



**AGILE COMMAND CAPABILITY:
FUTURE COMMAND IN THE JOINT BATTLESPACE
AND ITS IMPLICATIONS FOR CAPABILITY DEVELOPMENT**

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Command cannot be understood in isolation. The available data processes technology and the nature of armaments in use; tactics and strategy; organisational structure and manpower systems; training, discipline, and...the ethos of war; the political construction of states and the social makeup of armies – all these things and many more impinge on command in war and in turn are affected by it.²

Martin van Creveld, Command in War

ABSTRACT

The paper defines the Ministry of Defence (MoD) requirements for Future Command³ within the context of the United Kingdom's (UK) Joint Higher Level Operational Concept (HLOC). It defines a course of action for the development of Future Command and offers a baseline against which appropriate Balance of Investment (BoI) decisions can be made, both within and across Lines of Development (LoD). The analysis is set within the context of prior and current work on Effects Based Operations (EBO), the capability components of 'Command', 'Inform' and 'Operate' within HLOC, and technologies associated with Network Enabled Capability. The approach adopted

¹ With thanks to Brig Neil Baverstock and Cdr Mark Allibon for their input to earlier drafts.

² Van Creveld, M (1985) *Command in War*, Harvard University Press.

³ Command is defined as the 'authority vested in an individual for the direction, coordination, and control of military forces'. British Defence Doctrine (Second Edition), JWP 0-01, October 2011. The paper considers Command at the level of the Joint Force Component Commander (JFCC), the Joint Task Force Commander (JTFC) and the Joint Commander (JC), although much of the analysis is relevant to other levels of Command, particularly for the Land component down to Battle Group (BG) level.

focuses on those factors that determine Decision Superiority, including the human, organizational and cultural dimensions of command, and how these factors will be impacted by the demands arising from the changing military context. Mission Command is taken as an enduring element of Defence Doctrine. However, the concept acknowledges that the principles of Mission Command need to find new expression in the information age and that the way of command will adjust to the digitised era with new disciplines, structures and battle-winning capabilities.

INTRODUCTION

1. Recent defence analysis has highlighted the changing geo-political, military and technological environments and the consequent need for the MoD and the Armed Forces to develop new operational concepts, new systems and new ways of working.⁴ Within the context of this strategic thinking, a number of important new concepts and initiatives are currently being matured.⁵ Many of these developments have significant implications for the way command will need to be exercised. (see Annex A).⁶

2. The future network enabled force will be composed of highly responsive, well-integrated and flexible joint force elements that possess the ability to conduct effects based operations. In particular, the mixture of capability components will mean that even the lowest tactical level operations will be viewed as truly joint activities regardless of the environment in which they take place. The key challenge will lie in looking and planning ahead, and then providing the Command, Control and Communications (C3) required to achieve the desired effects in the contact battle in a timely manner. A future, more agile, command capability should allow commanders at all levels to lead, to make decisions and to execute their plans more effectively.

3. Mission Command will remain a key element of British Defence Doctrine and rests on the adoption of five basic principles that must now be interpreted in light of the demands of the network era: unity of effort; freedom of action; trust; mutual understanding; and timely and effective decision making.⁷ The human component, including the role of will and determination, is a central and dynamic element in the conduct of command.

BACKGROUND

The Future Battlespace

4. Analysis supporting the UK's Defence Strategy Guidance suggests that there has been a significant change over the past 15 years in operational tempo from intermittent, moderate scale of operations to (effectively) continual, concurrent small and medium scale contingencies. Further, terrorists or other non-state actors now pose the possibility of asymmetric attack on UK strategic and operational Centres of Gravity across a wider battlespace.⁸ Trends derived from recent

⁴ Strategic Defence Review (SDR, especially the New Chapter), the UK Joint Vision (JV), the UK Joint High Level Operational Concept (HLOC) and the Defence Strategic Guidance 03. Lessons Learned from Operation TELIC (the UK contribution to Operation Iraqi Freedom) were also reviewed.

⁵ These concepts and initiatives include Effects Based Operations (EBO), Network Enabled Capability (NEC), Agile Mission Groups (AMGs), Decision Superiority and Tempo, Information Exploitation (IX) and the Joint Operations Picture (JOP).

⁶ This list of factors in the future British approach to operations is taken from Joint Vision 2015.

⁷ British Army Doctrine Publication, Volume 2, Command, DGD&D/18/34/51, April 1995.

⁸ Land, Sea, Air, Time, the Electro-Magnetic Spectrum (EMS) and Computer Generated Space.

operational experience indicate that that UK Armed Forces will need to continue to undertake a wide range of operations from peacekeeping and counter-terrorism to power projection and deliberate intervention. The new challenge being that the full range of operations may take place simultaneously in the same battlespace.⁹ *An unpredictable strategic environment, therefore, demands a different approach to security that is predicated on the concept of operational agility. There is a compelling need to adapt to the new environment by moving away from forces that are physically and conceptually heavy, relatively inflexible and strategically immobile, toward more agile forces.*

5. UK Joint Vision seeks to realise the full potential of the Manoeuvrist Approach¹⁰ and articulates EBO – which seeks to create effects across seven dimensions of the strategic environment¹¹ – as the best way to achieve this. Currently, commanders make decisions based, inevitably, on assessments derived from incomplete information sets and in an environment of deception, error and ‘data deluge’. Intelligence theory and practices are brought to the process to increase certainty and confidence as far as possible. *Therefore, if EBO is to be conducted successfully, intelligence and information requirements need to be identified early and used to drive information collection and processing capabilities that could be applied to the delivery of valid and timely assessments. Intelligence capability is a pivotal part of command capability and will require investment.*

6. EBO has further implications for command. In the future, commanders can expect to receive more direction from Government, together with more finely defined Rules of Engagement (ROE). *Commanders will need a broader range of capabilities to deliver effects and they will need to synchronise these capabilities to achieve effects in both the cognitive domain (against will) and the physical (kinetic) domain. The impact of military force in any situation will need analysis of 2nd order unintended consequences which will require the exploitation of a complex, multi skilled analytical capability, probably accessed via ‘reachback’.*

Emerging Technologies

7. UK Armed Forces plan to exploit technological advances focussed through the adoption of an NEC that intends to link sensors, decision makers and weapons systems so that information can be rapidly translated into synchronised joint operations to achieve required effects.¹² Shared Situational Awareness and a widely shared Command Intent¹³ are intended to encourage force elements to grasp fleeting opportunities, across environmental and functional boundaries, with reduced possibilities for fratricide and collateral damage. *However, this will require high quality leadership to ensure that the complexity of the networked environment does not obscure lines of*

⁹ 'In one moment of time, our service members will be...providing humanitarian assistance,...peacekeeping [and] fighting a highly lethal mid-intensity battle. All in the same day, all within three city blocks'. Gen C C Krulak, Comdt USMC.

