



The UK Joint High Level Operational Concept

THE UK JOINT HIGH LEVEL OPERATIONAL CONCEPT

AN ANALYSIS OF THE COMPONENTS OF THE UK DEFENCE CAPABILITY FRAMEWORK

An Analytical Concept Paper by the Joint Doctrine and Concepts Centre

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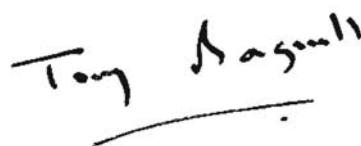
VCDS FOREWORD TO UK JOINT HLOC

The UK Joint High Level Operational Concept has been developed by the Joint Doctrine and Concepts Centre, and it has been endorsed by the Chiefs of Staff Committee. This important work is a key milestone on the path to fulfilling the requirement identified in the Strategic Defence Review to have “...a clearer long term vision of the way in which we expect our forces and their methods of operation to develop...”. The UK Joint Vision, published in June 2001, included the first embryonic description of what has now matured into a detailed head-mark for the manner in which the UK Armed Forces should aim to operate in the 2020 timescale.

With its focus at the strategic and operational level, the High Level Operational Concept is a guide and stimulus to the development of subordinate Joint and single-Service concepts. However, given its ownership by the Chiefs of Staff, the Concept also offers guidance to a wider audience within the Department on policy and balance of investment decisions across all lines of development. It is an analytical concept, which will evolve in the light of experience and analysis; it will therefore be reviewed biennially.

The Introduction sets the scene by giving the essential context for the Concept, which is then explained using the seven components of the Defence Capability Framework as an underlying structure. Each of the seven components is covered in more detail within subsequent, dedicated chapters. Although Chapters 1 and 2 give an excellent overview of the High Level Operational Concept, those seeking guidance in specific areas should read the relevant pages devoted to the individual components of capability. These are cross-referenced to ensure that the Concept is not viewed as a series of separate viewpoints, but as a unified and coherent piece.

The UK Joint High Level Operational Concept is the leading contribution to the growing volume of conceptual work within the Department. It will prove of particular value to staffs involved in Equipment Capability, Force Development and further concepts development, whilst assisting others involved in supporting research and experimental work. Beyond that, it is of particular relevance to all who are engaged in thinking about and generating the UK's future defence capability.

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CHAPTER 1 – INTRODUCTION

101. Fighting power comprises conceptual, moral and physical components.¹ The conceptual component of joint fighting power was articulated in UK Joint Vision, where the importance of the enduring nature of the Principles of War was endorsed. The Vision provided broad guidance for future capabilities in the form of a joint High Level Operational Concept (HLOC), an effects based framework for operations and a description of capability as seven discrete but closely interlocking components.² However, UK Joint Vision did not develop the conceptual components in detail. Using the Defence Capability Framework, this Analytical Concept³ describes the components of capability in sufficient detail to inform Joint Operational Concept Committee stakeholders, particularly the single Services, who are developing their own high level operational concepts in parallel. The three components of capability, Command, Inform and Operate, form the capability backbone of the HLOC around which considerations for the remaining four components – Prepare, Project, Protect and Sustain – have been woven to form the complete concept. The concept addresses the 2020 timeframe, assessed as the best compromise between the need to break free from the dominance of current systems⁴ without venturing into the purely speculative. It has also been harmonised with US joint concepts,⁵ noting the clear guidance from COS that we must be able to operate *with* but not necessarily *as* our close allies.⁶

102. The ‘Context - Future Environment’ paragraphs below apply to the following chapters. The chapters deal with the 7 components of the Defence Capability Framework but, just as in the Framework itself, there is considerable overlap between them. To reduce repetition, most such links between chapters are indicated by footnotes and the concept should be read as a whole rather than considered as a series of stand-alone documents.

AIM

103. This paper provides a conceptual head-mark for joint operations in 2020 in order to inform Force Development, in particular joint experimentation, Future Capabilities Requirements, the Equipment Capability Customer and single-Service conceptual development.

¹ British Defence Doctrine (2nd Edition).

² The 7 components of the DCF are Operate, Command, Inform, Prepare, Project, Protect and Sustain.

³ As defined in The Provenance, Authority and Coherence of Concepts - D/JDCC/2/6/1 dated 19 Feb 03.

⁴ Many current systems will be in service until 2030, albeit with enhancement through technology insertion.

⁵ The three key themes of US joint concept development are: achieving decision superiority; creating coherent effects; and conducting and supporting distributed operations.

⁶ 59th COS Meeting 27 Mar 03.

SCOPE AND ASSUMPTION

104. This concept is underpinned by the assumption that we will operate alongside US Forces for large-scale warfighting operations. The Command and Inform components of capability embrace what has previously been encapsulated within Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR). The Operate component of capability describes the future battlespace and how the three Services will work together within it. The remaining papers develop the support framework required. Some new terminology is introduced within the concept, necessitated by the requirement to express new ideas. The terminology used is not intended to be definitive and only time will tell if it will be adopted more widely within the Department.

CONTEXT – THE FUTURE ENVIRONMENT

105. **Conflict.** The risks of large-scale armed conflict have reduced. However, there is increasing turbulence world wide with persistent low intensity threats, a trend that is likely to continue. Threats will increasingly include terrorists or other non-state actors, who may not be easy to identify or locate and who are highly unlikely to observe international law and our moral conventions. We can expect them to continue asymmetric attacks on our strategic and operational Centres of Gravity (CoGs) but across a much wider battlespace.⁷ Globalisation, the interdependence of world-wide resources, economics and information, will create conditions where deliberate actions can lead very rapidly to unintended consequences. Meanwhile, many of our potential adversaries will adapt to this complex environment, where cause and effect will be hard to predict. We will face adversaries whose structures lack traditional nodes and whose CoGs will be hard to define and attack.⁸ They may choose to operate where our strengths are mitigated and theirs are maximised, for example by operating beyond traditional state boundaries or in complex terrain.

106. **UK Armed Forces.** Our force structure and doctrine will determine the responses available to the UK. Arguably, the structure, processes and equipment of the UK Armed Forces remain predominantly best suited to operations against symmetric adversaries in a geometric, industrial-age battlespace. But there is a compelling need to adapt to the new environment and develop more agile forces. Although UK Armed Forces should continue to be optimised for warfighting, trends derived from recent operational experience indicate that we will still need to undertake a wide range of other operations from peacekeeping and counter-terrorism to power projection and deliberate intervention. The full range of operations may take place

⁷ “The battlespace will become larger in terms of distance and space [reaching] well beyond theatres of operation to the homelands of coalition members”, UK Joint Vision.

⁸ The description of Al Qaeda as birds, which generally travel alone but come together to form a flock in response to ‘swarming’ stimuli, may indicate the shape of adversaries to come.

simultaneously in the same battlespace, the so-called *Three Block War*.⁹ With 24-hour international media increasingly shaping public opinion, we are likely to be called upon for rapid intervention in order to avert crises and to respond to humanitarian disasters. Successful prosecution of strategic objectives in this complex battlespace will be a challenge. The scale of involvement will vary from a single unit to substantial joint and multinational deployments. In all cases we will need the capability to deploy, sustain and recover robust forces beyond state boundaries.

107. **Multinational Operations.** Operations in 2020 are as likely to be in ad hoc coalitions of the willing, as they are to be with established allies. The technological capabilities of potential coalition partners will range from those who stay abreast of US Transformation, through those who retain some form of interoperability, to those who do neither. It is also likely that many non-military organisations with which we need to operate in the battlespace will not have compatible capabilities. Therefore, whilst technological interoperability is a major issue, culture, organisational structure, procedures and training will significantly influence the effectiveness of all organisations involved in joint or combined operations.¹⁰

108. **Constraints.** It is likely that tolerance to friendly, adversary and civilian casualties, collateral damage and damage to the environment will diminish, whilst legal imperatives will increasingly constrain our freedom to operate and train. The UK commitment to the international legal system will also require an audit trail of operational decisions and consequences. Adversaries will rarely operate under such constraints, giving them an asymmetric advantage.

109. **Emerging Technologies.**¹¹ This concept depends on the development and exploitation of nanotechnology, information technology,¹² power sources, satellites and advanced sensors. There is a growing realisation, however, that although technology is rapidly delivering more information to commanders and staffs the business processes needed to manage this information have not kept pace.¹³ If we are successfully to exploit new information technology in particular and prevent commanders and their staffs being swamped by information, we must develop suitable information management techniques. But only by harmonising technology, doctrine, training and structures will we deliver advantage.

⁹ “*In one moment of time, our service members will be feeding and clothing displaced refugees - providing humanitarian assistance. In the next moment, they will be holding two warring tribes apart - peacekeeping. Finally, they will be fighting a highly lethal mid-intensity battle. All in the same day, all within three city blocks*”. Gen C C Krulak, Comdt USMC.

¹⁰ Interoperability for Joint and Coalition Operations, Thea Clark and Dr Terry Moon, ADF Journal No 151, Nov/Dec 01.

¹¹ D/JDCC/7/11/7/1 dated 28 Feb 03 sets out the expected future technology environment in more detail.

¹² Communications, data processing and fusion, information collection distribution and dissemination.

¹³ “*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.

FURTHER DEVELOPMENT OF THE HIGHER LEVEL OPERATIONAL CONCEPT

110. The HLOC necessarily makes assumptions about the future that will be the subject of further discussion. The assumptions, particularly those that relate to future technology, underpin aspirations yet to be tested in detail against financial, technological and cultural factors. However, one objective of a high level analytical concept is to precipitate further detailed thought and associated work. At this early stage of concept development, the Personnel, Equipment and Structures Lines of Development are assessed as most critical.¹⁴ The reasons for this will be apparent in the Prepare and Operate sections in particular, but there are cumulative factors that influence this judgement that can be derived from the whole concept. Subsequent single Service concept development and experimentation should help to determine the art of the possible.

¹⁴ “*Sponsors of Analytical concepts must identify potential critical LoDs at an early stage.*” The Provenance, Authority and Coherence of Concepts - D/JDCC/2/6/1 dated 19 Feb 03.

CHAPTER 2 – THE CONCEPT

201. The UK Joint High Level Operational Concept (HLOC) provides a transformational head mark for UK operations in 2020 across the range of military operations. It is an analytical concept that articulates the conceptual component of fighting power, based on the Defence Capability Framework,¹ with seven separate papers articulating the detail.² This paper summarises essential issues. Historical research, a review of current doctrine and analysis of lessons identified in major operations over the last 12 years provide a strong sense of what should endure for future operations as much as what might need to change. This allows the concept to be framed in a way that will help the single Services to interpolate coherent interim steps for their own force development. The HLOC provides guidance for research, experimentation, single Service concept development, force development and future capabilities requirements. The UK may not have the resource to risk large scale intervention in equipment programmes or other lines of development, therefore the concept assumes pragmatic evolution toward the head mark, albeit with the transformational goals below always clearly in sight.

OPERATE CORE CONCEPT

An agile, task-oriented joint force with freedom of action to synchronise effects throughout the battlespace and with maximum potential to exploit fleeting opportunities.

“The greatest risk to UK security is that the strategic environment will change faster than the UK can or will acquire and apply resources to meet that threat.”³

202. The nature of the future strategic environment strongly influences this concept, which provides a framework for future capabilities cast in a concept of operational agility. Agility is essentially a human-centric attribute epitomised by the enduring ability of our people to think creatively, to be resourceful and imaginative and to adapt with versatility to the unexpected. However, it also has a strong physical dimension. Therefore operational agility will embrace personnel, structures, equipment and procedure. At its heart are four attributes for which we will equip and structure: responsiveness, robustness,⁴ flexibility and adaptability, all of which will underpin future individual and collective training. Agility is an instinctive quality in organisations that share information efficiently and which empower their subordinates. The UK Armed Forces have a very strong ethos of trust and empowerment but we have yet to achieve an operational information age environment that can unleash the full potential of our junior commanders.

¹ UK Joint Vision, 15 Jun 01. The Defence Capability Framework comprises 7 components of capability; Command, Inform, Prepare, Project, Operate, Protect and Sustain.

² Staffed through the Joint Operational Concepts Committee.

³ JDCC Strategic Trends, Mar 03.

⁴ Robustness encapsulates both physical resilience and the ability to conduct multiple missions with one capability.

203. Future operations will be effects based⁵ with stronger focus on cause and effect vice target-centric attrition.⁶ At the strategic level, networked information will better enable coherent effects by introducing more dynamic cross-government communication. At the operational and tactical levels, experienced commanders have always understood that the battlespace can never be fully resolved; the fog of war will persist. But we view the future battlespace as 7 dimensions of a very closely-coupled strategic environment⁷ across and among all of which we can create a wealth of desired and unanticipated effects. Battlespace resolution will be the degree of understanding and shared awareness within these dimensions. It will be a function of information available to exploit in an appropriate context, information management and – most importantly – commanders’ abilities to make sense of the information presented to them. Well-integrated joint forces will help improve resolution by achieving better shared awareness and therefore best potential for agility, tempo and precision. However, because information sharing will always be imperfect and there will always be technological and cultural barriers to interoperability within coalition forces, the conceptual model is one of variable resolution.

204. Strategic reach, precision and persistence must underpin future capabilities. The goal for future operations is an ability to achieve precise effect – if necessary from a distance – but always with minimum planning time. Precision is more than weapon accuracy because we invariably target effects against an adversary’s will and that does not always require precision, or even kinetic, weapons.⁸ Traditional technology will achieve precision in part, but predominant future features will be widespread cross-platform cueing to provide maximum flexibility for high discrimination where the requirements are most demanding. The considerable strengths of high payload, extended endurance and stand off weapon delivery could thus overcome a potential major weakness: a lack of precision and discrimination in the end game against low resolution fleeting targets. The ability to operate in all weathers and terrain – day and night – will deny sanctuary to an adversary and operating in these difficult environmental conditions will be a firm standard for operational flexibility. Implicit in all of this is the need to network information across the appropriate Maritime, Land, Air and functional interfaces. Whilst procedural mechanisms may still have their place in future, more flexible interactions, exemplified by current time sensitive targeting and joint fires, will become the dominant and most flexible features of future operations. This higher flexibility and speed of action will demand even greater discipline for tactical targeting in order not to undermine operational schemes of

⁵ Effects Based Operations are the subject of JDCC and multinational work that will be published separately.

⁶ This will concurrently drive a transition from rudimentary techniques of battle damage assessment to more effective means of measuring the effects achieved in a campaign.

⁷ Economic, political, military, technological, socio-cultural, physical, and legal ethical and moral. The close coupling is a function of modern information systems and global economic interdependencies. JDCC Strategic Analysis, Mar 03.

⁸ For example, the persistent bombing of front line troops with relatively inaccurate weapons can still achieve a precise effect against their will - especially when harmonised with a coherent information campaign.

manoeuvre. It will also require close integration and understanding of the legal dimension.

205. Thus, information systems will comprise a significant fraction of future capability that will allow commanders better to manage engagements at acceptable risk. No longer will fire and manoeuvre be conducted solely within the confines of a single environment or be restricted by unwieldy procedural deconfliction. Forward-positioned unmanned sensors could allow platforms to maintain stand off from an adversary for greater periods. Unmanned vehicles in all three environments have potential to enable persistent joint fires because, with greater ultimate endurance than manned platforms, they can enhance target acquisition and almost continuously cue long-reach effect. Information networking should eventually enable the demise of more cumbersome co-ordination measures, but there will always be a need to co-ordinate activity, even when the battlespace is well resolved. In the near term, co-ordination will still be largely procedural, especially until Land forces and then the Land-Air interface in particular are well networked. But we should evolve more ephemeral means: fleeting co-ordination measures that are rapidly designed and widely distributed with collaborative information tools, but which - immediately post action - are quickly dissolved in order to preserve maximum manoeuvre space for all battlespace users.

COMMAND CORE CONCEPT

Mission Command relevant to the information age. At its heart is a network-wide expression of command intent – promoting unity of effort – and an adaptive Command and Control (C2) process. The concept seeks to maximise the creativity and initiative of subordinate commanders by resolving the tension between freedom of tactical action and alignment of strategic and operational goals.

206. There is no better example of the need for embracing change whilst maintaining a sense of continuity than in the requirements for future command and control. Our command philosophy is robust and must endure. However, we perceive an urgent need – and the emerging means – to change control mechanisms that are increasingly inappropriate for operations in the information age. Command is the authority vested in an individual for the direction, co-ordination and control of military forces.⁹ Only humans command because they demonstrate the range of innovative and flexible thinking necessary to solve complicated and unexpected problems; therefore competency, authority and responsibility are essential features.¹⁰ British Defence Doctrine articulates the essential balance between direction and delegation but highlights an important dilemma: modern communication systems can tempt commanders to over-control. Moreover, when communications fail, it can also expose over-dependency upon technology. The philosophy of Mission Command must

⁹ JWP 0-01.1.

