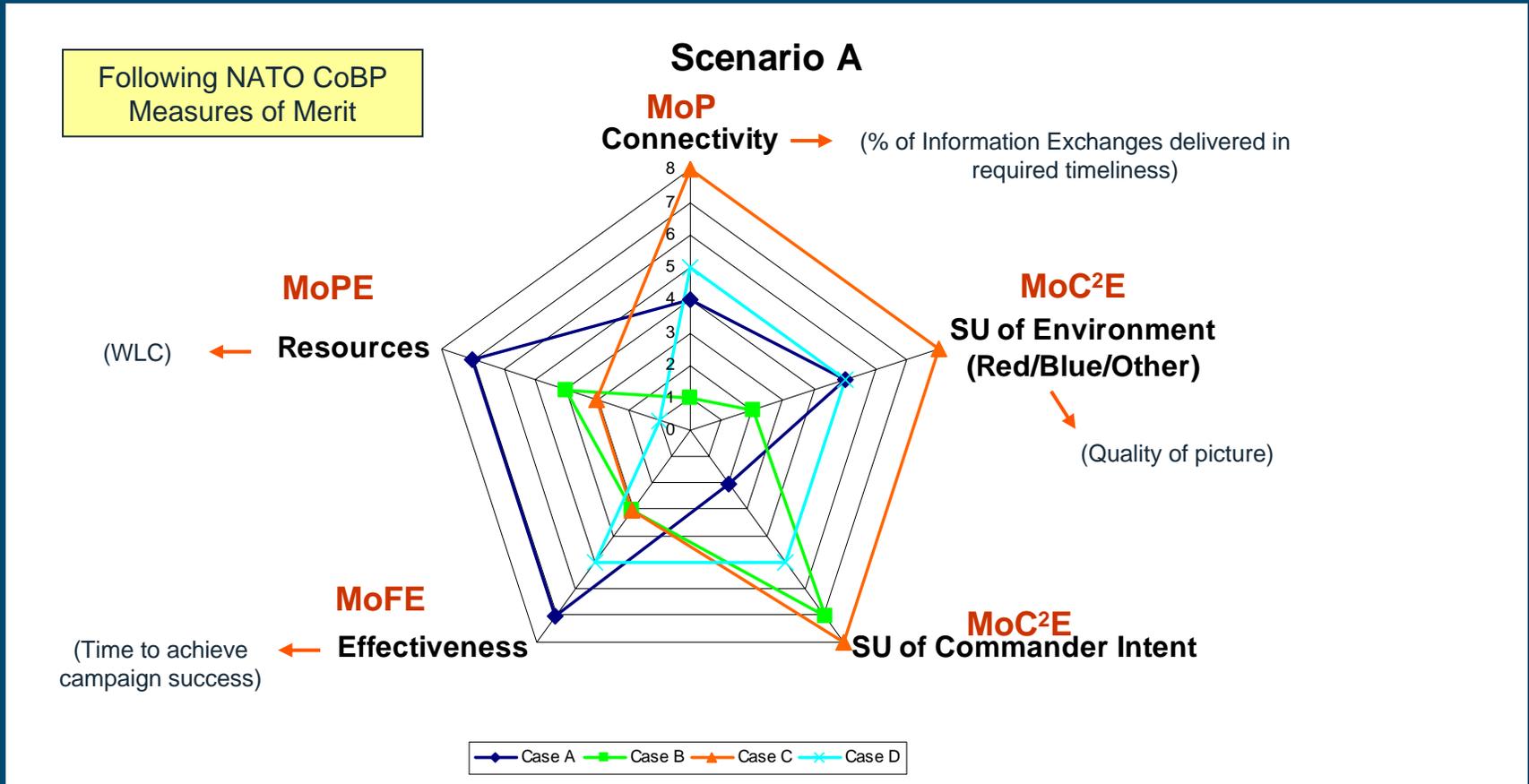
Courses of Action



Creating Coherence



Comparison of cases : Metrics



Scenario Classification

- The majority view from the VCDS – led workshop was that C2 should be designed (and resourced) for the most challenging C2 case.
- A short study has been undertaken to investigate feasibility
- A set of metrics have been developed which could be applied to the set of scenarios:
 - Interoperability
 - Geography
 - Task
- To be taken forward this year

Conclusions

- Making changes to C2 structures is challenging and a multi-disciplinary approach is required.
- A multi-disciplinary programme has been established to provide rigour to UK Command and Control Concept development.