¹⁰ An approach which calls for doing the unexpected and exploiting initiative and originality, combined with a determination to succeed.

¹¹ The seven dimensions are: economic; political; military; technological; socio-cultural; physical; legal, ethical and moral. EBO requires that effects are applied across seven dimensions of the strategic environment by using each of the Instruments of Power: Diplomatic, Military and Economic.

¹² D/CM(IS)2/1(106/02) dated 29 May 02.

¹³ A style of command that seeks to convey understanding to subordinates about the intentions of the higher commander and their place within his plan, enabling them to carry out missions with the maximum freedom of action and appropriate resources.

accountability and the impact of a commander's will does not become diluted across a distributed 'virtual' force. It will also require that the commander balance the competing demands of empowering all levels of command, and retaining suitable control protocols. Within Mission Command, it is recognised that freedom of action is occasionally constrained, but that if this occurs on a regular basis it causes disruption to the longer-term efficiency of the force.

8. Technologies are developing that offer the potential to support 'Command', 'Inform' and 'Operate' capabilities.¹⁴ However, exploitation of technology must be balanced with appropriate changes to doctrine, structures and training. Although technology is rapidly delivering more information to commanders and staffs the processes needed to manage this information have not kept pace.¹⁵ *If technology is to be successfully exploited and the benefits offered by NEC realised, it will be necessary to prevent commanders and their staffs being swamped by information and, therefore, appropriate information management principles, practices and organisational structures may be required.*

9. Potential coalition partners will have technological capabilities that will range from those who stay abreast of United States (US) Transformation, through those who retain some form of interoperability, to those who do neither. It is also likely that many non-military organizations with which UK Armed Forces need to operate in the battlespace will not have compatible capabilities. *Therefore, whilst technological interoperability is a major issue, commanders must be sensitive to the cultural, structural, procedural and training issues that will significantly influence the effectiveness of all organizations involved in joint or combined operations.*¹⁶

FUTURE COMMAND AGILITY

The Agile Commander

10. The UK's Defence Strategic Guidance notes that the main threat to UK security lies in a strategic environment that will change faster than the UK can or will acquire and apply resources to meet the threat. The HLOC, therefore, recommends a forward-looking posture underpinned by an ethos of agility, optimum tempo and persistence. Agility is characterised by *four* key attributes for which Armed Forces will be trained, organised and equipped: responsiveness, robustness, flexibility and adaptability. The emphasis on agility and tempo requires commanders to have the confidence, flexibility and access to intelligence to exploit fleeting opportunities, and allow subordinates the freedom of action to use their initiative. *Agility in the operational environment also requires agility in the competences and functions of Command.* That is, an 'Agile Commander' must possess the skill, knowledge and understanding to be responsive, robust, flexible and adaptable if his forces are to display these attributes too. The infrastructure (including processes) to support the commander must be built to reinforce these characteristics. In addition, agility also requires the Commander to have the capacity to reflect on his aims, methods and command style, and demonstrate creative thinking in order to formulate a course of action that retains the element of surprise.

11. The core competences that an agile Commander must demonstrate include:

¹⁴ HLOC, op. cit.

¹⁵ The Information Management challenge is about to overwhelm us. V Adm M Stanhope, DCINC FLEET, at the Fleet Study Period, Maritime Warfare Centre, 26 Nov 02.

¹⁶ Interoperability for Joint and Coalition Operations, Clark, T and Moon, T, ADF Journal No 151 Nov/Dec 01.

Those specified in HLOC:

- a. **Responsiveness:** the speed with which the commander reacts to a change in the environment relative to potential or actual adversaries.
- b. **Robustness:** the degree to the commander remains effective under arduous conditions and is able to protect his, and his staffs', decision action cycle against interference/interruption from the enemy.
- c. **Flexibility:** the capacity of a commander to avoid foreclosing options at too early a stage in planning.
- d. **Adaptability:** the aptitude of a commander to learn rapidly about new environments, especially when faced with the unexpected, to recognize the need for change and have the capacity to change.

Plus two additional competences:

- e. **Innovation:** the capacity of the commander to think laterally, to remain open-minded and develop novel interpretations of the situation, out of which creative courses of action can be generated.
- f. **Self-reflection:** the ability of the commander to reflect on his aims, methods and command style, and the degree to which he is open to change (learning).

12. Although these attributes are usually discussed in relation to the agility of mission groups, they must above all be embodied in the commander himself. Agility in operations can only take a particular form and achieve particular effects if the commander has first conceived them.

Recommendations

[1] The selection, appraisal, career paths and training of future commanders must be defined by the requirements of agility – responsiveness, robustness, flexibility, adaptability, innovation and reflection.

[2] Revised concepts, doctrine and procedures must be incorporated into Collective Training at the tactical and operational levels.

[3] Agile Commander and key supporting staff competences need to be developed, which requires the development of competence frameworks, the implementation of Training Needs Analysis and delivery of effective training and development programmes through the Joint and single-Service providers of Command and Staff Training and Warfare Training.

AWARENESS AND UNDERSTANDING

13. Situation Awareness (SA) is the understanding of the operational environment in the context of a commander's (or staff officer's) mission (or task).¹⁷ At a given level of command, SA requires aggregated information provided by subordinate commanders and appropriate Intelligence, Satellite, Target Acquisition and Reconnaissance (ISTAR) assets, which are supplemented by

¹⁷ British Defence Doctrine (Second Edition), JWP 0-01.1.

appropriate reference material. The capability needed to produce and share information to support SA currently varies by Service and by level of command. This brings penalties when working with allies as the probability of fratricide is partially dependent upon the ability to exchange information on the location of own forces effectively. For example, a UK division working alongside a US digitised division today may be as much as an hour behind in its display and interpretation of the current situation.¹⁸

14. Research shows that SA depends on assimilating available information in the context of appropriate mental models, training and experience.¹⁹ In particular, SA depends on how well information systems support activities in the cognitive domain: firstly, the *perception* of the status, attributes and dynamics of relevant elements in the environment; secondly, *understanding* what the elements mean in relation to goals and objectives; and thirdly, *predicting* how those elements will behave in the future. Information displays need to allow commanders rapidly to assimilate relevant information and analyse patterns and trends from past events. The ability to move back and forth in time within the information domain will enable commanders to make better sense of situations and the potential consequences of their actions.

Shared Situation Awareness

15. Agility also requires high levels of Shared Situation Awareness, whereby force elements achieve a common (or consistent) understanding of both the operational level context and the prevailing tactical situation. The basis of shared situational awareness will be a joint blue force tracking system that will allow friendly forces a high degree of certainty of own force disposition, status and intentions, fused with information acquired for adversaries and neutrals. Shared Situation Awareness will be a major contributor to Decision Superiority and requires information to be integrated across echelon, component and function. The Joint Operations Picture (JOP) is a foundational step towards achieving Shared Situation Awareness and provides the opportunity to exchange information with decision makers that would otherwise lie outside conventional communications channels.²⁰

16. However, given the possibility for different interpretations of an operational situation by decision makers, providing access to a Common Picture is only part of what is needed to deliver Shared Situation Awareness. Relevant training, doctrine and experience are required in order to foster a common frame of reference. Modern information tools must be developed that can optimise the presentation of information to decision makers and quality of interaction across the Information Domain.²¹ Human Factors Integration Programmes need to heavily influence the requirements for and design of any future situational awareness tools.