¹⁰ Reconceptualising Command and Control, Dr Ross Pigeau and Carol McCann, Canadian Military Journal, Spring 02.

therefore endure; commanders must define their missions and provide resources for subordinates, but delegate authority wherever feasible to encourage freedom of action and to promote initiative. In essence, we must continue to tell subordinates what to do and why, not how to do it.

207. The human-centric nature and therefore the fundamentals of mission command – unity of effort, freedom of action, trust, mutual understanding, timely and effective decision making – remain valid. However, the power latent in new information tools¹¹ may go to waste until we understand which relationships between command and control remain valid for the information age. Control is the authority exercised by a commander over subordinate organisations.¹² Whilst often necessary it comes at a price: it takes time and once adopted restricts subordinate flexibility. Experimentation shows that in a modern information environment more natural synchronisation across function, component and coalition could replace hierarchical planning and communication. These powerful peer-to-peer relationships occur almost spontaneously within the context of widely distributed and meticulously expressed command intent. Much theory and a growing body of evidence indicate the possibility of tactical self synchronisation¹³ and optimum tempo provided that there is: clear and consistent understanding of command intent; high quality information and shared situational awareness; competence at all levels of command; and trust in information, subordinates, superiors, peers and equipment.¹⁴ However, with higher overall awareness and a far greater ability for lateral communication and initiative, there is also potential for tactical anarchy. Therefore an adaptive command and control process will seek to resolve the inevitable tension between freedom of action in well-resolved battlespace and alignment of strategic and operational goals. This type of command process will be characterised by light corrections on the ‘command tiller’ to establish synchronisation of subordinate action with higher level intent, followed by immediate restoration of freedom of action to the lowest possible levels. Although difficult to achieve – doubly so in coalition operations where cultures and command philosophies vary – the prize is much higher tempo and remarkable agility.

208. The current definitions of command¹⁵ are becoming too crude to apply effectively in a highly dynamic politico-military environment. Therefore the adaptive command and control process also seeks to provide greater flexibility for command and control configurations in order to optimise integration with coalition partners. Decision superiority will remain the central theme of the command process, but collaborative planning and shared situational awareness may set conditions where commanders at all levels have the capability to delay option lock-in to the last possible

¹¹ For example, Collaborative Information Environments that promote rapid and deep understanding of a problem through the strong interaction of participants who use networks to enrich critical information.

¹² JWP 0-01.1.

¹³ Self synchronisation is a condition where force elements intuitively synchronise their actions without control.

¹⁴ Power to the Edge, David Alberts and Richard Hayes, DoD Command and Control Research Programme, Jun 03.

¹⁵ OPCOM, OPCON etc.

moment, thus providing very high flexibility. The ability more rapidly to ‘sense and understand’ at the tactical level may lead to strategic planning cycles being outpaced by those at the operational and tactical levels. Consequently, decision-making at the strategic level must be rooted in planning that is highly responsive across government. This is an extension of collaborative planning: a technique that is showing great promise through experimentation and which could replace traditional planning cycles. However, it will need very responsive control mechanisms. If the correct balance is achieved, lower battlespace management overheads – gained from more rapid and natural synchronisation of activity at the tactical level – could permit better focus on exploiting and creating opportunities at all levels. The most critical issue throughout will be the careful engineering and widespread understanding of command intent.¹⁶

INFORM CORE CONCEPT

Decision superiority gained through shared situational awareness within task-orientated communities of interest that exploit collaborative processes in a single information domain.

209. The provision of a single, robust UK communications architecture and comprehensive joint information management procedures – which are compatible with close allies – is an essential element of the UK’s future expeditionary capability.¹⁷ Until quite recently, information networking was too expensive for us to realise its enormous potential value,¹⁸ but we will soon be able to support much better interactions among force elements. The UK has encapsulated this approach as Network Enabled Capability (NEC). NEC will allow powerful new combinations of combat power, principally through shared situational awareness within mission-orientated communities of interest.

210. NEC will also enable collaborative planning – a key component of shared situational awareness in its own right – and a far more flexible execution phase that will avoid unnecessarily early option lock-in, enhancing responsiveness. Information communities of interest will comprise pre-configured sensor, shooter and decision maker groups, but also dynamic cross-component communities – agile mission groups – which coalesce in the physical or virtual sense to act and then disperse. Mission groups need only combine physically at critical junctures; at other times they could remain dispersed throughout the battlespace for optimum force protection, better logistic postures and pattern disruption. The degree of flexibility for agile mission groups is finite. It will be important that commanders understand the complexity of

¹⁶ The unambiguous expression of command intent in the information domain is difficult; we need to understand how to overcome the vast network of implicit intent that cannot be vocalised, namely: personal expectations based on style and experience; military expectations based on doctrine, training and tradition; and cultural expectations based on societal values and morals. Understanding the latter factors is critical in coalition operations.

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

¹⁸ Quantified in Metcalf’s Law - the value of a network is proportional to the square of the number of nodes. Power to the Edge, David Alberts and Richard Hayes, DoD Command and Control Research Programme, Jun 03.

integrating them into an effective combat force, as well as what comprises a cohesive unit¹⁹ within each environment, in order not to undermine the moral component of fighting power.

211. The future information domain will be wide, deep and rich.²⁰ It will provide representations of the physical domain in which we will fight²¹ and a depiction of the strategic environment that constitutes one catalyst for a commander's deep understanding of the battlespace. A risk is that the volume and complexity of information will overwhelm commanders and that consequently they may fail to resolve the battlespace. The enduring ability of well-trained commanders to resolve complexity will help, but commanders at all levels will need confidence that technology will assist and not hinder them in creating structure and meaning from large volumes of information. The emerging culture of information pull²² has great promise, but we may not in the immediate future have access to the bandwidth and information technologies that might realise this powerful technique. Therefore we will need in the interim to retain a degree of 'intelligent push' and traditional staff disciplines in order to minimise the proliferation of unnecessary information. The collaborative processes that lead to widespread understanding of command intent will aid effectiveness by helping set the correct conditions for efficient information flow.

212. We should progressively network information across command echelon, component, military function and coalition with an early focus on pre-configured communities in general and the relevant Maritime, Land, Air and functional interfaces in particular. These interfaces are where we have most potential to generate more flexible and powerful combinations of combat power, which are currently inhibited by restrictive procedural mechanisms. We have increasing confidence through experimentation that this horizontal fusion of information is viable and it has already been proven to great effect – albeit at limited scale – on recent operations. Because a determined adversary will target communications, reversionary modes will still be important.

¹⁹ A unit that, if dispersed into smaller elements to form part of an agile mission group, would significantly weaken the moral component of its fighting power.

²⁰ For Effects Based Operations (EBO) the potential volume of information is bounded by the 7 dimensions of the strategic environment (Legal, Ethical and Moral, Social and Cultural, Economic, Political, Technological, Military and Physical), the levels of command (Grand Strategic through to Tactical) and the instruments of national power (Diplomatic, Economic and Military).

²¹ For example, the Recognised Environmental Picture.

²² The advent of networking and browser technology has enabled a move to smart pull, freeing us from the constraints to be synchronous in time and space with information and processes therefore eliminating the need for owners of information to know exactly what is important to whom. This enables widespread information sharing that is a prerequisite to shared situational awareness and an information age approach to command and control. Power to the Edge, David S. Alberts and Richard E. Hayes, DoD Command and Control Research Programme, Jun 03.

PREPARE CORE CONCEPT

Deep preparation will develop robust and flexible individuals imbued with fighting spirit, as the bedrock of operational agility. Functional preparation will develop core competencies, unit cohesion and the ability to transcend traditional boundaries to achieve an agile, task-oriented joint force. Immediate preparation will fine-tune the force for specific operations.

‘If we are going to depend upon one another in wartime, then we must forge the bonds of trust in peacetime. And that means that our training has to become increasingly joint’ ...²³

213. The strategic environment is now generating more frequent military responses to global threats. How we manage the transition from training and lower readiness states to deployment, operations and recovery is a hard challenge and our success or failure in this will influence morale and success on operations. Political and military warning time are essential factors, especially for medium to large scale operations that require longer lead times for mobilisation of resources. We must judge future force readiness as readiness to operate with confidence, not simply readiness to move. We will structure for the most likely operations and adapt our structures for the most demanding, noting that the latter may not always be an issue of scale but sometimes simply threat or time related. Our equipment, doctrine and training will remain broad based and will cover the full range of military operations. From a conceptual point of view, the formative levels of preparation are considered to be *deep* and *functional* preparation, whilst integration, rehearsal and other pre-deployment factors are *immediate*, situation-dependent preparation. *Deep* preparation brings an individual to a combat ready standard. *Functional* preparation is performance-driven as opposed to event, unit or process-driven. *Immediate* preparation is the mission-focused work-up of the force, to ensure functional groups are fit for task. In order to acquire the strong moral component of fighting power that underpins this concept, we need to build on a firm foundation of *deep* preparation with carefully focused *functional* preparation. Well-prepared agile standing force elements – the result of *deep* and *functional* preparation – will help reduce the *immediate* preparation burden to acceptable levels of risk.

214. Whilst there are both physical and mental aspects to agility, the human-centric nature of this attribute suggests that we invest thoroughly in deep preparation of sufficient, capable and motivated personnel²⁴ to develop robust, adaptable skill sets that will provide individuals with confidence to work in the face of the unexpected. In the vanguard of those skills must continue to be strong leadership at all levels. Bringing an individual to a combat ready standard in any discipline takes time. However, this brings the greatest possible strength to an armed force and the value of

²³ Deputy Defense Secretary Paul Wolfowitz, Transformation Trends 20 Jun 03.

²⁴ D/DCDS(Pers)/34/2 dated 16 Oct 03.

an individual that has undertaken high quality robust training must underpin all of our capabilities.²⁵ The training environment must also reflect the considerable effort that underpins an individual's grasp of mission command and be one in which honest mistakes are accepted and in which unorthodox solutions are not rejected.²⁶ Deep preparation must also cultivate personal relationships at all levels with our coalition partners.

215. The moral component of fighting power is derived in part from ethos and unit cohesion. This requires that we understand the useful boundaries between environmental centres of excellence, which build and nurture core skills and unit ethos, and joint or coalition preparation, which addresses the technical and cultural aspects of interoperability. This will be a critical success factor and a delicate balance to strike, because agility will demand much higher levels of joint tactical interoperability. Training is the key and the future joint training ethos must therefore be changed to accommodate continuous joint tactical training. This will not be traditional large-scale exercises, but more frequent and moderate scale events, particularly for those who work at the key tactical interfaces.²⁷ Large-scale, set-piece exercises are increasingly difficult to resource and frequently interrupted by operational demands. Therefore whilst training at large scale will always have its place, particularly in addressing the cultural aspects of coalition interoperability, we need to reconsider the relative scale of values attributed to current tiers of training. Although we may seek to integrate equipment, tactics, techniques and procedures with allies, we will always bring strength through natural diversity and we must configure to fight with, not precisely as, our close allies. We will integrate²⁸ for warfighting with key allies that are able to exploit the future information environment, but perhaps only interoperate²⁹ with other multinational forces. In the extreme case of allies with no digitised capability or with strong cultural barriers, we will deconflict entirely but seek unity of purpose.

216. More frequent small scale joint tactical training should provide higher confidence that interfaces and procedures work for the 'last tactical mile', where bandwidth is often most restricted but where the pre-configured sensor-shooter linkages are most critical. However, we will still need confidence to orchestrate the integrated whole. This will be the preserve of operational and strategic commanders. They will in future use less resource-intensive but nevertheless highly effective virtual environments to hone higher command skills. This will represent a sharper division

²⁵ *'The greatest strength lay in the attitude, versatility and resourcefulness of the Royal Marine. This strength was set against...a high individual training burden.'* (DOC Audit of 3 Cdo Bde cited in COS Minutes 4 Mar 03). Similar sentiments were independently and strongly expressed in separate interviews with 1SL, CGS and CAS in Sep 03.

²⁶ Modern Warfare; Mission Command. Brigadier Mungo Melvin in British Army Review, Autumn 02.

²⁷ For example those individuals in the Land environment who will use precision designators to enable Land commanders at all levels to exploit long range air and maritime capabilities.

²⁸ *'Combine or be combined with to form a whole'*. Concise Oxford Dictionary, 10th Edition.

²⁹ *'Able to operate in conjunction'*. Concise Oxford Dictionary, 10th edition.

between training at the operational level and above, vice that at the tactical level. Tactical interoperability should be achieved through routine, almost day-to-day events, both live and synthetic, that extend the esprit de corps found at unit level into our joint and combined consciousness. But it must generally be separated from higher level command training – which has rarely been compatible with tactical training objectives. If we are to introduce sufficient skilled personnel into our experimentation programmes, then experimentation must also become a routine part of our exercise programmes. In this case, incompatibility of objectives should more easily be overcome following recent precedent for the successful integration of live and virtual events during training.

217. The rapid purchase of new or additional equipment or enhancement or essential modification of an existing equipment, is often required to support a current or imminent operation. Where this is possible in time for the operation we should minimise the challenge of integration and training for new capabilities introduced at short notice to the front line. We need a clear understanding in advance of exactly what can be and cannot be achieved in short time-frames. This might entail the development of better structures and procedures to allow fast, and in some cases pre-scripted, responses to operational demands. Finally, the immediate phases of preparation should adequately cover planning for all phases of a campaign. A joint approach to managing operational aspects of post conflict activity must extend to embracing other government departments in military exercises.

PROJECT CORE CONCEPT

Timely projection of mission-optimised joint forces. For multinational operations, the UK Armed Forces will share political and military risk by matching the more demanding deployment timescales of close allies with credible and valued operational capabilities.

218. Interoperability with close allies will drive the UK's strategic response benchmarks. If we are to develop levels of confidence that will make the UK a reliable ally, we must match the most demanding deployment timescales³⁰ with credible and valued operational capabilities. The notion of political risk sharing is important and suggests that early deployments must include offensive or at least militarily significant capabilities.

219. The range of environmental capabilities is generally characterised by variations in strategic responsiveness that range from weeks for heavy armour to hours for air. Consequently, strategic air has a permanently high value of responsiveness, but tactical air, maritime and land capabilities have to be forward deployed to achieve useful levels of responsiveness. Maritime capabilities have potential to sustain

³⁰ For example, the US Future Force aspires to deploy a Brigade in 96 hours that is able to sustain itself for 3-7 days and a Division - of which the UK may be a part - in 5 days.

forward presence and, once in position, land forces have both permanence and high responsiveness. However, the closer the proximity of the threat, the more that platform vulnerability dominates the risk equation. Strategic responsiveness is but part of the calculation, the precise effect required will determine the particular capability required. No individual capability has unlimited strengths and all have weaknesses, therefore a robust force projection capability will inevitably comprise a mix of joint assets.

220. Other factors that drive force projection include sufficient political and military warning time for the scale of operation, distance, overflight rights, weather, terrain, coupling bridge, including available air and sea lift, and also in-theatre logistics enablers and threat access denial capabilities – including those to extended lines of communication.³¹ We will generally need access to in-theatre basing and where this is restricted, we must have some capability for global reach or access from the sea. Access must be underpinned by a combination of long-term basing and overflight contingency planning. Alignment of defence relations strategies, planning assumptions, treaty processes and overseas security policies are all critical to this process and it will require a co-ordinated cross-government approach for best effect. However, wherever this long-term investment fails, we will need capabilities for anti-access environments. Long reach high persistence systems in general, but unmanned vehicles in particular, may provide initial footholds where adversaries contest access.

221. Force projection offers a conceptual base for balancing capability. It is where the balance of movement across the three environments could be usefully harmonised by considering the relationship between responsiveness, reach, effect and scale of effort. For large-scale warfighting, we assume coalition operations and, within a framework of burden sharing, a balance between national quality and quantity of high readiness forces may be easier to conceive. We will judge future quality of force projection by speed of response and credible fighting power. Air capabilities, light forces, special forces, medium land forces and forward-deployed maritime capabilities are all credible high readiness options. Options that achieve military and therefore political credibility must drive the initial deployment, but for overall quality of response, we should consider the balance of forces carefully. Land capabilities will be the most demanding case, particularly with sustainment brought into the equation. In all cases, high readiness forces must be sustainable in order not to place a burden on allies; an important aspect of our overall credibility.

222. Options for improving response times include better strategic warning, forward basing – that includes the concept of sea basing – and higher speed deployment. However, the inherent speed of airlift is offset by its limited capacity. Given that forward basing, even at sea, is equally resource intensive and relatively inflexible, it follows that we can only balance the equation by maximising flexibility of options.

³¹ This includes threats to the home base.

Improvements in the speed of medium and heavy lift may provide a better balance of overall means. This can only be achieved if the warning and decision times exceed the deployment time of the least responsive capability required for a mission.