¹⁸ See Enabling Information Exploitation in Operations: Strawman Concept Paper. D/DG INFO/11/5/7/6/1.

¹⁹ Endsley, M.R. (1988) Design and Evaluation for Situation Awareness. Proceedings of the Human Factors Society 32nd Annual meeting. Santa Monica, CA: Human Factors Society.

²⁰ The JOP should provide a variety of visualisations of the operational information set e.g. access to shared application documents in application folders, via web pages, and via geo-spatial picture sets by drilling into symbols and seeing associated documents.

²¹ Hayes, Alberts et al.

Mutual Understanding.

17. The unambiguous expression, widespread distribution and clear mutual understanding of command intent are critical enablers for agility. Commanders can express their intent explicitly in the information domain using words and pictures. However, the information domain cannot capture all the subtle nuances of face-to-face communication and there is always much hidden beneath explicit intent; any overt order, no matter how meticulously stated, contains a vast network of additional or implicit intent.²² Implicit intent arises from personal expectations based upon style and experience, military expectations based upon training, doctrine, tradition and ethos and cultural expectations based upon societal values and cultural norms.

18. Collaborative processes may have a role in supporting the mutual understanding of Command Intent and help force elements seize fleeting opportunities without detailed forward planning. Experimentation will need to help establish the degree to which collaborative planning is helpful or a distraction; does it, in fact, foster more powerful peer-to-peer relationships and more rapid exploitation of information.²³ As Multinational Experiment 3 (MNE3) has showed, collaborative planning requires stable networks and significant bandwidth and does not necessarily guarantee shared situation awareness.

19. Collaborative planning will, therefore, need core direction, procedures and control protocols, which entail the development of appropriate doctrine supported by the delivery of improved training. Consequently, commanders at all levels are likely to need Information Age skills. Suitable collaborative planning tools²⁴ (including those in support of Campaign Planning) will need to be carefully designed which take a balanced approach to the use of audio and video conferencing facilities, graphical tools and email.

Recommendations

[4] Core direction, procedures and control protocols for collaborative planning need to be defined at the tactical, operational and military strategic levels, in joint and multinational contexts.

[5] Devices, technologies and applications must be specified, designed and developed that support collaborative planning and consultation.

[6] Appropriate, non-equipment aspects of situational awareness, including procedures and training, must be established to improve Combat ID and enhance combat effectiveness.

[7] Appropriate structures and procedures must be created to maximize the situational awareness and collaborative planning that will enable the co-ordination and prosecution of Joint Fires.

²² Command Intent, Ross Pigeau and Carol McCann, Defence and Civil Institute of Environmental Medicine, Toronto Canada

²³ USJFCOM emerging recommendations 17 Oct 03.

²⁴ Such as the Shared Awareness and Joint ISR management tools in emerging US Joint Fires software.

INFORMATION EXPLOITATION

20. Information exploitation (IX) arises from the sharing and use of information to support a commander's situation awareness, planning, decision-making and the coordination of desired effects. The philosophy of IX requires that information is treated as a domain in its own right requiring organisation, core processes and dedicated resources.²⁵ As a result of improved or evolving IX, the future commander will be better able to co-ordinate actions in order to achieve the desired type, sequence and scale of the effects.

21. IX satisfies commanders' information needs through integrated Information Management (IM) processes and services that enable collectors, producers and users to store, locate, retrieve and transfer information in a manner consistent with the commander's mission. The relationship between IX and IM is represented in **Figure 1**. A commander's Key Information Requirements in support of situation awareness, decision making and planning may be defined in terms of the three widely known dimensions of information: richness, reach and quality of interaction or how well information is passed between nodes in a network.²⁶ These attributes provide a representation of future information requirements (the degree of richness), who that information needs to be shared with (how far it must reach) and how it should be conveyed (the desired quality of interaction).²⁷ Collaborative information environments should, therefore, be measured by the degree to which exchanges are interactive or reciprocal and enrich information as individuals contribute to the process.

Intelligence Requirements

22. If EBO is to be conducted successfully, intelligence requirements need to be identified early and used to shape the *direction, collection, processing* and *dissemination* of intelligence so that valid and timely assessments can be delivered.²⁸ Indeed, the development of an appropriately resourced Intelligence Preparation Process, supported by a full intelligence cycle, would optimise commanders' ability to anticipate and deal with likely scenarios. During the initial phases of Operation 'TELIC' (the UK contribution to Operation Iraqi Freedom), approximately 90% of Intelligence was generated in-theatre and this, therefore, raises the question of where the weight of effort for gathering intelligence should be directed (forward or through reachback).

23. In order to determine whether the desired effects have been achieved there is a requirement for measures of effectiveness that assess both physical and behavioural effects. However, it is quite likely that even with a well-developed NEC, the measurement of behavioural outcomes will be difficult and unreliable. Within the context of EBO, intelligence requirements will not only need to address infrastructure analysis, military capability and environmental data, but also more detailed insights into key attributes of allies, neutrals and adversaries, including as culture and value sets. For example, those values held by an individual, group, organisation, regime or nation, which form

²⁵ Emerging lesson from joint experimentation, USJFCOM 17 Oct 03.

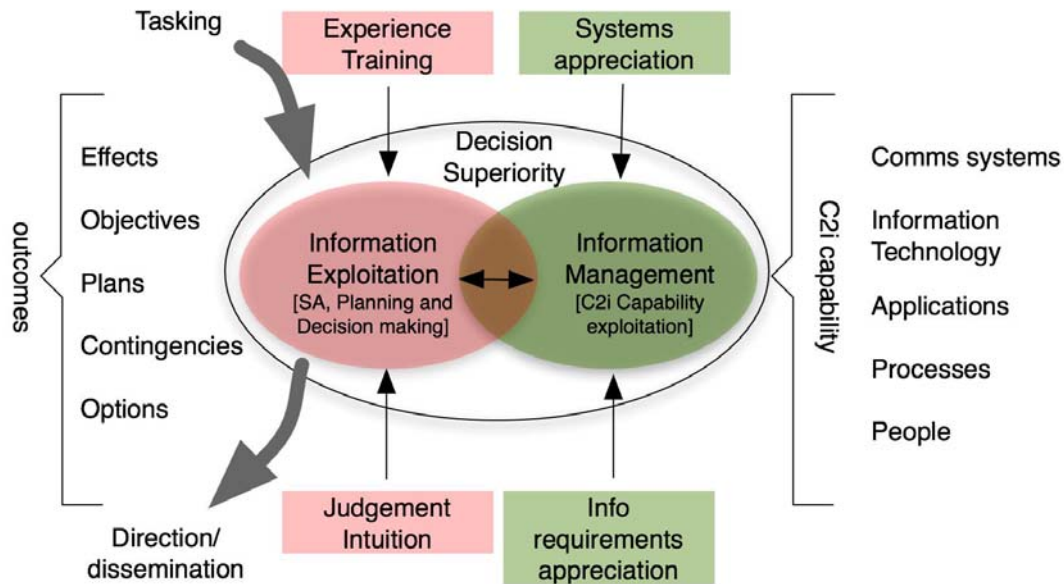
²⁶ Dimensions drawn from Alberts, Garstka and Hayes 'Understanding Information Age Warfare', DoD Command and Control Research Programme, Aug 01.

²⁷ See Boisot, M (1998) Knowledge Assets: Securing Competitive Advantage in the Information Economy, Oxford; Boisot, M (1995) Information Space: A framework for Learning in Organisations, Institutions and Culture, Routledge.

²⁸ JWP 2-00 Aug 99. This defines information analysis as a step in the processing phase in which information is reviewed in order to identify significant facts for subsequent interpretation. Integration is an additional step in processing where analysed information is selected and combined into patterns.

the basis of their strategic Centre of Gravity. This involves understanding a potential adversary's psychology, plus the formative factors – cultural, religious, ideological, historical, economical and political – that determine his intentions, objectives and modus operandi.²⁹

Figure 1: IX-IM in support of command³⁰



24. However, traditional methods of analysis and modelling are biased towards the measurement and assessment of kinetic and attritional actions; essentially the current Battle Damage Assessment process. Therefore, future Intelligence, Surveillance and Reconnaissance (ISR) collection and analysis capabilities need to support both qualitative and cognitive assessments if behavioural outcomes are to be properly evaluated.³¹ This will need information to be gathered on reliable secondary and tertiary indicators of behaviour. Campaign Effectiveness Analysis (CEA) may provide a suitable framework for achieving this, within which ISR capabilities must provide robust evidence that the campaign is achieving the strategic aim, accepting that the achievement of cognitive effects is exceptionally difficult to measure and therefore may have to be probabilistic by nature.

Information Communities

25. The battlespace will be configured for efficient information sharing by identifying information communities within which information flows are matched to reflect different needs as well as the capacity of each entity to handle information. Experimentation shows that such communities

²⁹ JDCC Potential Generic Adversary project, Mar 03.

³⁰ Adapted from "Developing Information Exploitation and Information Management Competencies for the NEC Era", Oct 2003.

³¹ 'Integrated assessment and strike processes are required to understand and achieve desired effects.' Exercises PI03, UQ03 and Operation Iraqi Freedom Lessons from USJFCOM interim assessment Oct 03.

rapidly coalesce and adapt as operations develop.³² Currently, data is gathered, analysed and distributed to points of interest determined by information exchange requirements, conditioned by security protocols. However, in order to realise the concept of operational agility, there is a need for more lateral communication paths to enable better peer-to-peer interaction.

26. HLOC suggests that a realistic interim solution is a layered, but interoperable network³³ comprising: a virtual real-time high fidelity and low latency network for target acquisition; a lower fidelity and higher latency near real-time network for control, battlespace management and shared situational awareness at the tactical and operational levels; and shared situational awareness networks at the operational and strategic levels of command that could work with relatively high data latency. The interoperability framework will comprise *structured* elements including pre-configured information communities – sensor, shooter and decision maker groups – and *dynamic* elements including self-forming, cross-component and cross-function communities. Information communities may also embrace coalition partners, Other Government Departments (OGD), Non-Governmental Organisations (NGO) and International Organizations (IO).

27. The initial composition of these communities may be determined, in part, by the Effects Based Planning process and the command process; each community could be primed by an intelligent push of information relevant to its function. However, commanders will continue to need a mix of ‘smart information pull’³⁴ and ‘dependable push’ supported by high-capacity, real-time information exchange mechanisms. The role of networking and browser technology will need to be explored in order to determine how well it provides for more intuitive information search, ready access to wide information networks and better visualisation techniques.

Recommendations

[8] EBP procedures and the emerging CEA framework, including the use of Measures of Effectiveness, need to accommodate the assessment of both physical and behavioural effects.

[9] The co-ordination, command and control and dissemination of the product of ISR assets within a NEC environment must be optimized to deliver timely and valid assessments.

[10] A dynamic, reconfigurable JOP with appropriate IM tools needs to be delivered that allows the requirements of different levels of command to be met.

DECISION MAKING

Dealing with Equivocality

28. Without further technological developments, NEC is unlikely to achieve a reliable and resolved operating picture with high fidelity.³⁵ Indeed, a networked picture is always likely to be an

³² Communities of interest self-configure very rapidly once information starts circulating around a network. Vice Admiral Cebrowski, Personal communication to JDCC, Head of the US DoD Office of Transformation.

³³ J2CSS Paper: ECC(CCII)/TACCCBM/10/02/01/02/02 dated 1 Sep 03.

³⁴ This process has been referred to as “a selective searchlight in a sea of information”. Builder, C.H. et al. *Command Concepts: A Theory derived from the Practice of Command and Control*, RAND report, MR-775-OSD, 1999, page 12. With suitable context, individuals find it easier to access relevant information.

³⁵ Without breakthroughs in antenna technology, battlespace spectrum management and airspace control.

approximation of reality, because it will be out of synchronisation with real events and contain contradictory information. Mission Command is a recognition of this. In the NEC era, commanders will continue to need the competence to exploit their *knowledge* and *intuition* in order to develop an understanding of a chaotic, non-linear, battlespace of varying resolution.³⁶ Commanders will continue to need to deal with ‘equivocality’ and demonstrate an intuitive ‘feel’ for the precise moment at which the battlespace is sufficiently resolved to make effective decisions.

29. Given the breadth and depth of information likely to be available to the future commander a key issue is how best to present information to best support Decision Superiority.³⁷ Tempo must always be viewed as 'speed within context'; in certain operating environments it may be best to pick the correct time to act rather than speed of acting. Moreover, optimum tempo could be deliberately slow. Research, including evidence from military exercises, suggests that under conditions of uncertainty and time pressure, decision makers engage in a rapid, intuitive-based decision-action cycle.³⁸ This decision-action cycle involves recognising ‘patterns’ in the operational situation, identifying typical actions with which to react and testing courses of action through mental simulation. This is shown in **Figure 2**. The process requires the use of mental models, conditioned by training, doctrine and personal values, to develop a picture of how the current situation might evolve over time. In so doing, the commander develops his understanding when he is able to draw inferences about the possible consequences of a situation and predict future patterns.