223. Achieving high resolution of the battlespace will help commanders to manage risk; therefore early deployment of strategic and operational sensors will always help inform and refine force projection decisions. One potential value of NEC is that it might better enable more efficient mixes of dedicated and shared joint capabilities, the ratio of which could be dictated by the robustness of information networks and therefore battlespace resolution.³² Moreover, a network-enabled force that can trade some physical robustness for higher mobility would be of less mass and therefore more responsive. Taking this concept to its conclusion, early shaping of the battlespace to improve information resolution could allow commanders to take pre-emptive action to prevent, stabilise, contain or deter the adversary before combat operations are inevitable. This offers potential early in a campaign to optimise the overall scale of effort.

224. Improving the responsiveness of the coupling bridge and thereby reducing the overall scale of effort will equally improve the ability to recover the force for recuperation and eventual redeployment.

PROTECT CORE CONCEPT

Exploit information age techniques to protect and preserve fighting power. Protection of the physical component demands a better balance between platform resilience and information-centric capabilities. Preservation of the moral component requires versatile command and leadership skills to meet information age challenges.

225. We need to be robust across a wide spectrum. This component of capability ranges from traditional platform-centric concepts of armour, defensive aids and stealth through to casualty treatment facilities, personal immunisation against disease, protection from extremes of the environment, personnel recovery, chemical, biological, radiological and nuclear threats, combat identification and, most critically for the future, information assurance. Information, from strategic intelligence to tactical threat warning, is at the root of force protection and its greater, shared availability will be a potent future enhancement to our capability. Collaborative environments could allow a useful re-balancing of protection techniques, exchanging platform-centric for information or system-centric models. Mission groups could be more dispersed in the battlespace for optimum force protection and pattern disruption, combining physically only at critical junctures. Threats would thus more easily be held at the limits of their weapon reach and a combination of shared awareness,

³² In unresolved battlespace, commanders may need more organic capabilities like Intelligence, Surveillance, Targeting, Acquisition and Reconnaissance (ISTAR), but where battlespace resolution is good, cross-component responsiveness can be robust enough to allow more flexible and efficient postures.

tactical mobility and high levels of tactical interoperability will allow traditional protection to be enhanced and in some cases superseded by cross-component responsiveness and tactical innovation. The traditional concept of a reserve force could be re-evaluated. Whilst the fundamental tenets for operational and tactical reserves will endure – to be appropriate and uncommitted – the networking of information cross-component should in time allow more flexible combinations of reserve combat power. However, relying upon information alone has vulnerabilities and we should not forsake completely the value of physical robustness. At one extreme for example, slow moving aircraft will always remain vulnerable to small arms no matter how high their shared awareness. At the other, there may simply be no substitute for heavy armour in some high density threat environments.

226. The future distributed information environment may allow commanders, an essential component of our capability, to be physically remote from their subordinates more often. Notwithstanding the confidence and trust that they must still generate within their subordinates, they will have the means in future to exercise effective command from a more secure position, not necessarily leading from the front. Future training must help achieve the optimum balance between command and leadership skills for the information age. Finally, the future battlespace may present us with an array of asymmetric threats. Asymmetry by its nature is often unexpected and therefore mental and physical agility is one of the best defences. Even when surprised, we must be able – if necessary – to reconfigure our equipment, structures and procedures to regain the initiative and prevail in the face of the unexpected.

SUSTAIN CORE CONCEPT

Network-enabled logistics to sustain the physical component of an agile joint force. The moral component requires administrative agility and a strategic perspective for the joint force that inculcates mental resolve to sustain protracted operations.

227. This component of capability has implications for the moral and physical components of fighting power, both vital to success. In relation to economy of effort and sustainability, logistics has a major bearing on the physical component of fighting power. An emerging Defence Logistic Vision indicates how closely the logistic component must be networked to the operational component in order to provide robust tactical responsiveness. The future logistic communication architecture must be joint and we must achieve global asset tracking in order that logistics commanders might better respond to the demands placed upon the movement of materiel in an agile operational environment. Logistic commanders at all levels must be involved in collaborative planning from the outset in order to achieve an early understanding of command intent. Hence, future logistics planning will not be a response to an operational plan but an integral part of it. The requirement to locate, identify, transport and track assets is already well documented and technology is beginning to provide the means to achieve it. Better asset tracking should foster a more virtuous circle of

efficiency and effectiveness, with fewer assets supplied solely to mitigate operational risks. We must have the logistic ability to work in coalition with a close ally that intends to deploy a high readiness force able to sustain itself largely unsupported for three to seven days.

228. The core threads of the moral component – leadership and motivation – are well documented in British Defence Doctrine. Management is the third element and it is no substitute for leadership but a vital element of the moral component nevertheless. Increasingly, the emphasis must be to optimise sustainability cycles to match levels of operational activity. Sustaining the moral component of fighting power requires periods of recuperation and we can usefully view this as the start of the preparation phase, not simply the end of the last operational cycle. The difference is subtle but important. The ethos must be to charge an individual's psychological batteries before training and operations, not just to recharge them on an ad hoc and opportunity basis afterwards, although flexibility demands an element of this.

229. Reserve personnel have a strong role in sustaining the overall force mix. Their use to compensate for overstretch and under-manning, and its impact upon the provision of formed unit support, is an increasing risk. After major combat operations, reserve forces may take considerably longer to recuperate than their regular counterparts; from a civilian employers' viewpoint, large scale use of reserves may be a single shot option with a recovery time measured in years, not months. This could lead to asynchronous readiness cycles with the slowest to recover – almost certainly the reserves – dominating the cycle for major combat operations. We must also consider how to deploy our most experienced manpower during an operation. There is a natural tendency to deploy the most experienced at the outset. However, it can be difficult to sustain fighting power if the majority of experience is invested in the initial phases and there is then an extended build-up before combat operations, or a protracted follow-on phase.

230. Finally, there is a wider principle at stake. There is a very Western tendency to achieve outcomes within pre-defined timescales and resource levels.³³ Many other cultures do not share this perception and prefer to take the long view. Emerging adversaries – for example international terrorist organisations – may not have such a perception of timescale and this may require considerable endurance to counteract the effects. For the West, it may include the determination to accept sustained low levels of casualties over extended time.³⁴ This will require considerable mental resolve at all levels of command - in essence a strongly shared sense of strategic perspective - and this will be an essential element of sustaining personal motivation and hence the moral component of fighting power

³³ J Keegan quoted by Colonel David Potts in Principles for Waging Modern War, British Army Review, Autumn 02.

³⁴ A factor that ultimately proved decisive in Vietnam.

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CHAPTER 3 – OPERATE

OPERATE CORE CONCEPT

An agile, task-oriented joint force with freedom of action to synchronise effects throughout the battlespace and with maximum potential to exploit fleeting opportunities.

KEY THEMES AND CAPABILITIES

301. The Operate concept will develop the manoeuvrist approach optimising its four recognised functions of *Shape, Attack, Protect* and *Exploit*.¹ The *Shape* and *Attack* functions will be expanded to capitalise upon an emerging effects based framework² and a battlespace that represents all 7 dimensions of the strategic environment.³ An effects based framework will provide more emphasis on the relationship between attacking or influencing capability and will, whilst a deeper understanding of the strategic environment enables a much wider range of effects. Most important, the concept of operational agility described below will lead to much stronger emphasis of the *Exploit* function that will allow higher tempo operations. This will be achieved through a network-wide expression of command intent and a degree of shared situational awareness⁴ that promotes much better tempo and freedom of manoeuvre. This will most obviously be expressed as close integration of the firepower and movement of all components at the tactical level, to the extent that they cease always to be dependent upon higher level co-ordination and can therefore exploit the immense potential power of cross-component exchange of critical information.

302. At present, commanders expend considerable effort to co-ordinate or deconflict force elements, most often by using procedural, hierarchically derived plans. Fleeting opportunities pass unnoticed or prove too difficult to pursue, while the main effort is focused on lines of operation that do not always in retrospect prove best, but for which the degree of procedural control tends to reduce the flexibility of subordinates. We are inhibited by option lock-in at too early a stage in planning. Shared situational awareness could immediately improve this because it will reduce procedural deconfliction to a minimum.

303. **Agility.** Agility has both mental and physical dimensions but it is essentially a human-centric attribute epitomised by the enduring ability of our people to think creatively, to be resourceful and imaginative and to adapt with versatility to the unexpected. At its heart are four key attributes for which we will train, organise and

¹ JWP 3-00 (Edition 2) ‘*Joint Operations Execution*’.

² The JDCC-led Multinational Effects Based Planning process will be tested by experimentation in early 04 and, whilst introduced below, will be the subject of a separate JDCC paper in due course.

³ Economic, political, military, technological, socio-cultural, physical, and legal ethical and moral. JDCC Strategic Trends, Mar 03.

⁴ The topics of command intent and shared situational awareness are developed in Chapter 4 - Command.

equip our Armed Forces. Those attributes are responsiveness, robustness, flexibility and adaptability. *Responsiveness* is the speed with which we react to a change in the environment relative to potential or actual adversaries. It is a measure of how quickly we can seize the initiative, especially when faced with the unexpected when we may start from a position of disadvantage. Responsiveness is often most dominated by time, and to react effectively to a global threat we will need capabilities that are dominated by speed and payload. They must balance graduated readiness and forward deployment with the capability rapidly to project credible force. Our people are inherently responsive but they must be provided with appropriate force structures, equipment and procedure to unleash their full potential. *Robustness* is the degree to which our people and capabilities will remain effective under arduous conditions, particularly in close contact with an adversary, but also the ability to conduct different missions with the same capability. No longer can we afford ‘single note instruments’ and we shall only procure capabilities that are versatile across the full spectrum of operations. Those capabilities must be characterised by high reliability and precision of effect, in order that we might engender confidence in our own Armed Forces and credibility in the eyes of our adversaries. *Flexibility* seeks to avoid foreclosing options at too early a stage in planning. It will allow us better to overcome the unforeseen and avoid selection of options that cease to be relevant as the dynamics of a situation unfold. In addition, it will allow us to overcome system failure or enemy action by ensuring we are not dependent upon a single course of action or only one way of operating. Most importantly of all, *adaptability* will embrace an aptitude to learn rapidly about new environments, especially when faced with the unexpected, to encourage ‘loyal opposition’ and recognise the need for change,⁵ thence a measure of how well we can reconfigure our structures, equipment, processes or plans in order to succeed. Agility is not just a sense of being swift and the concept does not always substitute speed for mass. Indeed, agility can be exploited to achieve mass from a dispersed force.

304. **Effects Based Operations.** Effects Based Operations (EBO) are focused on actions and their influence on behaviour, i.e. stimulus and response, rather than on targets and attrition. Whilst the methodology for Effects Based Planning is still immature, the philosophy is widely understood. Indeed the concept is not new; good commanders have in the past intuitively understood and applied a wide range of effects. A lexicon is now being developed that can be used to describe effects across the range of operations. It is intended to enable a better understanding of how we achieve transitions between conflict prevention, high intensity operations and all the intermediate conditions of a complex operating environment. The lexicon includes specifics, e.g. to reassure, persuade, deter, coerce or destroy, but - except in the case of a war of national survival – the overriding strategic aim will always embrace influence on human behaviour. This recognises the requirement that democracies must achieve

⁵ In other words, to avoid ‘groupthink’, a recognised situation in close knit groups whereby challenging the perceived truth can be judged as disloyal or disruptive.

their objectives at minimum cost of life and public resource. The freedom of manoeuvre anticipated in a highly resolved battlespace⁶ will allow commanders to focus better on the achievement of effects. Those effects will be of two types; decisive and enabling. The former are those leading directly to the achievement of strategic and operational military objectives, while the latter will be necessary to shape the battlespace. By this distinction, EBO makes clear its ability to realise the full potential of the manoeuvrist approach as enabling effects are very much the *Shape* and *Protect* functions, while *Attack* and *Exploit* should deliver the decisive blows.

305. **Types of Effect.** Effects fall into two broad categories: physical (often called kinetic), targeted primarily against capability; and cognitive, principally targeted against will. Targeting capability often influences will and vice versa. Effects can be primary and subsequent (second, third, fourth order etc), intended and unintended. They can be applied to friendlies, adversaries and neutrals, across the 7 dimensions of the strategic environment by using the Instruments of Power⁷ individually or in conjunction. To unlock the full potential of EBO, future commanders will need to exploit a much richer information environment. It is important to emphasise, however, that to achieve the desired cognitive effect in some circumstances it may still be necessary for armed forces to engage in close combat or as a minimum have the credibility and will to do so. This may be the only way of affecting the capability and will of a determined adversary.

306. **Network Enabled Capability.** The UK Armed Forces intend to harness technological advances through the adoption of Network Enabled Capability (NEC).⁸ Network Enabled Capability promises to deliver shared situational awareness,⁹ a condition where force elements achieve a common understanding, of both the operational level context and the prevailing tactical situation. NEC also offers an opportunity to reconfigure the structure of our forces and to change the way in which we fight, generating fighting power that is currently latent at the seams between Service components and military functions. Joint Fires and Time Sensitive Targeting are emerging examples of mechanisms that might unlock the latent fighting power and this theme will be developed throughout this chapter.

307. **Command Intent and Freedom of Action.** Shared situational awareness, together with widely shared command intent, are intended to encourage force elements to grasp and generate fleeting opportunities that occur across traditional environmental (Land, Maritime, Air) and functional (intelligence, operations, logistics etc) boundaries, more confident that this will not lead to unintended effects like fratricide

⁶ The Information Age view of battlespace resolution is described below.

⁷ Diplomatic, Military and Economic. British Defence Doctrine (2nd Edition).

⁸ “Linking sensors, decision makers and weapons systems so that information can be translated into synchronised and overwhelmingly rapid effects.” D/CM(IS)2/1(106/02) dated 29 May 02.

⁹ Situational Awareness (SA) is defined as ‘the understanding of the operational environment in the context of a commander’s (or staff officer’s) mission (or task)’. JWP 0-01.1. The theme of shared situational awareness is explored in detail in Chapter 5 - Inform.

and collateral damage. The result should be an ability to create effects at optimum tempo. There is tension, however, with this idea and the need for control to achieve precise effects. On the one hand there is the responsiveness, creativity and freedom of action that the concept of agility seeks to enable; on the other, the degree of control required to ensure tactical actions are harmonised with the desired effects at the operational and strategic levels. We should strike the balance between the two by empowering all levels of command whilst retaining suitable control protocols. This is an expression of the UK Mission Command¹⁰ philosophy appropriate to the Information Age. It will be developed further in Chapter 4 - Command, but it is important to emphasise at the outset that it is a more human-centric than technological concept. It will require high quality leadership to ensure that the complexity of the networked environment does not obscure lines of accountability and that the impact of a commander's will does not become diluted across a distributed force.

BATTLESPACE MANAGEMENT

308. The current geometric and essentially linear construct of the battlespace is sub-optimal for the Information Age. The nature of future conflict suggests that a new concept is needed; a less rigid construct which encompasses more than just the military dimension of the strategic environment. Therefore, the future battlespace will encompass all 7 dimensions of the strategic environment using commonly referenced geo-spatial co-ordinates of the Land, Maritime, and Air environments, the electro-magnetic spectrum, computer-generated space and time.

309. **Battlespace Resolution.** At the operational and tactical levels, experienced commanders have always understood that the battlespace could never be fully resolved; the fog of war will prevail. But the future battlespace is now so complex that we can create many unanticipated effects. Battlespace resolution will be the degree of understanding and shared awareness within the 7 strategic dimensions. It will be a function of information available in appropriate context, information management and – most important – commanders' abilities to make sense of information presented to them. Well-integrated joint forces will help improve resolution by achieving better shared awareness and therefore the best potential for agility, tempo and precision. Given that the actions undertaken by the military are overwhelmingly in the physical domain,¹¹ the use of a physical frame of reference for the battlespace is an obvious choice. Therefore the physical domain will be represented in detail in the information domain. The representations of each of the other strategic dimensions will enrich this physical frame of reference, providing areas of greater or lesser clarity depending on the level of information available and the

¹⁰ 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.

¹¹ Contemporary Information Age theory uses 4 domains; physical, information, cognitive, and social. Power to the Edge, Hayes, Alberts et al Jun 03.

ability of commanders. The result could be likened to an unevenly lit landscape, with the level of illumination reflecting the amount of information resolution and understanding achieved. These illumination levels will be in a state of constant flux. The use of Intelligence Surveillance and Reconnaissance (ISR) could increase the level of resolution, but it must be stressed that, as the battlespace is all the dimensions of the strategic environment, increasing the information available in only one dimension might not lead to sufficient resolution overall. It appears certain that areas of relative obscurity will persist; therefore the conceptual model is one of variable resolution. The zones of shadow and light within the battlespace will produce both challenges and opportunities for future commanders. Experienced commanders have for many years intuitively understood this. However, the volume of information available to resolve the future battlespace will be orders of magnitude greater than today. Therefore future commanders need to be trained to deal with equivocality, in a similar way that current commanders have learned to deal with ambiguity.¹²

310. Factors in Poor Resolution Battlespace. The poorly resolved areas of the battlespace could be caused by many factors. Within the military dimension, these might include complex terrain, enemy actions or our own capability shortfalls. Complex terrain¹³ might cause signal degradation rendering adversary and neutral discrimination more difficult. Enemy actions such as deception, decoys and camouflage will continue to reduce resolution, while friendly doctrinal, technical or cultural differences could lessen the ability to exploit the advantages offered by networked capabilities. In particular, technical and cultural disparities within coalition may well prevent the entire force acting as an integrated, networked whole and limit the extent to which certain elements can interoperate with others. Insufficient knowledge of the socio-cultural, political or economic environments could make the task of identifying the required effects equally difficult.

311. Active Deconfliction. An integrated force in higher resolution areas of the battlespace should have shared situational awareness for both commanders and force elements. This will allow them to share position, status and intention to reduce the need for pre-planned deconfliction and permit dynamic adjustment of plans as they develop. Consequently, there should be much less requirement for procedural management of the battlespace and active deconfliction will be the normal *modus operandi*.¹⁴ The intervention of higher commanders would only be necessary when timing or physical constraints lead to the concurrent requirement for a particular volume of battlespace by more than one force element and efforts at active

¹² Equivocality exists when a commander can map multiple mental models onto the volume of information available. Whereas more information can help resolve ambiguity in an information sparse environment, in the future information rich environment it is likely that more information will create more equivocality. This may lead to a higher risk of 'decision paralysis'.

¹³ E.g. jungle, mountain, urban and littoral.

¹⁴ Procedural methods would still be needed to achieve graceful degradation in the event of system failures or enemy action.

deconfliction have failed, perhaps because of timelines imposed by higher authority. Freed from the need to expend so much time managing the battlespace, commanders will be able to focus more on the exploitation or creation of opportunities. The visibility of subordinate units and the overall situation will also permit commanders to take control, should it prove necessary to re-establish the synchronisation between tactical action and strategic and operational effect. In both cases, however, the level of interaction between elements should result in control being the exception rather than the rule. With this increased awareness of the battlespace, interaction of fire and manoeuvre will be much easier, permitting a high degree of tactical innovation with reduced risk of fratricide.

312. **Freedom of Action and Manoeuvre.** Freedom of action in high-resolution areas reduces the requirement to assign dedicated volumes of the battlespace to forces for long periods. Force elements should be able to inter-penetrate without undue constraint, greatly enhancing agility. Some limits and boundaries will still be imposed, even in high resolution. But these will be ephemeral; fleeting co-ordination measures that are rapidly designed and widely distributed with collaborative information tools,¹⁵ but which – immediately post action – are quickly dissolved in order to preserve maximum manoeuvre space for all subsequent potential users of that space. However, operations within lower resolution areas may still require a degree of circumscription to prevent mutual interference. A good example of this would be the case of a close contact battle, where the resolution of the battlespace invariably reduces, no matter how well communications are working. Any intervention by external force elements would require co-ordination with engaged forces and a higher degree of control. This control could be minimised if the engaged forces could produce sufficient temporary resolution for external forces to act; examples would be target designation for air support with precision munitions; a classic example of providing sufficient resolution for a *finite* time to enable Joint Fires. The situation would be somewhat easier when forces engaged within the lower resolution area were required to project force ‘outward’ into more resolved areas of the battlespace. Provided that force elements were able to retain their connection to the wider force network, they would still be able to act without undue constraint and in the era of long range weapons this would be an extremely useful capability. The difficult case would be where a force entering an area of low resolution was unable to use its networked capabilities to maintain sufficient shared awareness. Procedural deconfliction would then be the only solution.

¹⁵ For example the Joint Situational Awareness tool within the trial US Joint Fires software.

ENGAGING TARGETS

313. **Precision.** Wherever targeting is used in this concept, it embraces the generation of effects in its widest possible sense. Therefore targeting is always against both capability and will and it can include both lethal and non-lethal means. The goal for future operations is an ability to achieve precise effect – if necessary from a distance – but always with minimum planning time. Precision is more than weapon accuracy because effects are ultimately against an adversary's will and that does not always require precision weapons.¹⁶ The notion of precision also extends to the precise generation of all capabilities from fires to logistics. Precision will be affected by the resolution of the battlespace; poor battlespace resolution will not only limit the means by which we can act precisely but it will also hamper our ability to identify how to achieve desired effects in the first place. Our ability to resolve the battlespace is therefore critical to enabling EBO.

314. **Optimum Tempo.** Commanders seek to achieve and maintain Decision Superiority¹⁷ and optimum tempo at all levels in order to gain and retain the initiative. Decision Superiority may be easier to obtain in a well resolved area of the battlespace and it could also be depicted as a comparative advantage in resolution. Better shared situational awareness across a joint force will be a major contribution to Decision Superiority, and it will need information to be integrated across echelon, component, function and coalition. Decision Superiority also requires more responsive and adaptive command processes to improve tempo. Tempo is the rate or rhythm of activity relative to an opponent. Tempo must always be viewed as 'speed within context'; in certain operating environments a commander may wish to pick the correct time to act and timing can be more important than speed. Moreover, optimum tempo could be deliberately slow. Waiting for high-grade information to increase battlespace resolution and hence create better effects in the correct sequence can reduce the risk of unintended consequences. We will in all cases require commanders who have an intuitive feel for the precise moment at which the battlespace is sufficiently resolved to allow them to hold or seize the initiative. Finally, tempo allows the sudden massing of effects to achieve surprise. In a highly networked force, where the tactical level of command is fully empowered, a high degree of synchronisation of effort may manifest itself as 'swarming'. These natural opportunities for simultaneity, whereby so many effects overwhelm an adversary that he is unable to concentrate on any one, or even establish priorities, are key to achieving operational momentum and to shattering an adversary's cohesion.

¹⁶ For example, the persistent bombing of front line troops with relatively inaccurate weapons can still achieve a precise effect against their will - especially when harmonised with a coherent information campaign.

¹⁷ *'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 battlespace'*. DG Info (CBM) working definition, May 02.

315. **Persistence.** Responsiveness and therefore tempo is improved by persistence; the ability to maintain activity over time. Persistence can be delivered by either long-term presence of robust force elements able to survive contact or by the rapid rotation of less robust elements from areas of relative safety. The latter method requires good battlespace resolution and adoption of an information-centric philosophy that can exploit dispersed capabilities. The more physically robust platform-centric method, typified by heavy armour, would be required where the battlespace resolution cannot be maintained reliably thereby preventing effective support from external assets. Thus a balance must be struck between platform centric and information-centric approaches to provide persistence and responsiveness throughout the battlespace; this construct is developed in Chapter 8 - Protect. Sustainment will be critical for both platform and information-centric approaches.

316. **Agile Mission Groups.** The use of re-configurable, cross-component agile mission groups at all levels of command is one important expression of agility. These groups could be widely dispersed within the battlespace. Dispersal could mask intent and reduce the opportunities for a single, crippling attack by the adversary, although it would have to be balanced with the warning times needed to achieve sufficient mass for attack or defence. Force elements would remain as part of an agile mission group only for the time taken to complete the assigned tasks.¹⁸ The creation of an agile mission group from dispersed locations implies the ability for elements to act at a distance (reach) and/or to be able to move swiftly into position (speed). Just as collaborative planning can be conducted within virtual headquarters, so execution will be possible without physical co-location. However, the ability to co-locate is unlikely to become entirely redundant, as massing forces may still be necessary in certain cases. The true potential of the agile mission group philosophy is in the ability to integrate key capabilities across components to exploit the unique strengths of each whilst negating known vulnerabilities. The key strengths that we should preserve and integrate are: the high discrimination and resolution provided by close-in, all weather day and night sensors; the precision of terminally guided munitions; the persistence of Land and Maritime capabilities; the high responsiveness and flexibility of Air; and the considerable reach of the emerging generation of weapons.¹⁹ Agile mission groups will achieve effects throughout the strategic environment by exploiting Joint Fires, Joint Manoeuvre and Joint Information Activity.²⁰

¹⁸ The US draw similar conclusions: ‘*Joint Force Commanders require the ability to combine and re-combine forces to create specific capabilities that adapt more rapidly than adversaries.*’ Exercises PI03, UQ03 and Operation Iraqi Freedom, USJFCOM interim assessment Oct 03.

¹⁹ The moral component of fighting power is discussed in Chapter 6 - Prepare and Chapter 9 - Sustain.

²⁰ Joint Fires is the application of targeted weapons throughout commonly referenced geo-spatial dimensions of land, maritime, and aerospace environments, the electro-magnetic spectrum, computer-generated space and time. Joint Manoeuvring is the re-positioning of agile mission groups throughout commonly referenced geo-spatial dimensions of land, maritime, and aerospace environments, and time. Joint Information Activity is the application of targeted information techniques throughout commonly referenced geo-spatial dimensions of land, maritime, and aerospace

317. **The Relationship between Responsiveness, Reach and Vulnerability.** A key goal for future operations is freedom of manoeuvre and the ability to manoeuvre implies mobility and reach from the strategic to the tactical level. But it is the relationship between reach, responsiveness, vulnerability and physical robustness that provides a major driver for future capabilities. For kinetic fires, closer to the target means more responsive, but also more vulnerable.²¹ Figure 3.1 illustrates the balance. A highly responsive conceptual ideal would be a system with permanent global coverage and near-zero commit-to-initial effect time.²² Clearly, apart from the limited range of effects which that conceptual ideal might generate, limited resources will force us to consider capabilities that fall short of this; a mix of systems that are as responsive as possible but with global reach are the realistic aspiration that balances strengths against weaknesses.

318. The initial strategic posture of Maritime, Land and Air capabilities is characterised by the plots at the right hand side of Figure 3.1. The full range of capabilities encompasses a variation in strategic responsiveness that ranges from weeks for the heavier end of Land to hours for Air. Strategic air can have a permanently high value of responsiveness, but tactical Maritime, Land and Air capabilities have to be forward deployed to achieve useful values. The speed and reach of tactical air makes it highly responsive, but it can suffer from a relative lack of persistence. Conversely, Maritime capabilities have potential to sustain forward presence and they deliver high persistence of effect but certain weapon systems still have relatively long commit-to-initial effect times, which render them less flexible, even with mid-course re-targeting. However, once in position, Land forces have both permanence and high local responsiveness. A rifleman can respond in seconds to an opportunity threat while larger calibre direct and indirect fire systems can react nearly as quickly. However, the proximity of the threat to shorter-range weapon systems means that platform vulnerability then begins to dominate the equation. This will be discussed further in Chapter 8 - Protect. Finally, any degree of forward-deployment means a more extended, and hence more vulnerable, logistic tail. As ever, a careful force mix provides both robustness and flexibility. Whilst the examples above concentrate on kinetic effects, to stress the issue of vulnerability, the only way to deliver many of the more subtle effects in non-warfighting operations is through the physical presence of a well-trained individual.

environments, the electro-magnetic spectrum, computer-generated space and time. Examples of the latter include computer network attack, radio/TV broadcasts, and leaflet drops.

²¹ This is not to ignore asymmetric threats along lines of communication or even on home ground - but the statement is true for most combat engagements.

²² Commit-to-initial effect time is the irreducible period between the decision to commit an action and the initial effect occurring. TLAM has a relatively long commit-to-initial effect time whereas for infantry with small arms in contact, the commit-to-initial effect time is low.

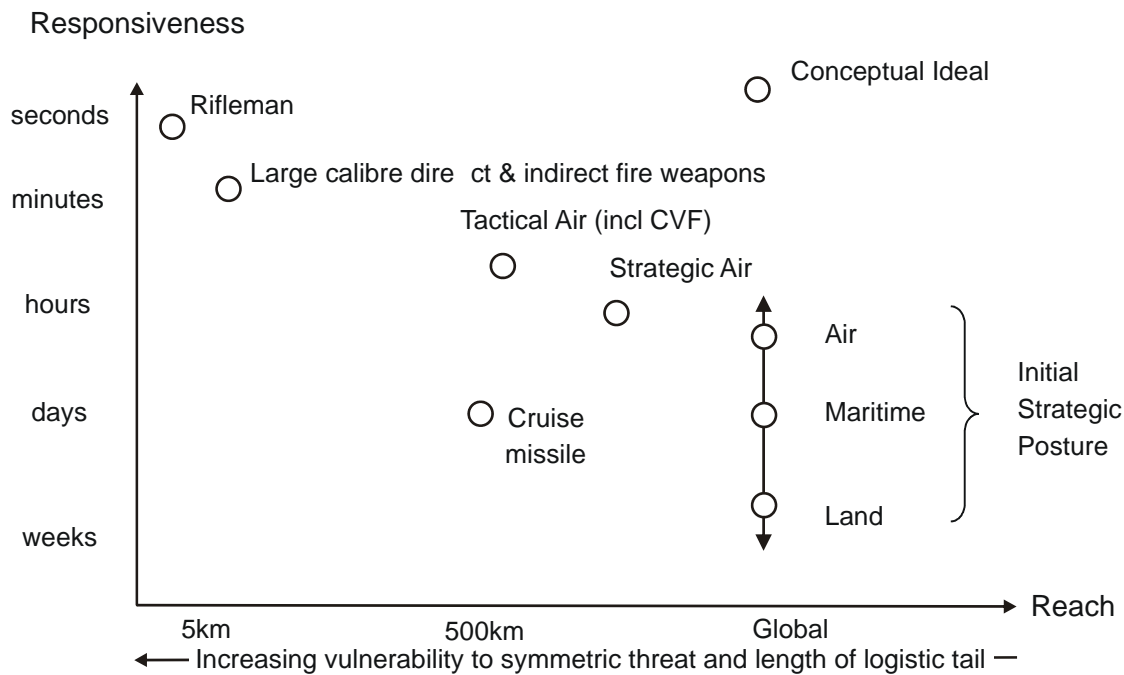


Figure 3.1 – Illustrative levels of Responsiveness, Reach and Vulnerability

319. **Shared and Dedicated Capabilities.** When the resolution is high, agile mission groups can be highly-optimised, as the parameters of the task can be precisely set and it is less likely that force elements will face the unexpected. These optimised groups would have a small core of dedicated assets, depending on the ability of other networked assets within the force to provide capabilities that organic assets perform today. If the resolution is lower, a higher proportion of the capabilities must be met by dedicated assets. Furthermore, these groups could not be optimised to the same degree and there will be an increased risk of the unexpected. The specific qualities of force elements will often determine whether particular assets are used in dedicated or shared roles. The qualities that must be considered include reach, mobility, commit-to-initial-effect time, precision and lethality, survivability, and persistence. The value of each is situation-dependent. However, the final decision will always rest upon the knowledge, experience and intuition of the local commander.

320. **Reserves.** The immutable characteristics of operational and tactical reserves are that they should be appropriate and uncommitted. Operating in a high resolution area will reduce the risk of unexpected events, permitting finely tuned force packages to operate with well balanced reserve capacity. They may even depend on shared assets to fill the reserve role, exploiting agility to the full, confident that reserves can engage quickly, even from a distance. In lower resolution battlespace the effectiveness of remote or cross-component tactical reserves may be reduced as their ability to act is limited and the engaged force will have to depend on its own resources for longer, increasing the ratio of dedicated assets required. Very low resolution battlespace would force the group to meet virtually all capability requirements, including reserves,

with dedicated assets.²³ A critical factor affecting a commander's calculations for reserve requirements and the design of agile mission groups will be our force projection capability, discussed in Chapter 7 - Project.

321. **Doctrine.** Notwithstanding the concept of configuring combat power optimised to local battlespace resolution and the different capabilities of dedicated and shared force elements, it will remain important for the overall force to use a common doctrine. However, varying the tactics, techniques and procedures according to the mission and the local level of resolution would provide sufficient flexibility for coalition operations. The fundamentals of the doctrine should remain as currently cast in British Defence Doctrine.²⁴

²³ Chapter 8 - Protect discusses further the differing capabilities of dedicated and shared assets with respect to the battlespace resolution and the degree of protection provided by physical or informational attributes.

²⁴ Warfighting ethos; joint, integrated and multinational; Principles of War; manoeuvrist approach; flexible and pragmatic; Mission Command.

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CHAPTER 4 – COMMAND

COMMAND CORE CONCEPT

Mission Command relevant to the Information Age. At its heart is a network-wide expression of command intent – promoting unity of effort – and an adaptive Command and Control (C2) process. The concept seeks to maximise the creativity and initiative of subordinate commanders by resolving the tension between freedom of tactical action and alignment of strategic and operational goals.

MISSION COMMAND

401. There is no better example of the need for embracing change whilst maintaining a sense of continuity than in the requirements for future command and control. Our command philosophy is robust and must endure. However, we perceive an urgent need – and the means – to change control mechanisms that are increasingly inappropriate for operations in the Information Age. Command is the authority vested in an individual for the direction, co-ordination and control of military forces.¹ Only humans command because they demonstrate the range of innovative and flexible thinking necessary to solve complicated and unexpected problems, therefore competency, authority and responsibility are essential features.² British Defence Doctrine articulates the essential balance between direction and delegation but highlights an important dilemma; modern communication systems can tempt commanders to over-control. Moreover, when communications fail, it can also expose over-dependency upon technology. The philosophy of Mission Command must therefore endure; commanders must define their missions and provide resources for subordinates, but delegate authority wherever feasible to encourage freedom of action and promote initiative. In essence, we must continue to tell subordinates what to do, not how to do it.