Consultation

30. Complex military decisions are made by the relevant commander and are a result of interaction between groups of participants. Relatively small numbers of contributors (for example, an inner circle) who have different backgrounds and views of the situation make the best contributions to complex decisions. Only a relatively small number of contributors who have different backgrounds and views of the situation may be needed, but their selection will be crucial. Contributors need to actively check with each other at every step, co-ordinate to get information from each other, prioritise as a group to deal with contingencies and question each other to ensure that their picture of the situation is accurate.³⁹ If this is not achieved, decision making may be undermined a combination of factors, including the misinterpretation of information, acceptance of poor situation understanding, and not volunteering pertinent information.⁴⁰

³⁶ Boisot, M. *Knowledge Assets*, Oxford, 1998. Devlin, K. *Infosense: Turning Information into Knowledge*, Freeman, 2001. Knowledge is about both ‘knowing that’ and ‘knowing how’. Information only becomes knowledge when it acquires meaning by placed within a rich framework of existing knowledge – knowledge requires a knower. It is not a property of databases.

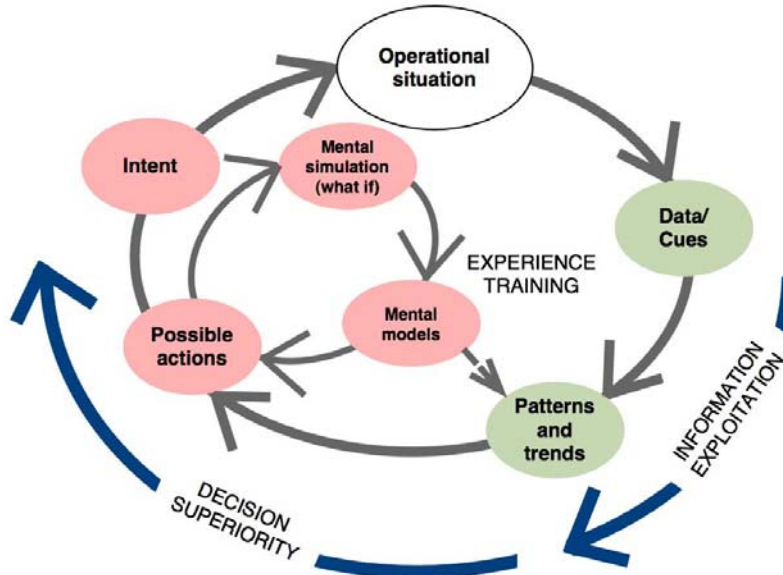
³⁷ The application of knowledge by commanders to make quality decisions directing assigned forces and harnessing additional support at the right time, such that they preserve operational flexibility and maintain the initiative in the battlespaceDCBM/J6 working definition, May 02.

³⁸ Intuition is defined as ‘experience translated into judgements and decisions. Klein, G. *Intuition At Work*, Doubleday, 2003. See also Zsombok, C.E. & Klein, G (eds) *Naturalistic Decision Making*, Lawrence Erlbaum Associates, 1995. Fuller references given at Annex B.

³⁹ See Klein, G. A., Zsombok, C. E. and Thordsen, M. S. (1993) Team Decision Training: Five Myths and a Model. *Military Review*, April, 36-42; Taylor, R. M., Endsley, M. R., and Henderson, S. (1996) Situation Awareness Workshop Report. In B. J. Hayward & A. R. Lowe (Eds), *Applied Aviation Psychology: Achievement, Change and Challenge* (pp 447-454). Aldersot, UK: Ashgate Publishing Ltd.

⁴⁰ See Duffy, L. R. (1993) Team Decision Making Biases: An Information Processing Perspective. In G.A.Klein, J. Orasanu, R. Calderwood & C. E. Zsombok (Eds), *Decision making in Action: Models and Methods* (pp 346-359). Norwood, NJ: Ablex.

Figure 2: decision action cycle



31. The quality of interaction to build a shared understanding of roles, functions, goals and plans between commanders and subordinates, without losing the subtle nuances, is a difficult task. As has been stated previously, collaborative working practices and technologies may be helpful. Indeed, with the aid of modern technology a great variety of specialists and experts who do not need to be physically present are potentially available for the commander to consult via mechanisms that support ‘reachback’. Training at unit, component and coalition level will, therefore, be important in order to overcome differences in expectation that might lead to fatal misinterpretation of intent.

Planning Processes

32. Experimentation is needed to help determine how near real-time planning, execution and assessment processes control can be exerted more precisely to shape outcomes in the battlespace. CEA may underpin feedback on the impact of actions, because it will allow commanders to assess the delivery of Effects against Strategic Objectives, and detect discontinuities and unintended outcomes in the battlespace. Inevitably, operations will become desynchronised and higher-level commanders will need to reassert control as their level of resolution, and hence their understanding of the situation, permits. The ideal will be minimal control actions to re-establish synchronisation, followed by restoring freedom of action to the lowest possible level.

Recommendations

[11] Decision making and planning processes at the strategic levels of government associated with legal, political and military policy need to be aligned.

[12] Procedures for the processing, management and dissemination of information need to be developed that will enable Decision Superiority and the co-ordination of operations at optimum tempo.

[13] Collaborative information environments must be designed and developed that support effective discussion, negotiation and joint problem solving amongst distributed personnel.

COMMAND AND CONTROL

33. Within the context of EBO, the current practice of task organising will be extended by grouping capabilities according to their ability to deliver particular effects.⁴¹ It is envisaged that mission groups will range from large, joint force structures to small bespoke packages. Tasks would be grouped according to suitable criteria; for example geographic location or environment. A mission group would be allocated and its commander would begin the collaborative planning process to refine the tasks, based on his own appreciation of the battlespace, and of the composition of the mission group itself. In the case of small packages tasked with producing very precise effect at the strategic or operational levels, command could be retained at a higher level. Equally, for larger groupings, the mission commander could usefully empower subordinates to promote initiative and tempo.

34. Inevitably, operations will become desynchronised and higher-level commanders will need to reassert control as their level of resolution, and hence their understanding of the situation, permits. The ideal will be minimal control actions to re-establish synchronisation, followed by restoring freedom of action to the lowest possible level. However, it is not enough to allow subordinate commanders wide latitude and then demand that they fill it with their initiative; to do so they must be properly trained and provided with the right organisational means.