402. The human-centric nature and therefore the fundamentals of Mission Command – unity of effort, freedom of action, trust, mutual understanding, timely and effective decision making – remain valid. However, the power latent in new information tools³ may go to waste until we understand which relationships between command and control remain valid for the Information Age. Control is the authority exercised by a commander over subordinate organisations.⁴ Whilst often necessary it comes at a price: it takes time and once adopted restricts subordinate flexibility. In a modern information environment, experimentation shows that more natural lateral synchronisation across function, component and coalition could replace hierarchical planning and communication. These extremely powerful peer-to-peer relationships

¹ JWP 0-01.1.

² Reconceptualising Command and Control, Pigeau and McCann, Canadian Military Journal, Spring 02.

³ For example, Collaborative Information Environments that promote rapid and deep understanding of a problem through the strong interaction of participants who use networks to enrich critical information.

⁴ JWP 0-01.1.

occur almost spontaneously within the context of widely distributed but carefully expressed command intent. Much theory and a growing body of evidence indicate the possibility of tactical self synchronisation⁵ and optimum tempo provided that there is: clear and consistent understanding of command intent, high quality information and shared situational awareness, competence at all levels of command, and trust in information, subordinates, superiors, peers and equipment.⁶ However, with higher overall awareness and a far greater ability for lateral communication and initiative, there is also potential for tactical anarchy. Therefore an adaptive command and control process will seek to resolve the inevitable tension between freedom of action in and alignment of strategic and operational goals. This type of command process will be characterised by light corrections on the ‘command tiller’ to establish synchronisation of subordinate action with higher level intent, followed by immediate restoration of freedom of action to the lowest possible levels. Although difficult to achieve – doubly so in coalition operations where cultures and command philosophies vary – the prize is much higher tempo and true agility.

403. The current definitions of command⁷ are becoming too crude to apply effectively in a highly dynamic politico-military environment. Therefore the adaptive command and control process also seeks to provide greater flexibility for command and control configurations in order to optimise integration with coalition partners. Decision superiority will remain the central theme of the command process, but collaborative planning and shared situational awareness may set conditions where commanders at all levels have the capability to delay ‘option lock-in’ to the last possible moment, thus providing very high flexibility. The ability more rapidly to ‘sense and understand’ at the tactical level may lead to strategic planning cycles being outpaced by those at the operational and tactical levels. Consequently, decision-making at the strategic level must be rooted in planning that is highly responsive across government departments. This is an extension of collaborative planning; a technique that is showing great promise through experimentation and which could replace traditional planning cycles. However, it will clearly need very responsive control mechanisms. If the correct balance is achieved, lower battlespace management overheads – gained from more rapid and natural synchronisation of activity at the tactical level – could permit better focus on exploiting and creating opportunities at all levels. The most critical issue throughout will be the careful engineering and widespread understanding of command intent.⁸

⁵ Self synchronisation is a condition where force elements intuitively synchronise their actions without control.

⁶ Power to the Edge, Alberts and Hayes, DoD Command and Control Research Programme, Jun 03.

⁷ OPCOM, OPCON etc.

⁸ The unambiguous expression of command intent in the information domain is difficult; we need to understand how to overcome the vast network of implicit intent that cannot be vocalised, namely: personal expectations based on style and experience, military expectations based on doctrine, training and tradition and cultural expectations based on societal values and morals. Understanding the latter factors is critical in coalition operations. See Pigeau and McCann on Command Intent.

DECISION-MAKING IN THE INFORMATION AGE

404. An operational environment that emphasises agility and tempo will require commanders who have what Frederick the Great termed ‘*coup d’oeil*’ – the inner light of understanding derived from experience and intuition that will allow them to make sense of a chaotic, non-linear, battlespace. They will not only need to understand this environment, they will need to be comfortable in it; this sits uneasily with centralised and mechanistic military command cultures and the nature of the emerging information environment – that is inexorably compressing the levels of command – and which threatens to encourage inappropriate command behaviours. This is underlined by experience of networks to date, which has revealed that shared information can have unintended consequences.⁹ Thus information may in future more easily distract commanders from their strategic and operational foci, further hindering their deep understanding of a situation.

405. **Shared Situational Awareness.** The first step in a decision making process is observation. Thence follows the complex cognitive processes that lead to awareness, understanding and sense making. However, agility also demands high levels of *shared* awareness. This exists in the minds of multiple actors and is the result of complex interactions between information presented to individuals, their personal attributes and the quality of interaction between them.¹⁰ The quality and accuracy of the information can increase the speed of cognition and well-engineered displays with good human-machine interfaces add value. But training, doctrine and experience impact strongly because they provide a common frame of reference and can improve shared situational awareness to a high degree. It is for this reason that human factors should heavily influence the design of any future situational awareness tools. Shared situational awareness is thus a rich, dynamic comprehension of the military situation and all the factors that drive it. Where it generates in commanders’ minds more than one potential future, they must be able to recognise the uncertainties within each.

406. **Understanding and Sense Making.** Understanding follows awareness when a commander is able to draw inferences about the possible consequences of a situation and it allows trained commanders to predict future patterns. There is considerable evidence from US research, including empirical data from military exercises, to suggest that commanders can recognise key patterns and jump directly from assessing a situation to a solution: the experienced commander’s short cut. Understanding therefore bridges awareness and sense making. Therefore once understanding is mapped onto a commander’s unique mental model, the latter conditioned by training, doctrine and personal values, a picture can emerge of how the current situation might evolve over time. As a result of sense making, decisions are made.

⁹ For example, the temptation to ‘interfere forward’ and the almost hypnotic nature of centrally displayed tactical video feeds that can distract an entire operational staff from assigned tasks.

¹⁰ Hayes, Alberts et al note that personal interactions occur in a Social Domain and that modern information tools can vastly improve the quality of interaction in the Information Domain - See Chapter 5 - Inform.

407. **Decision-Making.** Decisions take place in the mind but are communicated through the information domain. They may result in complex plans that, if developed in isolation, could be subject to misunderstanding in the transmission process. Complex military decisions are made by the relevant commander and are a result of interaction between groups of participants. Research shows that a relatively small numbers of contributors who have different backgrounds and views of the situation make the best contributions to complex decisions. This is reflected in the way that many commanders confide with an inner trusted circle. But the quality of interaction required in the information domain to convey this invariably complex collection of factors to subordinates, without losing the subtle nuances, is a difficult task. It hinges upon the unambiguous expression of command intent.

COMMAND INTENT

408. The unambiguous expression, widespread distribution and clear understanding of command intent¹¹ are critical enablers for agility. Command intent will be more powerful than traditional guidance or orders, which by current convention are converted through linear process into detailed missions and objectives at each level of command. In future, command intent will arise from a quality of interaction between commanders and subordinates that is not currently possible. This will improve the ability of lower echelons, informed by the collaborative planning process, to recognise more often and to exploit rapidly windows of opportunity without detailed forward planning.

409. Intent is an aim or purpose along with all of its associated connotations. 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.¹² This comprises 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 morals. The latter factors are the most deep-rooted and difficult to influence therefore they become crucial in coalition operations. Consequently, commanders at all levels need Information Age skills. One of the most of important of these Information Age skills will be exploiting the power of metaphor; the artistic skill that underpins operational art and which must be adapted to allow clear expression of intent in a modern

¹¹ Command intent is a statement that focuses on the decisive elements of how a mission should be accomplished. It must be rich enough to convey intent but simple enough to be unambiguous. The key is to leave sufficient room for initiative and interpretation by individual commanders. Adapted from Network Centric Warfare - Developing and Leveraging Information Superiority 2nd Edition, David S Alberts et al, DoD C4ISR Co-operative Research Programme, Aug 99.

¹² Command Intent, Ross Pigeau and Carol McCann, Defence and Civil Institute of Environmental Medicine, Toronto Canada.

information environment. Also important will be training at unit, component and coalition level that imparts rich but diffuse information over time to overcome differences in expectation that might lead to fatal misinterpretation of intent. Experimentation indicates that prior face-to-face interaction with colleagues who then work in virtual environments does much to help engender suitable trust and understanding.

410. Collaborative Planning. Effects Based Planning seeks to generate a broad range of physical and cognitive effects. It requires richer information than the traditional planning process, involving detailed Knowledge Bases¹³ to provide a thorough understanding of the adversary's culture and value sets. The outputs of Effects Based Planning will be command intent, the operational framework to produce the required effects, and, most important, the campaign effectiveness analysis metrics. A shared information environment will allow commanders and staffs at all levels and functions to interact immediately a plan is initiated, in other words to plan collaboratively. Because everyone will be continuously aware of the strategic and operational level context, collaborative planning will be an important element of shared situational awareness and it will improve the chances of subordinates understanding intent. This should also reduce the time required to synchronise operations. Force elements may even be able to prepare for operations before being ordered to do so and plan on the move, as already demonstrated in US Experimentation.¹⁴ Subordinate HQs at every level should be able to initiate their part in the operation with shared situational awareness allowing continual adjustment and co-ordination across virtual flanks.¹⁵ However, procedures will still be required to allow for graceful degradation in the event of network failures.

411. Impact of Battlespace Resolution. Freedom of action, high tempo and more accurate planning will be easier within highly resolved battlespace. Likely campaign branches would be identified with greater clarity. During execution, this should lead to greater economy of effort, reinforced in turn by more accurate campaign effectiveness analysis. Within lower resolution areas, the reverse is true. Although command intent will still provide the basis for action, low levels of shared awareness could make synchronisation and collaborative execution more difficult. Similarly, the commander would have a more limited knowledge of the overall situation and

¹³ Knowledge Bases are pools of processed information maintained by expert communities, such as the US Operational Net Assessment.

¹⁴ Exercise PI 03.

¹⁵ The disruption caused by the fuel crisis strike in the UK during winter 2000 is an example of so-called 'self synchronisation'. Lacking any national leadership or formal organisation, but armed with a common intent to move the government on a fuel tax issue, informed by mass media telecom and the Internet, disparate groups acted in concert to create havoc. This concept is not as revolutionary as some would claim. A 1930s German Army pamphlet stated: "...the emptiness of the battlefield requires fighters who think and act on their own and can analyse any situation and exploit it decisively and boldly". The German Army system demanded that, when necessary, the various Arms should co-ordinate and act together without direction from above. In J Storr, A Command Philosophy for the Information Age, The Big Issue, Ed D Potts, SCSi No 45, Mar 02.

therefore a lessened ability (or at least justification) to take direct control of subordinate units. Courses of action might well be less optimal, with potential branches less well-defined, leading to increased subsequent levels of both planning and effort.

INTEGRATING THE JOINT AND COALITION FORCE

412. There are numerous interoperability models but the key point is that there are both technological and cultural dimensions that senior commanders must address.¹⁶ Whilst technological interoperability is a major issue, culture, organisational structure, procedures and training can significantly influence the effectiveness of interactions between systems, units or forces in joint or combined operations¹⁷ and in many cases it is these aspects that are the main barriers to interoperability. Therefore the commander will always have a key role to play. The greater the degree of joint integration the better the potential degree of battlespace resolution. However, as the Military dimension¹⁸ is but one of the 7 dimensions of the strategic environment,¹⁹ a fully integrated force will not necessarily result in a fully resolved battlespace. Rather, improved resolution within the Military dimension is the primary factor enabling agility and agile mission groups.

413. **Integrated, Interoperable and Deconflicted Forces.** The level of technological integration, along with the human and organisational attributes above, can be used to describe the level to which we *integrate*²⁰ for warfighting with key allies that are able to exploit the future information environment, but perhaps only *interoperate*²¹ with other multinational forces. In the extreme case of allies with no digitised capability or strong cultural barriers, we will deconflict entirely but seek unity of purpose. Integrated forces will exchange near real-time information over secure links using shared procedures, a common command ethos and deep understanding of cultural differences. Interoperable forces are likely to use reversionary techniques and processes such as liaison officers and standing procedures. *Deconflicted* forces will have their activities constrained in space and time.

¹⁶ A development of the US Levels of Information Systems Interoperability model derives interoperability from four enabling attributes: preparedness considers what doctrine, experience and training enable organisations to work together; understanding determines what level of information and knowledge sharing exists and how it is used; command style addresses how roles and responsibilities are delegated or shared; and ethos determines the levels of trust, culture, values and goals that are shared. Interoperability for Joint and Coalition Operations, Thea Clark and Dr Terry Moon, ADF Journal No 151 Dec 01.

¹⁷ Interoperability for Joint and Coalition Operations, Thea Clark and Dr Terry Moon, Australian Defence Force Journal No 151, Nov/Dec 01.

¹⁸ Military dimension includes Blue (friendly forces), Red (hostile forces) and White (third party neutrals).

¹⁹ Economic; political; military; technological; socio-cultural; physical; legal, ethical and moral, JDCC Strategic Trends Mar 03.

²⁰ 'Combine or be combined with to form a whole'. Concise Oxford Dictionary, 10th Edition.

²¹ 'Able to operate in conjunction'. Concise Oxford Dictionary, 10th edition.

414. **Agility and Interoperability.** In Figure 4.1, the four components of agility are divided into two pairs; Responsiveness and Robustness are more physical attributes, whereas Flexibility and Adaptiveness are more cognitive. To a great extent, equipment determines physical agility, while mental agility is mainly a matter of ethos, doctrine and training. Forces can be usefully categorised in these pairings to understand how best they might be integrated into a coalition. Those with relatively poor equipment and rigid command structures have low overall agility. While procurement of better equipment, leading to more robust and responsive forces, or the adoption of more flexible doctrine and adaptive command structures would increase agility, the optimum position is achieved when both good equipment and flexibility are evident. Increasing agility by procuring better equipment would only be possible in a practical sense before becoming involved in an operation as the time required for procurement and the necessary training would normally preclude short notice acquisition of major equipment. The only solution available in the short term to improve agility would be to bolster coalition cognitive ability by providing information connectivity and liaison officers. This limited degree of networking would increase probability of understanding cross-coalition intent. Even if the underlying doctrinal and command structure were to remain relatively unchanged, the ability of the force overall would be enhanced by the ability of higher command elements to make better informed decisions. The dotted lines at Figure 4.1 indicate where the boundaries between deconflict, interoperability and integration might lie. Coalition forces of lower cognitive agility might therefore become interoperable, although full integration is likely to remain the province of those who have procured suitable equipment and prepared their forces accordingly.

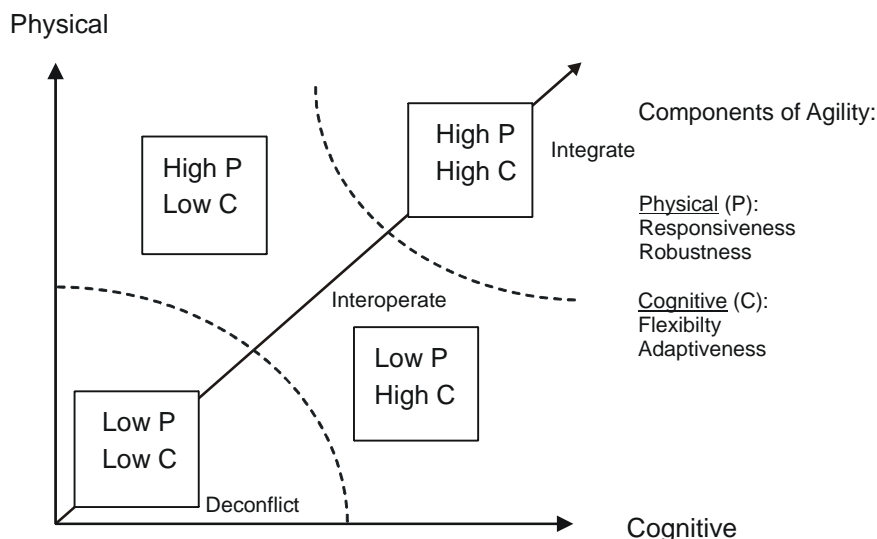


Figure 4.1 – Force Integration by Components of Agility

415. **Unity of Purpose.** It seems that in most cases it is the organisational, doctrinal and cultural aspects, not just the technological issues, which are the real barriers to

interoperability. Of all these, security is probably pre-eminent; it, more than anything else, inhibits the flow of information within the military, between Government departments and within a coalition. The implications of this in a networked force are explored more fully in the Inform paper. The differences between coalition partners will continue to cause friction. In particular, the British way of command may sit uneasily with the preference amongst others for more detailed control; a pertinent example being the emphasis on staff led planning processes in the US compared with greater emphasis on Mission Command and delegated planning in the UK. This is one reason for working *with* if not precisely *as* our coalition partners. The key will be to retain unity of coalition purpose, if not the traditional view of unity of command. It is likely that some allies, even if they have the technology, will have cultural differences that create friction. It follows that UK Armed Forces will require commanders and staffs who have the patience, tact, flexibility and cultural empathy to minimise these difficulties. These qualities will also be required to manage relations with potentially non co-operative agencies in the battlespace, such as some non-governmental organisations (NGOs), who can create both positive and negative effects.

416. **Headquarters Integration.** At national level, the availability of information on a network could usefully erode the tendency to stovepipe information within traditional staff branches. Smaller HQs would help cross fertilisation and it may be that the traditional J1-J9 staff branches are no longer appropriate. Future HQ structures could, for example, extend the current PJHQ philosophy of joint task groups, who take ownership of operations from inception to completion. However, such a level of integration may not suit all coalition partners and we must retain the ability to revert to more traditional structures if required.

CONTROLLING AN AGILE FORCE

417. **The Command and Control Relationship.** Command and control should not be seen as synonymous.²² Whilst possessing command is a prerequisite to exercising control, it is dangerous arbitrarily to group command and control with communications and computers to yield acronyms such as Command, Control, Communications and Computers (C4).²³ Commanders exercising excessive control do so at the price of timely decisions. Successful commanders understand this because control by exception promotes freedom of action and tempo among their subordinates. Control is about guiding an operation; ideally commanders will exercise a degree of control consistent with the objectives at their level of command. Put another way, the objective of control is to contribute, not to interfere. Therefore the exploitation of technology to 'reach forward' is valuable only if it contributes to success. One case for exercising control under the future Command and Control (C2) construct in this

²² The C2 acronym has less than logical provenance; it was coined by President Truman when giving General MacArthur authority over occupation forces in post 2nd World War Japan and had nothing to do with warfighting. JFCOM website Oct 03.

²³ Rediscover the Art of Command and Control, V Adm Robert F Willard USN, 'Proceedings', Oct 02.

paper is to maintain the alignment of strategic and operational level goals. The imperfect interpretation of command intent, combined with occasional chaos in the physical domain, will invariably lead to operations becoming desynchronised. The sensible use of control at that stage will help realign tactical actions with higher goals. It follows that in all operations commanders will need to strike an appropriate balance between centralised and decentralised control. The key to resolving the tension between freedom of action and control will be a shared information environment that uses a richer more broadly distributed and better understood command intent. Shared situational awareness should allow optimum synchronisation²⁴ between force elements but, if it slips, higher level commanders must be ready to reassert control if their level of resolution, and hence their understanding of the situation, permits. The ideal will be minimal corrections on the 'command tiller' to re-establish synchronisation, followed by restoring freedom of action to the lowest possible level. Although difficult to achieve – doubly so in coalition operations, where cultures and command philosophies vary – the prize is higher tempo and agility.

418. Adaptive Command and Control. A limited representation of adaptive C2 is at Figure 4.2. The process starts with the wide range of effects generated in a complex operating environment. The effects are managed at levels of command from strategic to tactical, with the degree of control required varying across the battlespace. To do this, commanders exercise control appropriate to the situation. The control default is biased to zero in order to promote initiative and tempo, but Figure 4.2 illustrates a situation where the operational level commander has taken corrective action - and this is reflected by an even greater degree of subsequent control by a tactical commander over his own subordinates. The ability of a higher level commander to take control, or even to realise that he should, will be highly dependent on the level of resolution of the battlespace. In less resolved areas, his understanding of the overall situation may be insufficient to permit anything other than procedural control. In this case, good understanding of command intent becomes vital, as subordinates exercising Mission Command must be trusted to proceed in accordance with intent.

²⁴ Optimum synchronisation not only includes time and space but is achieved when primary and secondary effects are being generated in harmony with command intent, in particular the strategic and operational goals.

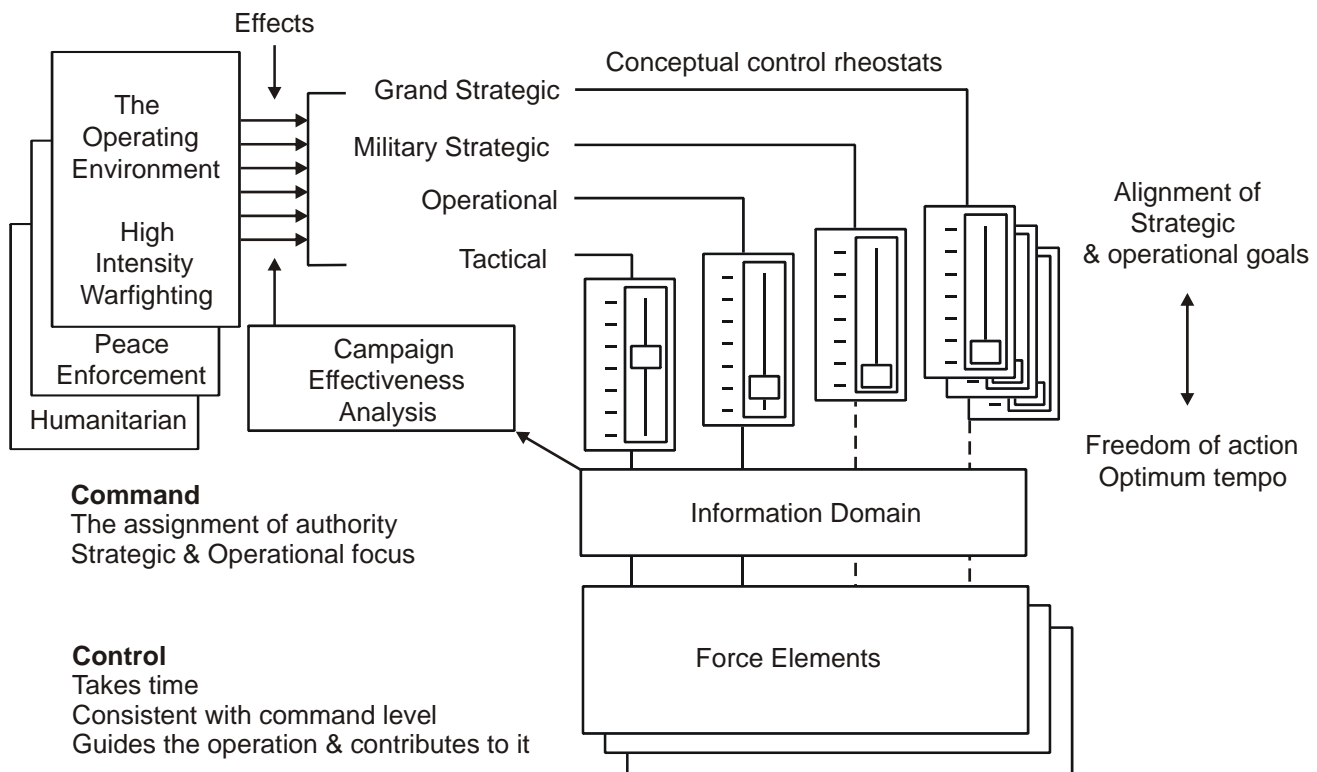


Figure 4.2 – An Information Age Adaptive C2 Model

419. Although control takes time and can inhibit high tempo if used without thought, in cases where timing and quality of decision are more important than speed, it is appropriate to take time by exercising control. Therefore there is a strong link between the complexity of the operating environment, what constitutes optimum tempo for that environment and how much control might be exerted to achieve it.²⁵ Finally, campaign effectiveness analysis is a crucial element of control. It is what allows commanders to detect discontinuities, adverse outcomes or simply the wrong effects occurring in the battlespace. With that rapid feedback, control can be exerted to shape the correct outcome.

420. **Command and Control of Agile Mission Groups.** The current practice of task organising works well as groupings can be formed tailored to the mission under unified command. At present, re-grouping takes place only within, rather than between components. However, this does not preclude the need for mass versus speed in certain offensive or defensive operations and agility can be exploited to achieve mass with a much higher probability of maintaining an element of surprise. One way of doing this could be to group capabilities according to their ability to deliver

²⁵ A good example of an 'adaptive C2' system is UK Army operations in N Ireland where commanders may choose to listen to any tactical radio net. Media Ops staffs are thus able to listen to an incident as it unfolds and rapidly issue a credible account before others offer a different version of events. Although commanders could 'interfere forward', experience shows this happens very rarely as this creates uncertainty when tactical commanders have to think and act very fast indeed and so does not contribute to success. Any corrective action tends to take place 'off line' between commanders and staffs, so maintaining, and not undermining, the integrity of the chain of command.

particular effects.²⁶ The agile mission groups created would 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 appreciation of the local battlespace, and possibly 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.

421. **Structural Impact.** The C2 model is potentially flatter and certainly far more responsive. It provides the opportunity to re-examine the size, nature and function of HQs, with particular regard to the current hierarchical structures. In so doing we should be careful to distinguish between the function of command and the mechanisms of control. Stripping out control infrastructure does not necessarily mean that levels of command will be removed. Fewer co-ordination requirements would increase tempo and a smaller number of HQs would make collaborative planning easier to achieve. Experimentation must assess the implications of de-layering, but at the very least, we should seek to dissolve the traditional barriers that currently inhibit the free flow of information across the echelons of command. The development of autonomous sensors and weapon systems have additional legal implications for future control mechanisms that we should consider in experimentation. The reduced size of in-theatre HQs could also have the advantages of reducing life support overheads and signature, increasing strategic and tactical mobility and improving the efficiency and speed of staff work by reducing the requirement for internal briefing. Full exploitation of reachback and adaptive C2 may require a modular approach to HQ design. This could allow modules to be positioned where they can perform most effectively, minimising vulnerability and administrative overheads. On the other hand, the demands of multi-nationality are likely to militate against reducing HQ size and we may be forced to retain more traditional structures for multinational operations. Finally, the distributed information environment may allow commanders to be physically remote from their subordinates more often than hitherto.²⁷ The implications of this are discussed in Chapter 6 - Prepare and Chapter 8 - Protect.

²⁶ This approach has been explored in the course of current studies work. For example, one campaign plan 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.

²⁷ British Defence Doctrine, 2nd Edition.

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CHAPTER 5 – INFORM

INFORM CORE CONCEPT

Decision Superiority through shared situational awareness within task-orientated communities of interest that exploit collaborative processes in a single information domain.

DECISION SUPERIORITY

501. Decision superiority is achieved by individuals at any level who mentally manoeuvre at best speed – relative to their adversary – through the ‘observe – orient – decide – act’ cycle. A good commander always sees this speed in context, recognising that sometimes it is better to act deliberately and that correct timing can be as important as speed. Therefore commanders need information presented in context to act as a catalyst for decision making.¹

502. However, the future military information environment will be complex. Its most dominant characteristic will be the sheer breadth and depth of information available to a commander² and therefore the greater difficulty of presenting information in context at the correct time. The Internet is a good example of a modern communication system. This kind of technology may prevail for the future information environment,³ but there are both strengths and weaknesses. Web-based technologies can host much valuable information but the information relevant to an individual at any given time is inevitably immersed in other information clutter. The ratio of relevant information to clutter gets worse as sensors and information systems proliferate. Even if we know in future precisely what information we need, it may on occasion prove difficult or even impossible to discriminate it from clutter.

503. Current military information processes are based upon long-established structures that are now poorly matched to the nature of the modern information environment. We gather and analyse large volumes of data and then distribute analysed and structured information to points of interest that are pre-determined by information exchange requirements. Process is most frequently influenced by command process and security protocols, with information most typically flowing within vertical echelons. This rigidly structured approach worked well but its roots can be traced back hundreds of years when it was the only effective way to control a large military enterprise that had limited communications. The processes still work, but they have arguably reached the limits of their capacity – and therefore effectiveness – and are sub-optimal for an information rich environment. More

¹ USJFCOM concept staffs contend that Information Superiority is needed to establish Decision Superiority. The UK emphasises that Information Superiority is not the difference in volume or quality of information, but simply the condition where enough information is presented in context to enable timely high quality decisions.

² ‘The commander may be overwhelmed by the sheer mass of information.’ Exercise PI03 Final Report Sep 03.

³ D/JDCC/7/11/7/1 dated 28 Feb 03 sets out the expected future technology environment.

important is that they are not flexible enough to realise the concept of operational agility that needs more natural lateral communication paths to enable better peer-to-peer interaction. Agility is also based upon a capability to exploit information at the earliest possible opportunity, even raw data, so that traditional processing and analysis is neither always necessary nor desirable.

SHARED SITUATIONAL AWARENESS

504. Shared situational awareness is essentially a condition where force elements achieve a common understanding of both the operational context and the prevailing situation and imperatives. We seek shared situational awareness because it provides the best context for rapidly synchronised action by force elements and therefore agility. The quality and accuracy of the information presented to commanders can increase speed of cognition and well-engineered displays with good human-machine interfaces add value. Therefore human factors will heavily influence the design of future awareness tools that will allow rapid assimilation of large volumes of fused information. Training, doctrine and experience will impact strongly because they provide a common frame of mental reference that can improve shared situational awareness to a high degree.

505. Despite one hypothesis that shared situational awareness is derived mainly from an operational picture, it actually exists in the cognitive domain and is the result of a complex interaction between information and personal attributes. To enable shared situational awareness, each force element should theoretically have access to all relevant information. However, the laws of physics suggest that this will be difficult to achieve and the information management challenge suggests that it may not even be desirable – in the short-to-medium term at least – until we have higher confidence that sufficient bandwidth and suitable information management tools will be available. The battlespace could be configured for efficient information sharing by identifying communities of interest within which information flows are matched to reflect different needs as well as the capacity of each entity to handle information. The bedrock of shared situational awareness will be a joint – ideally combined – blue force tracking system that will allow friendly forces a high degree of certainty of own force disposition, status and intentions. This will be fused with information acquired for adversaries and neutrals to provide the primary tool for shared awareness.

506. Achieving the awareness required for Effects Based Operations (EBO) will be challenging because the future information domain will be very wide, deep and rich.⁴ It will provide representations of the physical domain in which we will fight⁵ and a

⁴ For EBO the potential volume of information is bounded by the 7 dimensions of the strategic environment (Legal, Ethical and Moral, Social and Cultural, Economic, Political, Technological, Military and Physical), the levels of command (Grand Strategic through to Tactical) and the instruments of national power (Diplomatic, Economic and Military).

⁵ For example, the Recognised Environmental Picture.

depiction of the strategic environment that constitutes one catalyst for a commander's deep understanding of the battlespace. For EBO, information will span that which is already available, such as infrastructure analysis, military capability and environmental data, but also provide more detailed insights into key attributes of our allies, neutrals and adversaries such as culture and value sets.⁶ Information displays will allow commanders rapidly to assimilate relevant information and in future must be enhanced to allow them to analyse patterns and trends from past events. This ability to move back and forth in time within the information domain will enable commanders to make better sense of situations against the richest possible understanding of potential consequences of their actions.

THE COLLABORATIVE ENVIRONMENT

507. Experimentation with close allies⁷ indicates the immense potential power of collaborative processes. It is important to understand what effective collaboration is. It is *not* simply distribution of information followed by passive absorption, no matter how rich that information is or how widely it has been distributed. It *is* an iterative exchange of information that progressively adds value and deepens the understanding between participants. Modern information tools such as chat rooms – already used on operations – are a limited but good example. But there are far greater possibilities for future collaborative tools⁸ that will allow a high quality of interaction⁹ plus communication paths and processes that surpass traditional methods. This will principally lead to more powerful peer-to-peer relationships and more rapid exploitation of information. If technology enables this high quality information reach and interaction across function, component and coalition, then we will achieve another key enabler for agility. It is important to understand that collaborative planning is a key element of shared situational awareness in its own right.

COMMUNITIES OF INTEREST

508. Pragmatism suggests a structured but nevertheless flexible framework for information sharing. Whilst the conceptual ideal is the ability for all force elements to access all information, limited only by security caveats, a realistic interim solution is a layered but interoperable network¹⁰ comprising: a virtual real-time high fidelity and

⁶ Those values held by an individual, group, organisation, regime or nation, which form the basis of their strategic Centre of Gravity (CoG). This involves understanding a potential adversary's psychology, plus the formative factors (cultural, religious, ideological, historical, economical and political) that drive his intentions, objectives and modus operandi. JDCC Potential Generic Adversary project, Mar 03.

⁷ 'Actionable Recommendations' from flagship joint experiments, joint focused experiments, lessons learned and other studies indicate that key foci for decision making in a collaborative environment will be next decade leader competencies, joint military decision making processes, coalition information sharing technologies and policies. USJFCOM emerging recommendations 17 Oct 03.

⁸ Such as the Shared Awareness and Joint Intelligence Surveillance and Reconnaissance (ISR) management tools in emerging US Joint Fires software.

⁹ See the discussion later in this Chapter about information attributes.

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

low latency target acquisition network; 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. Within that framework, some information communities would be relatively easy to identify in advance of an operation, particularly those at the tactical level. However, not all information communities are identified in advance. Therefore the structured portion of the framework will comprise preconfigured communities of interest whilst flexibility will be preserved through dynamic or self-forming communities.