35. Centralised and decentralised decision making are two ways of coping with uncertainty. In war, to raise decision thresholds and reduce the initiative of subordinate units is to limit the latter's ability to cope on their own and thus increase the immediate risk with which they are faced; greater certainty at the top is only bought at the expense of less certainty at the bottom. In contrast, higher levels of performance can be achieved when higher HQs accept more uncertainty while simultaneously reducing it at lower levels. Under the first approach, the security of the parts is assured by the certainty of the whole; under the second, the security of the whole is assured by the certainty of the parts. Both ways of coping with uncertainty will remain open to commanders at all levels; but historical experience suggests that the second way will be superior to the first. Successful commanders understand this because control by exception promotes freedom of action and tempo among their subordinates.⁴²

Appropriate levels of control

36. It is envisaged that mission groups will range from large, joint force structures to small bespoke packages. HLOC proposes that NEC will offer potential for 'adaptive Command and Control (C2)', with the degree of control varying across the battlespace depending on the need to align outcomes at different levels. However, the exploitation of technology to '*reach forward*' is valuable only if it

⁴¹ Current studies work includes a campaign plan which adopted a two star Joint Force Protection Component Command comprising force elements which included RN warships, Army, RAF and Coalition GBAD, Army and Coalition Light Infantry, the Joint NBC Regiment and Coalition Theatre Missile Defence.

⁴² Van Creveld, M (1985) *Command in War*, Harvard University Press. The high level of performance of Moltke's armies and Ludendorff's storm detachments was possible due to a readiness at higher HQs to accept more uncertainty while simultaneously reducing it at lower ones.

contributes to success. Further, inappropriate degrees of control exerted by senior commanders, politicians and their advisors ('interfering-forward') must be resisted where this compromises Mission Command. Conversely, it is possible that subordinate commanders may be given more freedom of action than they have experienced in the past, which could lead to unintended consequences or effects. Therefore, there is a need for more research into what is implied by 'adaptive C2' in order that the central tenets of Mission Command – trust, leadership, cohesion and mutual understanding – are not compromised.

Structural Issues

37. Within the context of NEC, both functional and technical developments may require HQs to be structured differently. A smaller size of in-theatre HQ has potential advantages of reducing life support overheads and signature, increasing strategic and tactical mobility and improving the efficiency and speed of staff work. It is also contended that a *modular* approach to HQ design may allow capabilities to be positioned where they could perform most effectively, maximising C2 flexibility and making best use of scarce skills and resources.⁴³ However, the extent to which layering and modularity will be possible is yet to be determined. There is also evidence of a requirement for increased layers of command due to coalition operations and increased functionality demanded in future HQs.⁴⁴ Indeed, future structures will need to accommodate the demands of multi-nationality, including the need to interoperate with a range of coalition partners and structures from the traditional to the more advanced.⁴⁵

38. The British Army's Future HQ Study will help resolve some of these issues and experimentation has a key role in determining the implications of de-layering and modularity. In particular, experimentation may help to consider: whether modularity should be predicated on 'bespoke' HQs or 'standing core' HQs, organised and trained to accommodate the integration of staff modules; what the implications are of the readiness cycle for HQ design; and what the collective training implications are of adopting different structural options?

Reachback

39. Some HQ capabilities may be provided by 'Reachback', either within theatre to a more static secure command support node, or out of theatre – although it is an open question as to which current HQ capabilities might be left in the rear.⁴⁶ However, this raises the question as to what new reachback capabilities are required for the NEC era, including, for example, Information Management, Integrated Mission Support and Intelligence Fusion. A distributed information environment may also allow commanders to be physically remote from their subordinates more often than previously. It is possible to consider circumstances allowed by NEC where the commander of a task group never makes face-to-face contact with the assets under his command,

⁴³ A generic modular HQ structure would include Core Warfighting modules (optimised for the delivery of intelligence and Joint Effects), Joint C2 modules, Other Ops C2 modules (eg. Info Ops) and Multinational C2 modules.

⁴⁴ For example, analysis of increasing ISTAR product, Intelligence processing, demands of interoperability, EBP, Information Operations, Knowledge Management, integrating Joint Fires and managing NEC infrastructures.

⁴⁵ In respect of the latter, see the USJF COM led activity on the creation of SJFHQs for CCS by 2005.

⁴⁶ DGD&D is working on the concept of a Land Operations Support Centre whereby Land formation HQs provided with a mission support capability provided at the home base.

and that command has to be exercised ‘virtually’. This will require high levels of trust between commanders coupled with a thorough understanding of doctrine.

Recommendations

[14] Structures and processes in support of EBO need to be synergistic with those of likely coalition partners, OGDs, the media and NGOs, in particular those associated with United States military planning and execution functions.

[15] Structures, processes and command hierarchies need to be designed in order to optimize the tempo of EBO, and that this design principle should be used to test the Generic Modular HQ Structure.

[16] The End-to-End (E2E) logistic mechanisms in support of operations require enhanced visibility, increased velocity, and tighter allocation and movement of resources in order to enhance operational tempo.

INTEGRATION

40. The synchronisation of UK military forces demands integration across environmental and functional components, and across a coalition force, where forces will operate within a wide range of capabilities and cultures. Indeed, the provision of a single, robust UK communications architecture and comprehensive joint information management procedures that are compatible with close allies has been identified as a key element of the UK's future expeditionary capability.⁴⁷

41. HLOC defines levels of integration as follows:

- a. Fully integrated forces will exchange near real time information over secure links using shared procedures, a common command ethos and deep understanding of cultural differences.
- b. Inter-operable forces are likely to use reversionary techniques and processes such as liaison officers and standing procedures.
- c. De-conflicted forces will share a ‘unity of purpose’ within the coalition, but separate their activities in space and time in order to prevent an unacceptable drag on coalition tempo.

42. The requirements for Future Command span the full spectrum of operations postulated within the UK’s Defence Strategic Guidance. The requirements also indicate the need for the military to work closer with OGDs, NGOs, IOs and other civilian organizations. Differences between coalition partners will continue to cause friction and, in most cases, it is the doctrinal, organizational and cultural aspects, not just the technological issues, which are the real barriers to interoperability. It follows that UK Armed Forces will require commanders and staffs who have the patience, tact, flexibility and cultural empathy needed to minimise these difficulties. This will require the delivery of appropriate individual and collective training, in addition to exposure to relevant scenarios within exercises. These qualities will also be required to manage relations with non co-operative agencies

⁴⁷ Op TELIC lessons, D/VCDS/40/1/2(10/131) dated 17 Oct 03.

who are likely to be present in the battlespace, such as NGOs, who can create both positive and negative effects.

43. Command style is also important – a commander’s unique interpretation of doctrine, his use of established tactics and his art of leadership.⁴⁸ Differences in command style may be reflected by appropriate attributes such as the background and training of commanders, their operational experience, their decision and orders style, and their tolerance to risk.⁴⁹ National command styles have been shown to differ in the degree of detail contained in directives to subordinates and, therefore, UK forces in multinational contexts must develop an appreciation of different command styles and their implications. Both the speed of command and the distribution of work across command (particularly planning and execution management) will vary greatly depending on the commander’s style. Future Command requires a proper understanding of the doctrinal, organizational and cultural strengths and weaknesses of a wide variety of military and non-military stakeholders.

Recommendations

[17] The processes of EBP need to be compatible with intra-governmental, inter-governmental and inter-agency (ie NGO and IO) strategic planning and decision making processes.