509. **Preconfigured Communities.** These will be the sensor, shooter and decision maker groups, particularly those at the tactical levels where the bandwidth is currently narrowest and the rate of messaging highest. The information exchange for these communities will be highly structured and it will frequently include exchange of dynamic targeting data of millisecond precision. These communities need a degree of agility in their own right in order that we might achieve best potential for cross-platform cueing and therefore maximum robustness and flexibility of the whole sensor-shooter community.

510. **Dynamic Communities.** Dynamic cross-component and cross-function communities will provide a significant contribution to agility by enabling agile mission groups, which will coalesce in the physical or virtual sense to act in response to a situation and then disperse. Examples could be previously unforeseen groups of staff functions at the operational level, cross-component force elements at the tactical level about to engage an adversary or many other combinations of entities in between. If these mission groups need to combine physically, it should only be at critical junctures; at other times they could remain dispersed throughout the battlespace for optimum force protection, better logistic or communication postures and pattern disruption. The degree of flexibility for agile mission groups is finite; it will be important that commanders understand within each environment what comprises a cohesive unit¹¹ in order not to undermine the moral component of fighting power.

511. **The Pragmatic Balance.** The battlespace could be configured for most efficient information sharing by identifying first of all the pre-configured communities within which information flows could be pre-optimised using resilient networks. However, we also need an architecture that provides sufficient flexibility for dynamic communities. Of primary importance is that those communities should not be constrained by echelon, component or current functional boundaries. Experimentation

¹¹ A unit that, if dispersed into smaller elements to form part of an agile mission group, would significantly weaken the moral component of its fighting power.

shows that such communities rapidly coalesce and adapt as operations develop,¹² even if full freedom is given at the outset and there is initial potential for communication anarchy. In order to capitalise on EBO, communities of interest must also embrace coalition partners, other government departments and, when appropriate, non-governmental organisations (NGOs). Therefore we must progressively provide the ability to network information across command echelon, component, military function, coalition and other entities with an early focus on the pre-configured communities in general and the relevant Maritime, Land, Air and functional interfaces in particular. The latter interfaces are where we have most potential to generate more flexible and powerful combinations of combat power, which are currently inhibited by restrictive procedural mechanisms.

PROGRESSING TOWARDS A SINGLE INFORMATION DOMAIN

512. The provision of a single, robust UK communications architecture and comprehensive joint information management procedures – that is compatible with close allies – is already identified as an essential element of the UK's future expeditionary capability.¹³ Equally important is that one of our closest allies is already making the transition to widely networked information. However, there are limits to the notion of a single domain. Nations will always have secrets from nations, therefore in coalition some information will always be managed off line with relevant and releasable information entering the single domain. Even within a single collaborative coalition domain, information may be tagged and encrypted to allow different levels of access.¹⁴ Finally, whilst all information could have relevance at all levels of command – and we wish to exploit that – pragmatism will inevitably lead to distinct layers of granularity and degrees of processing at different levels of command.

513. **Information Gathering.** The UK cannot afford a global collection system.¹⁵ However, we can exploit a wide range of sources to provide indicators and warnings which can cue the narrower focus that provides a more concentrated regional view.¹⁶ This approach could result in the UK entering a crisis in position of information weakness; therefore Intelligence, Surveillance and Reconnaissance (ISR) assets would need to be very responsive to overtake an adversary's temporary advantage. The initial disadvantage could be offset in part by the creation of pre-populated knowledge

¹² US experimental experience indicates that community of interest self-configure very rapidly once information starts circulating around a network. Personal communication from Vice Admiral Cebrowski, Head of the US DoD Office of Transformation.

¹³ Op TELIC lessons, D/VCDS/40/1/2(10/131) dated 17 Oct 03.

¹⁴ See later discussion about content based information sharing.

¹⁵ “We cannot be all- seeing all of the time - we simply do not have the resources”. CDS speech to RUSI 10 Dec 01.

¹⁶ The cue- scan-focus approach. Maj Gen R Fulton, UK MOD Capability Manager (Information Superiority), speech to RUSI C4ISR conference Sep 02.

bases of the likely crisis areas¹⁷ and exploiting knowledge bases held by other interested or sympathetic parties.¹⁸

514. **Information Analysis.** In order to deal with all information available, to identify that which is relevant, to seek out that which is not present, and then to process the correct information, requires a series of structured tasks that is currently articulated as the *direction, collection, processing* and *dissemination* of intelligence.¹⁹ JWP 2-00 '*Intelligence Support to Joint Operations*' 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. In practise, integration follows from analysis without a break and the two processes are treated as one. Most important is that this processing is almost totally based on human judgement, it takes time and the processing can in fact destroy critical information. However, there is also risk in attempting to exploit data without processing. Even tactical data will on occasion require assessment by specialists to reduce the risks of deception. However, raw data may often have immediate utility. For example, a raw output from an airborne stand off radar might be of immediate tactical value to troops on the ground, even though only detailed analysis of the radar's output over time will reveal the full value of the information. The point is that the originator of specific information cannot foresee all the uses to which it might be put or the immediate significance of some details. Therefore we must build information structures and processes that have the correct balance between traditional analysis and wide access for immediate exploitation. This will require some cultural changes.

515. **Cultural Changes.** Our ability and will to alter or dispense with culture and practice that is inappropriate for the Information Age is potentially the greatest obstacle to optimising decision superiority. The need to dispense with familiar structures may become more obvious to a wider community through continuous experimentation. This sort of experimentation will allow operational commanders and staffs to see for themselves how to improve decision superiority and therefore develop the new communication paths and practices that are more relevant to their needs.

516. **Information Attributes.** The optimum structures and processes are best appreciated with a clear understanding of information attributes relevant to network theory.²⁰ These are information richness or quality; information reach or distribution; and the quality of interaction or how well information is passed between nodes in a

¹⁷ Such as the US Operational Net Assessment.

¹⁸ For example, non-governmental organisations increasingly have databases for areas where they operate. These knowledge bases are being built up over many years and represent a body of knowledge that the military could not to replicate in normal operational time frames.

¹⁹ JWP 2-00 (2nd Edition) '*Intelligence Support to Joint Operations*'.

²⁰ Understanding Information Age Warfare, Alberts, Garstka Hayes *et al*, DoD Command and Control Research Programme, Aug 01.

network.²¹ These attributes provide a powerful 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). An important phenomenon of the modern information environment is that sharing of information, defined by the degree to which exchanges are interactive or reciprocal, tends sequentially to enrich information as individuals contribute to the process. By creating effective information networks that exploit this phenomenon, it is possible to achieve truly collaborative information environments.

517. Information Pull. Commanders at all levels will need confidence that technology will assist and not hinder them in creating structure and meaning from large volumes of information. Traditional information models are strongly biased toward information push that – if used intelligently – is at least bandwidth efficient. But the majority of current information systems, particularly in the Land environment, are compartmentalised by component, sub component, echelon and weapon system. The individual awareness of a system operator can be very high but it can take years of individual and collective training to exploit low bandwidth communications – such as voice – to build shared awareness in a complex environment. However, a powerful emerging concept based upon information pull is particularly well suited for agility because it removes the concept of traditional information processing, which necessarily introduces time delays and filters. Information pull is a much faster process in which subscribers immediately exploit published information. A significant challenge is that it requires users to have strong context to find the information.

518. Smart Information Pull. The theory espouses a profound belief that networking and browser technology will enable a move to *smart* information pull,²² freeing us from the constraints to be synchronous in time and space with information and processes therefore eliminating the need for owners of information to know exactly what is important to whom. The rudiments for success in such an environment are provision of suitable context to allow more intuitive information hunting vice inefficient gathering, ready access to wide information networks and better visualisation techniques that will enable individuals to make sense of largely unstructured data and information. The formatting of less structured information is crucial if correlation is to be made between key items of information within a community of interest. New information management techniques are therefore critical enablers for the integration of information streams, but the most complex correlation will continue to be undertaken by experienced commanders.

²¹ The elements of information richness are: completeness; correctness, currency, accuracy or precision, consistency, assurance, timeliness and relevance. The elements of information reach are: sharing by functional area, sharing by alliance or coalition, sharing by component or echelon, sharing latency, sharing by security level, sharing by number of nodes, continuity over time and geographic range. Quality of interaction is defined by: data, text, voice, static images, dynamic images, whether exchanges are real time or delayed, level of information assurance about exchanges and the degree to which exchanges are interactive or reciprocal.

²² With suitable context, individuals find it easier to access relevant information.

519. **The Necessary Balance.** We may not in the immediate future have access to the bandwidth and information technologies that might realise the full power of information pull. Therefore information formats will need to make best use of available bandwidth. Paradoxically this could require a return to the discipline of formal staff processes, which have been eroded by the advent of e-mail.²³ The initial composition of communities of interest will be determined in part by the Effects Based Planning process and the command process; each community would be primed by a smart push of information. This initial burst must contain command intent and other information critical for context. For dynamic communities created for a specific task, the priming package is less likely to be complete and therefore it will generate greater need to pull additional information. This new information could in turn lead to the adjustment of community composition. Finally, communities of interest would push new useful information back into the wider domain.

520. **Information Management and Exploitation.** The US already views information as a battlespace domain in its own right requiring discrete organisation, processes and resources to win the Information Superiority fight.²⁴ The UK is coming to a similar conclusion,²⁵ therefore we must develop the close relationship between information exploitation and information management. Information exploitation is defined as the sharing and use of information to support situation awareness, planning, decision-making and the co-ordination of desired effects.²⁶ Information management is defined as a set of integrated management processes and services that enable collectors, producers and users to store, locate, retrieve and transfer the right information, in the right form and of adequate quality, by the most timely, effective and efficient means in a manner consistent with the commander's mission.²⁷ It is only possible to optimise information exchange through proactive information management and this will require a Network Enabled Capability (NEC) competency framework. This is developed in Chapter 6 - Prepare. The wide dissemination and understanding of command intent that has been created in a collaborative environment will provide the context that better enables the right information getting to the right person at the right time. This reinforces the 'post before processing' model.²⁸

²³ It is useful to reflect that Army operational 'Staff Duties' originated in order to facilitate message transmission using Morse Code on telegraph and, later, HF radio - in other words to make full use of restricted bandwidth.

²⁴ Emerging lesson from joint experimentation, USJFCOM 17 Oct 03.

²⁵ D/DG INFO/11/5/7/6/1 dated 22 Oct 03.

²⁶ Ibid.

²⁷ ACP 200.

²⁸ Information Age Transformation, David S Alberts, DoD C4ISR Co-operative Research Programme, 2002. '*Post before processing*' implies the sort of data that, today, is always processed before being disseminated is in future published (or posted) prior to processing. Whilst the information might well be processed in any case for pre-determined recipients, any time sensitive relevance to other, perhaps less obvious, communities of interest will in future be preserved by posting before processing. The decision to post before processing will depend upon situational awareness and a clear understanding of commander's intent.

521. **Information Networks.** Until quite recently, information networking was generally too expensive for us to realise its enormous potential value,²⁹ but recent lessons indicate that we need much better interactions between force elements, particularly cross-component. The UK has encapsulated this requirement as NEC. NEC correctly focuses on the key elements – sensors, shooters and decision makers – and it should in time allow powerful new combinations of combat power, principally through shared situational awareness within and between the communities of interest.

522. **Information Assurance.** Information assurance must ensure the availability, integrity, authentication, confidentiality³⁰ and timeliness of information that is now a key component of our future capability. The only restrictions on future access to information must be on the basis of classification, sensitivity or granularity. Information sharing in a coalition environment could be underpinned by content based security policies and technology, which will tag individual data with classification and release criterion.³¹ The information domain will need protection of both its physical elements and the information contained within it. This critical vulnerability is discussed in Chapter 8 - Protect. Apart from the need in a democracy to audit decision making, there will also be a need to provide precise, timely and evidential information to prove the legality of military action, particularly where pre-emptive self-defence is concerned. As the legitimacy of our decision-making is determined by reference to information that is available to us, timely collation and dissemination has an additional impetus. There will also be the need rapidly to produce evidence in order to rebut adverse or incorrect media assertions. As a result, we must maintain an audit trail of all information flows that lead to decisions. Because a determined adversary will target communications and may succeed, reversionary modes of operating will always be important.

THE RELATIONSHIP BETWEEN INFORM AND OPERATE

523. **Target Acquisition.** Target Acquisition³² sits at the boundary between Inform and Operate and its effectiveness is sensitive to battlespace resolution. ISR can increase resolution and high resolution would permit weapon systems to receive Target Acquisition data from multiple sensors; the network-centric approach. As resolution reduces, agile mission groups must increasingly provide a greater proportion of Target Acquisition data from dedicated assets, though shared systems might still be able to prosecute an attack. In extreme cases where battlespace resolution was very poor, Target Acquisition would be organic; a platform-centric approach that is already common in current weapon systems. Future ISR capabilities

²⁹ Quantified in Metcalf's Law - the value of a network is proportional to the square of the number of nodes. Power to the Edge, Alberts and Hayes, DoD Command and Control Research Programme, Jun 03.

³⁰ JWP 3-80 'Information Operations'.

³¹ JFCOM presentation to NATO CDE conference Oct 02.

³² 'The detection, identification and location of targets in sufficient detail to permit the effective employment of weapons'. (JWP 0-01.1).

will need to balance network and platform-centric Target Acquisition. Where possible, the network-centric approach should seek to provide Target Acquisition as the end product of the ISR process and this suggests better integration between J2, J3 and J5 processes to increase agility. Target Acquisition processes could also provide sufficient resolution for immediate weapon effect assessment, improving the ISR product and contributing to campaign effectiveness analysis.

524. **Campaign Effectiveness Analysis.** To function correctly, an effects based philosophy requires campaign effectiveness analysis to assess the effectiveness of the campaign. This requires information for three levels of analysis at approximately the tactical, operational and strategic levels. It is important to know whether the actions resulting from the planning process have been successfully completed – essentially the current Battle Damage Assessment process. But the focus must then switch to whether the required effect has been achieved³³ – requiring better developed measures of effectiveness that assess both physical and cognitive effects. This will need reliable secondary and tertiary indicators of behaviour. Information at the highest level must provide robust evidence that the campaign is achieving the strategic aim, accepting that many actions taken to achieve cognitive effects are exceptionally difficult to measure and therefore frequently probabilistic by nature.

³³ *‘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.

CHAPTER 6 – PREPARE

PREPARE CORE CONCEPT

Deep preparation will develop robust and flexible individuals, imbued with fighting spirit, to form the bedrock of operational agility. Functional preparation will develop core competencies, unit cohesion and the ability to transcend traditional boundaries to achieve an agile, task-oriented joint force. Immediate preparation will fine-tune the force for specific operations.

601. We will prepare future capabilities by developing the conceptual, moral and physical components of fighting power to produce forces with high levels of operational agility capable of Effects Based Operations (EBO). Effective preparation must permeate all lines of development such that the key outcome is that our forces will be ready to operate with high confidence, as opposed to being simply ready to move. A prerequisite for future operations is a critical mass of effective fighting power from which can be drawn force elements to form agile mission groups. From a conceptual point of view, the levels of preparation are considered to be *deep*, *functional* and *immediate*.

602. **Deep Preparation.** The value of an individual that has undertaken high quality robust training must underpin all of our capabilities¹ and the provision of sufficient trained and motivated personnel will bring the greatest possible strength to a joint force.² In the vanguard of skills required is strong leadership at all levels. This is encapsulated in this concept as the *deep* preparation that brings an individual to a combat ready standard. Core attributes include strong leadership, fighting spirit and an innate understanding of the Mission Command philosophy. Moreover, the development of robust, adaptable skill-sets will provide confidence to work in the face of the unexpected. *Deep* preparation must also continuously cultivate personal relationships at all levels with our coalition partners, to impart over time the rich but diffuse information that develops the mutual trust and understanding that underpins the cultural aspects of interoperability.

603. **Functional Preparation.** *Functional* preparation is performance-driven as opposed to event, unit or process-driven, and it is undertaken to provide fighting power in appropriate configurations. There is currently a sub-optimal balance between the form and function of certain areas of capability.³ However, functional preparation

¹ 'The greatest strength lay in the attitude, versatility and resourcefulness of the Royal Marine. This strength was set against...a high individual training burden.' DOC Audit of 3 Cdo Bde in COS Minutes 4 Mar 03. Similar sentiments are routinely expressed by commanders of all 3 Services who have long understood the payback from investment strategies in individual and collective training mechanisms such as high peacetime flying rates or combined arms training.

² D/DCDS(Pers)/34/2 dated 16 Oct 03.

³ US forces share a UK view that the closer integration of cross-component fire and manoeuvre plus improved joint Command and Control (C2) will improve the ability to deliver a wider range of timely effects. Lessons from Exercises PI03 and UQ03 Sep 03.

recognises the value of formed units and therefore centres of excellence will focus upon better levels of joint interoperability, particularly at the tactical level where we could achieve more powerful and flexible combinations of combat power. Individual and collective training, equipment, sustainability, interoperability and readiness will all underpin functional preparation. This should provide a more coherent pool of functional capability – within as well as between components – from which appropriate force elements can be allocated to mission groups.