[18] Commanders and staffs must acquire a sound appreciation of the doctrinal, organizational and cultural issues associated with coalition and multinational working.

[19] An appropriate mission rehearsal capability needs to be developed that allows the JC, JTFCs, JFCCs and their HQ staffs to conduct effective collaborative planning.

CAPABILITY DEVELOPMENT

LoD Tasks

44. The list of Recommendations allow a number of discrete tasks to be defined that need to be sequenced and balanced across the LoD in order to develop Future Command Capability. This forms the substance of MoD’s detailed Future Command Capability Development Plan. In overall terms, the priority tasks for the LoD concern the following strands of activity:

a. **Doctrine:**

(i) Development of doctrine and Tactics, Techniques and Procedures (TTPs) in support of Future Command, Adaptive C2 (and battlefield resolution), EBO, IX, Collaborative Planning.

(ii) Establishing policy and standards for collaborative planning including access to information (including review of security policies); access to means of managing information; management of interactions between the Commander and his staffs.

⁴⁸ See J Hayward, (2003) For God and Glory: Lord Nelson and His Way of War. Naval Institute Press.

⁴⁹ NATO Code of Best Practice for C2 Assessment, 2002; Moffat, J. (2002), Command and Control in the information age – Representing its Impact. The Stationery Office.

- b. **Design for collaborative and distributed working practices:** Identification of requirements for collaborative planning in support of Future Command; the specification of working practices and processes in support of collaborative and distributed working; and the development of guidance.
- c. **Training and development:** Development of Future Command competence frameworks that address the needs of Collaborative Planning and EBP; EBO and CEA; IM and IX; Adaptive C2; doctrinal, organizational and cultural difference between coalition partners; Information Campaigns. Also, Training Needs Analysis (TNA) and the preparation of training programmes to meet Future Command Competences and the implementation of Individual and Collective Training to develop competence.
- d. **Design for Situation Awareness:** Development of guidance for Smart Acquisition on designing for Situation Awareness; Development of a Metrics Framework to measure Situation Awareness, Shared Situation Awareness and Shared Understanding.
- e. **Development of Collaborative Planning Tools:** specification, design and development of devices, technologies and applications that support collaborative planning and distributed working.
- f. **Development of CIS equipment and technology:** specification of Key User Requirements for Communication and Information Systems (CIS) equipment and technology in terms of *richness* (including timeliness, accuracy, etc), *reach* (eg communities of interest) and *quality of interaction* (eg display and control technologies); mandate that Early Human Factors Analysis and Human Factors Integration Programmes provide an analysis of system functionality in terms of the goals and decision making requirements of the Commander; and an analysis of the functional requirements for the JOP based on the requirements of Future Command.

Research and Experimentation

45. A list of Cardinal Research and Experimentation Questions for Future Command Agility was also defined and formed an input to the Joint Experimentation Framework. In particular, the Cardinal Questions will assist the Customer 2 community in examining the doctrinal, organizational and personnel issues associated with the realization of NEC during the Network Integration Trials and Experimentation Works (NITEworks) Programme. More widely, research will need to build from qualitative description toward quantitative prediction of performance, using a range of investigation methods, including observation, analysis of lessons learned, man-in-the-loop experimentation, evaluation of exercises and operational analysis.

46. A research strategy in support of Future Command should comprise three phases of activity. The first phase of activity should be oriented toward the development of descriptive models derived from a synthesis of research and observation. The outputs from the first phase would be testable models and hypotheses and a mature set of performance measures and metrics. The second phase of the experimentation programme would focus on hypothesis-testing experiments and empirical validation. The scenarios relevant to this experimentation would focus on joint and coalition characteristics. The principal outputs from the second phase of activity would include preliminary recommendations for tools and changes to doctrine, TTPs, training, organization design. The third phase of the experimentation programme would develop demonstration experiments that would

apply the recommendations from the second phase in order to show tangible military benefit. Performance standards and design principles would be matured alongside specific recommendations for the integration of capability elements.

Route Map

47. The command capability routemap consist of three distinct periods which are coherent with those given in the three NEC states:

- a. **Initial: up to 2010.** A period of incremental improvement to current command practices, equipment enhancements and small-scale innovation.
- b. **Transitional: 2010-2020.** A period of substantial change driven by concepts, supported by mature new capabilities.
- c. **Mature: 2020+.** A period focused on achieving the vision of the HLOC through closer integration between, and dependency on, coalition, joint and single service tactical elements. These will require significant improvements in security technology, information management skills and increased bandwidth at all levels.

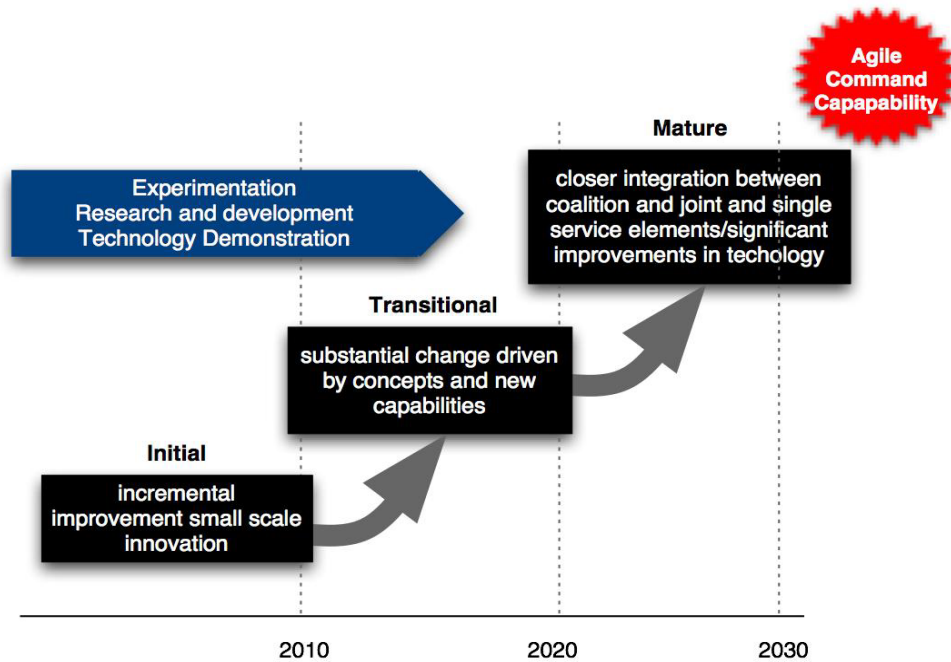
48. This is shown schematically in **Figure 3**. Capability will mature to the extent that emerging technologies are aligned with organizational structures, processes and core competences to deliver command agility, and thereby enhance responsiveness and operational tempo.

CONCLUSIONS

49. Several strategic factors are creating pressure for change in many areas of defence, including developments within NEC and ISR, and the requirements of EBO, agility and operational tempo. Although the strategic drivers are essentially political, military and technological in nature, their implications for Command are largely human, organizational and cultural in nature. **Annex B** summarises all the factors that are relevant to Future Command drawn from the analysis presented in this paper. The key challenges for Future Command arise in the following areas:

- a. **Operating in 'information-rich' environments.** While ISR, communications and information systems have been developed to provide information to manage an extensive and complex battlespace, they raise new questions concerning how a commander can: exploit information without being overloaded by the sheer volume of data; avoid the temptation to 'interfere forward'; and reduce the likelihood that operational staff will be distracted (for example, by the use of centrally-displayed operational video feeds) from their assigned tasks. NEC could make it possible for individual commanders to exercise freedom of action while ensuring overall coordination of plans and unity of effort. Certainly, NEC will improve Shared Situation Awareness in the medium term. However, access to a common information base will not be sufficient at the strategic and operational levels of command unless supported by processes of exchanging knowledge, views and ideas.

Figure 3: Maturity model



b. **Decision making.** Such is the current pace and volume of information flow in major HQs, that commanders and senior staff officers may not be able to find enough time for original thought and creative thinking. The tempo of the battle is such that dealing with process can dominate over product: timely and effective orders together with contextual information. CIS in the future need to streamline, and where possible automate, certain processes of data fusion, presentation and assessment in support of command decision making. In so doing, the role of the commander as a pro-active, ‘expert decision-maker’ will be maintained. Therefore, to improve command it will be important to understand how to exploit, rather than just employ, the network.

c. **Collaborative working practices.** A valuable use for communications networks lies in the ability to execute distributed collaborative planning. These networks would need to enable commanders to share and discuss their own understanding of the situation, and allow a richer, more complete understanding of the situation to emerge by the exchange of ‘know how’. A key challenge will be the use of ‘reachback’ communications to the sustaining base in order to enable commanders to access a wide range of scarce experts in their "virtual" teams – gaining their skill without the drag of their physical presence. Modular design of HQs may allow the commander to ‘plug-in’ staff modules from outside the commander’s peacetime domain but the organisation of such structures will need careful evaluation.

d. **Command and control.** An efficient and effective system of planning and execution is a key element of NEC, and is central to co-ordinating the multiple and diverse strands

of activity to achieve synchronicity.⁵⁰ This system depends on two interlocking and dynamic cycles - for planning and execution – operating at different levels. Indeed, the battlespace will contain many separate and distributed planning teams and their planning processes will need to be synchronised. The key challenge will centre on planning and managing a number of simultaneous tasks with different tempos, and making dynamic use of resources.

Future Command Capability

50. Both the Manoeuvrist Approach and Mission Command will remain key elements of UK Defence Doctrine, but that the way of command will need to adjust to the digitised era. A future, more agile, command capability will allow commanders at all levels to lead, make decisions and to execute their plans more effectively. This command capability will be tightly coupled to ISTAR delivered through NEC in order to better support situational awareness, decision making and planning.

51. To deliver Future Command capability a plan has been developed which identifies, rationalises and prioritises key actions, and identifies and manages the critical path toward the vision defined by HLOC. The plan also ensures that command capability development is enabled within the corporate planning cascade; from the Defence Corporate Plan through subordinate plans at Sector and TLB levels.

⁵⁰ British Army doctrine states that 'A commander should not only accept the inevitability of confusion and disorder, but should seek to generate it in the mind of his opponent. He should attempt to create only sufficient order out of chaos of war to enable him to carry out his own operations'.

ANNEX A:
IMPLICATIONS FOR COMMAND OF STRATEGIC DRIVERS

Constants	Implications for command
Conflict – violent and unpredictable	Need for decisive and timely action. Ability to cope with uncertainty. Ability to cope with high stress levels and costs of decisions.
Diversity of capable threats	Need for knowledge of threats and their capabilities, and how to counter them.
Broad scale and extent of operations	Direct experience of battlespace will be limited. Command largely exercised remotely.
Need for warfighting capability and ethos	Command must be capable and committed.
Emphasis on conflict prevention	Need knowledge of sources of tension, cultural factors, likely trigger points, sensitivities. Awareness of non-military options and leverage.
Joint and Multinational	Willingness to recognise contributions allies and other services can make. Awareness of strengths and weaknesses. Able to recognise and work with cultural differences.
Principles of War	Distillation of the 'know-how' of Command.
The 'fog' and 'friction' of war	Ability to cope with uncertainty and to accept that actions will not run to time or plan.
Human dimension of command	Commander as leader, source of inspiration, raiser of morale.
Manoeuvrist approach	Needs to be creative, flexible, undogmatic.
Need to conduct Close Operations	High levels of complexity and uncertainty. Costs likely to be high.
Changes	Implications for command
Increasing asymmetry	High levels of complexity and uncertainty. Established practice no longer a reliable guide.
Increasing exploitation of digitisation	Large volumes of information widely available. Have to be aware of what information is needed, how to find it and evaluate its quality.
Greater influence of legal issues	Greater accountability. May encourage risk-averse decision making.
Greater battlespace size and complexity	Dependence on technology. Multi-environment battlespace, large numbers of entities, and network of inter-dependencies. High mental workload for Command.
Urban operations	Very high levels of complexity and uncertainty. High costs.
Adoption of rapid and graduated response	Need to recognise danger signs early. May have to command forces of larger size or different composition than used to for period of time.
Task group based approach	Ability to recognise demands of an operational situation. Able to conceive and put together novel formations.

Continued overleaf

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Changes	Implications for command
Swift strategic deployability	Need ability for rapid re-orientation. And force structuring, planning and mission rehearsal.
Move to an Effects Based Approach with closely integrated effects	Clarity over what effects are desired. Broad knowledge of military and non-military means. Ability to use available means in a mutually supporting manner.
Emphasis on Deep Operations	Needs to be well informed about Deep situation and options. Understanding of how Deep Operations can contribute to achievement of desired effects.
Importance of Information Operations	Needs knowledge of opposing forces's procedures, information systems, decision-making methods, values, interests, etc. Also need knowledge of own vulnerabilities.
Better analysis of adversaries	Deeper knowledge of adversaries that can be exploited in Effects Based Planning.
Technology: Increased tempo and more precise effects	Need for more rapid decisions. Need knowledge of reliability of information and weapon delivery systems.
Technology: Greater component coordination	More tightly synchronised effects, but at price of need to consider multiple inter-dependencies between units and actions.
Technology: Opportunity for reachback	More specialist knowledge available remotely. Can lead to improved decisions but needs right kind of technological support.
Technology: Better situational awareness	Provides basis for collaborative planning, and coordinated actions. But exchange of information/data needs to be complemented by ability for true dialogue.

ANNEX B: SUMMARY OF THE KEY FACTORS RELEVANT TO FUTURE COMMAND AGILITY