604. **Immediate Preparation.** *Immediate* preparation is the mission-focused work-up of the force, undertaken to ensure functional groups are fit for task. *Immediate* preparation includes environmental training, Force Integration Training, Urgent Operational Requirements (UOR) and mission rehearsal. The effectiveness of *immediate* preparation will be constrained by an intrinsic understanding of what can and, most important, what cannot be achieved in the invariably short time scales available during crisis management.

605. **The Relationship to Agility.** Agility has both mental and physical dimensions, but it is essentially a human-centric attribute epitomised by the enduring ability of our people to think creatively, to be resourceful and imaginative and to adapt with versatility to the unexpected. This human-centric nature of agility suggests that we need a firm foundation of *deep* preparation to develop robust and flexible individuals. Our exploitation of technology must be balanced by appropriate changes to doctrine, structures and training in all aspects of *functional* preparation. Our structures must be optimised for the most likely operations but retain the ability to adapt to the most demanding,⁴ noting that the latter may not always be an issue of scale but sometimes simply threat or time related. Our doctrine, training and equipment must remain broad based to cater for the full range of military operations. Well-prepared agile standing force elements – the result of a thorough combination of *deep* and *functional* preparation – will help reduce the *immediate* preparation burden to acceptable levels of risk.

606. **Coalition and Inter-Agency Operations.** The nature of the future battlespace will demand much higher levels of joint and combined interoperability.⁵ This requires that we engage in joint and coalition preparation that addresses the moral and physical components of fighting power as well as the technological and cultural aspects of interoperability. Joint and combined preparation will be a critical success factor and with improved tactical interoperability we will achieve a more robust joint ethos through mutual trust of respective capability. Whilst we may seek to integrate equipment, tactics, techniques and procedures with key allies, we will always bring strength through natural diversity and we must prepare and configure to fight *with*, if

⁴ Paragraph 5.24, UK Defence Strategic Guidance, Jul 03.

⁵ Levels of interoperability are taken to be *integration*, *interoperability* and *deconfliction*. See Chapter 4 - Command, Paragraph 413.

not precisely *as*, our key allies. In a similar vein, EBO impose a requirement for inter-agency interoperability and relationships with other government departments and non-governmental organisations, which must be continually nurtured. In order to realise a *deep, functional and immediate* preparation ethos, 3 principal elements of force preparation - resource, develop and train - are considered below.

RESOURCING AGILE FORCES

607. Resource comprises the provision of sufficient materiel and manpower to address the physical component of fighting power. The current pressures on resource are unlikely to abate and the drive to achieve more effect with less resource will endure, whilst the increase in technical complexity and rapid obsolescence of some equipment may further complicate matters. However, it is crucial that high readiness forces have immediate access to and high confidence in their equipment. A consistent lesson from operations over the last decade is that failure to resource even the smallest detail of the operational requirement can have an adverse impact on the moral component of fighting power. Clothing appropriate to the theatre of operations is a good example. Success or failure in this also has an impact upon credibility with close allies.

608. **Manpower.** Demography and the civil-military cultural divide will continue to make the recruiting of sufficient personnel one of the most challenging aspects. Whilst technology may replace certain human functions and simplify others, there is likely to be a commensurate shift in our personnel requirements; potentially to a higher calibre, more technically able workforce in certain areas. This will occur at a time when the competition for such personnel will be fierce. Methods of identifying, recruiting and retaining sufficient personnel with the appropriate skills will remain vital. Rigorous selection and consistent absolute standards must prevail in the recruitment process, no matter how divergent the values between civil and military society.

609. **The Equipment Balance of Investment.** An important factor in future resource management will be the coherence of the Defence procurement plan to ensure an equitable but effective balance of investment in joint capabilities to meet both long-term requirements and near-term pressures. Investment in enabling capabilities (specifically Intelligence, Surveillance and Reconnaissance (ISR), logistics and force projection) is central to agility. Similarly, in order to achieve Network Enabled Capability (NEC), the shift from platform to capability-based procurement must continue and will impose a significant management challenge. Operational analysis and experimentation must underpin such a shift but this new balance must also be accepted as intuitive and to a degree inevitable given investments already made by our close allies.

610. **The Force Balance.** The balance of regular versus reserve forces and the division of their specialisation may require regular forces to migrate to employment in the more specialised roles whilst reserve forces undertake less specialised – but possibly more manpower intensive – tasks. Any reliance on reserve forces for the provision of key capabilities will carry an element of risk. However, the need to retain small numbers of highly specialised reserve personnel who can only gainfully be employed during operations will persist. Further analysis is required to qualify the balance of specialist manpower within the reserve and regular forces.

611. **Interoperability.** The requirement for interoperability with close allies will drive a proportion of our resource allocation. The need for collaborative resource – not simply to achieve interoperability, but also to foster mutual trust and purpose – will be important in achieving desired levels of combined effectiveness. It will also be necessary to achieve a balance of specific capabilities provided by allies and our desire to retain independence of action. With a desire for inter-agency improvements, we must also develop our ability to exploit information held by other interested or sympathetic parties. This typically requires long term investment in personal relationships to build trust.

612. **The Capability Requirement.** Fundamental to the resource process is the ability to identify the capability requirement that is responsive enough for a given scenario. In highly resolved battlespace it should be possible to predict accurately the effect that a certain action will have and hence we may be able to identify with some confidence the capability required. Consequently, we will be able to focus our immediate preparation to produce optimum scale mission-tailored capability. The process of identifying the requirement will match the process of resolving the battlespace and it may be necessary to adopt the ‘cue-scan-focus’ technique discussed in Chapter 5 - Inform as an iterative method to determine the capability requirement.⁶ This may lead to the early deployment of enabling capabilities in order to reduce the decisive capability bill and, similarly, clarify the balance of dedicated and shared resources.⁷ This technique will also help risk management, allowing the reduction of risk as granularity of requirement increases, but also ensuring that critical timelines are not overlooked and opportunities missed – the 80% solution now versus the 100% solution later.

613. **The Impact of Readiness on the Balance of Preparation.** Readiness is a critical factor and therefore has a fundamental impact on resource. We will increasingly focus on our forces’ readiness to operate with high confidence rather than simply readiness to move. Readiness to operate will be achieved by the balance of *deep, functional* and *immediate* preparation described above. In order to attain the

⁶ See Chapter 5 - Inform, Paragraph 513. ‘Cue-scan-focus’ approach – Lt Gen Fulton, then UK MoD Capability Manager (Information Superiority) in a speech to RUSI C4ISR, 10 Sep 02.

⁷ See Chapter 3 - Operate.

agility required, we have already identified a need to invest in *deep* preparation. *Functional* preparation will then ensure capabilities are held at a higher state of functional readiness, ameliorating the need for substantial *immediate* preparation. This balance in preparation will give greater clarity of a specific capability's readiness to operate and hence assist in managing readiness cycles.

614. *Deep* and *functional* preparation will always be resource intensive and we must shoulder that burden. But *immediate* preparation offers new possibilities. For example, the rapid purchase of new or additional equipment, or enhancement or essential modification to an existing equipment, is often required to support a current or imminent military operation. Where this is possible in time for an operation we should minimise the challenge of integration and training for new capabilities introduced at short notice to the front line. Where viable, we should consider a policy of 'fitted and trained for' where we cannot afford to be 'fitted and trained with', accepting that in some cases 'fitted for' may be a high percentage of the overall cost. This might also include developing better structures and procedures to allow fast and in some cases pre-scripted responses to operational demands.⁸ In essence, we need a better understanding of what can and cannot be achieved at reasonable risk in short timescales.⁹

615. Crucially we must ensure that our personnel are able to respond to the future readiness profile. Two aspects are individual readiness to engage in operations and individual recuperation following deployment. Individual readiness is directly proportional to *deep* and *functional* preparation such that, no matter what their present employment, individuals are equipped, trained, physically prepared and motivated to deploy on operations, in a timeframe commensurate with their specialist functional readiness.¹⁰ Similarly the necessity to enable full recuperation of individuals following operational deployment will need careful administration and this is addressed in the Sustain paper. In an enduring environment of high operational tempo, the lack of proper recuperation periods will significantly affect individual morale. Methods such as 'squadding',¹¹ where operational units are complemented with a higher number of people than there are billets to be filled, may enable appropriate stand-down of personnel both during and after operations without reducing operational capability or readiness.

⁸ See Chapter 9 - Sustain for further discussion on developing structures and procedures.

⁹ See Chapter 7 - Project, Paragraph 705 for further discussion on risk management.

¹⁰ With regard to individual personnel, 'A key factor which must be addressed is how best to achieve the required readiness requirements.' D/VCDS/25/22 (10/501) dated 26 Aug 03.

¹¹ As outlined in the RN TOPMAST Programme.

DEVELOPING AGILITY

616. Developing agility has a strong link to the conceptual component of fighting power and it is principally about developing people and teams with the correct ethos. The move to more agile forces is not simply an aspect of the physical; we must prepare people to adopt the new concepts and doctrine. *Deep* and *functional* preparation are essential tools in this development as it requires the evolution of the way our personnel think, something that cannot be achieved over short, mission-focused preparation periods. However, it must also reach deep into all of our joint and single Service education establishments. HLOC itself aims to provide the firm Joint conceptual foundation from which this aspiration may be achieved.

617. **Future Commanders.** The aim is to start developing the future commanders now that will intuitively understand Mission Command for the Information Age. Our next generation of commanders must understand that the world is more closely coupled than hitherto and that actions committed in the military dimension will potentially have multiple unintended effects in other dimensions of the strategic environment. They will need to think across these strategic dimensions and focus on ‘security’ rather than ‘defence’, considering campaign branches and sequels that have conceptual reach well beyond the normal military remit.¹² To assist them, doctrine must enable rather than constrain their flexibility and adaptability.

618. **Balancing Joint and Single Service Ethos.** We need to bind joint force elements together. A common way of thinking and sufficient knowledge of the strengths and weaknesses of each other is paramount to achieving a joint ethos. However, the strength gained through joint capability will need to be very carefully balanced with the enduring necessity for unit, Arm and Service cohesion. For combined operations, integration of doctrine, practices and procedures with close allies and other agencies will be ever more crucial to the success of an effects based approach.

619. **The Virtual Environment.** Experimentation, modelling and computer simulation will help promote the correct pace of individual and force development. The opportunity for experimentation in large-scale, operational level exercises is reducing but if we are to introduce sufficient skilled personnel into our experimentation programmes, experimentation must become a routine part of all our exercise programmes. Erstwhile incompatibility of objectives should more easily be overcome in future following recent precedent for the successful integration of live and virtual events during training.

¹² The US recognises that, ‘*The environment in which human decision makers and commanders will operate will be information rich, complex and time constrained. This environment will require new leader competencies.*’ Exercises PI03, UQ03, MC02 and human factors workshop listed in USJFCOM briefing 17 Oct 03.

TRAINING THE FORCE

“If we are going to depend upon one another in wartime, then we must forge the bonds of trust in peacetime. And that means that our training has to become increasingly joint”...¹³

620. Training is the final key to effective preparation of an armed force. We should continue to train as we intend to fight,¹⁴ noting that large-scale warfighting may no longer be the critical path. However, skill at fighting generates the credibility that must always underpin that most useful of effects, deterrence. Moreover, it is the best way to achieve the high confidence necessary to work in an increasingly uncertain strategic environment.

621. Training covers a broad spectrum of activity, and is divided into individual training and group or collective training. All military personnel must be proficient in a wide range of basic military skills as well as their chosen specialisations. The maintenance and currency of these skills is achieved through continuation training and a constant programme of skill refreshing. Collective or group training combines individual skills. The nature of collective training is incremental and is based on building teams from small, highly trained and therefore cohesive units that have the knowledge, skills and attributes to win, as well as a profound trust in each other’s capabilities.

622. **Remote Learning.** Increasingly, much training will be technology based, allowing individuals to study part-time and in areas geographically remote from individual and regional training centres of excellence. Regional centres will facilitate distance training for large numbers to update and maintain existing skills and acquire new qualifications. Collective training will also embrace technology, enabling the wide distribution but central control of efficient co-ordinated training. Virtual environments will become a key training resource and the successful integration of live and virtual events has great potential.

623. **Joint Training Opportunities.** To achieve suitable interoperability, training must be changed to almost continuous joint and combined tactical training; not simply focused at traditional Tier 3 training, but more frequently practised at moderate scale at the key tactical interfaces. Regular small-scale tactical training should provide higher confidence that interfaces and procedures work for the ‘last tactical mile’ where the pre-configured sensor-shooter links are most critical. Tactical interoperability should be achieved through routine events that extend the *esprit de corps* and trust found at unit level into our joint and combined consciousness. However, we will still need confidence that we can orchestrate the integrated whole. This will be the

¹³ Deputy Defense Secretary Paul Wolfowitz, ‘Transformation Trends’, 20 Jun 03.

¹⁴ Op TELIC lessons, D/VCDS/40/1/2(10/131) dated 17 Oct 03.

preserve of operational and strategic commanders albeit they may in future use less-resource-intensive but nevertheless highly effective virtual environments to hone higher command skills. This will represent a sharper division between training at the operational level and above versus that at tactical level.

624. **Skill Sets.** The increased dependency on the information fraction of capability may need new skill sets and a NEC competency framework.¹⁵ Information exploitation is the sharing and use of information to support situation awareness, planning, decision-making and the co-ordination of desired effects. Information management is a set of integrated processes and services that enable collectors, producers and users to store, locate, retrieve and transfer the information. Both information exploitation and management will require a range of new competences from information retrieval skills to adaptive decision making.¹⁶ But technology can also help and, provided that human factors are adequately addressed, many future military tasks may even be easier to undertake.

625. **The Training Environment.** Commanders will continue to think across all dimensions of the strategic environment but they must adapt to technological enhancements – that can frequently distract them – whilst retaining an ability to sense the abstract. Commanders must also be trained to understand the potentially adverse consequences of highly dispersed forces: the inability always to interact in person and exercise physical presence may erode the level of mutual trust and cohesion that we otherwise depend upon in team working. The training environment should also reflect the considerable effort that underpins an individual's strong grasp of Mission Command and part of our training environment must be one in which honest mistakes are accepted and in which unorthodox solutions are not rejected.¹⁷

¹⁵ Conclusion of the NEC 1 Star SG Oct 03.

¹⁶ Initial assessment of the Training Line of Development for the NEC 1 Star SG Oct 03.

¹⁷ Modern Warfare; Mission Command, British Army Review, Brigadier Mungo Melvin, Autumn 02.

CHAPTER 7 – PROJECT

PROJECT CORE CONCEPT

Timely projection of mission-optimised joint forces. For multinational operations, UK Armed Forces will share political and military risk by matching the more demanding deployment timescales of close allies with credible and valued operational capabilities.

“Experience shows that it is better, where possible, to engage an enemy at long range, before they get the opportunity to mount an assault on the UK. We must therefore continue to be ready and willing to deploy significant forces overseas.”¹

701. The Project component assumes that force elements are adequately prepared and therefore deals only with the strategic and tactical movement of force elements, both to and within a theatre. For the foreseeable future, expeditionary operations are expected to be the norm for UK Armed Forces and the nature of such operations means that our forces will often deploy with an operational footprint in a distant battlespace. In the past, the size of these forces has presented a tremendous challenge for both our strategic and tactical mobility. This chapter will consider force projection as a key enabler for the agility, tempo and persistence required for the success of an expeditionary posture. It will examine the impact that battlespace resolution,² Effects Based Planning and future networking will have on our ability to reduce the in-theatre footprint and how we can optimise our responsiveness to future crises.

702. The security threats posed by regional instability, the global strategic impact of terrorism, the proliferation of weapons of mass effect, and the increasing cost of defence make multinational coalitions an increasingly attractive option as the military response to many of the conflicts and crises.³ Furthermore, regional analysis demonstrates that there is also clear potential for increasing demands to deploy world-wide as part of coalitions of the willing, with a greater range of partners, sometimes based on NATO structures and often under US leadership.

703. The scope of these operations suggests that there is a broad spectrum of responsiveness with the rate of response being driven by a combination of the capabilities of potential coalition partners and the demands of the strategic effect required⁴. The strategic criterion against which the UK will be gauged is based upon our interoperability with key allies and willingness to share risk. If we can achieve success in both of these we will promote the view that the UK will make a reliable ally. Whatever the military response there will be the requirement for a global

¹ Ministry of Defence Strategic Defence Review - A New Chapter, Jul 02.

² See Chapter 3 - Operate.

³ ‘...in committing forces to future contingencies, the UK will want to operate within a coalition framework.’ UK Defence Strategic Guidance, Jul 03.

⁴ Prevent, stabilise, contain, deter, coerce, disrupt, defeat or destroy. UK Defence Strategic Guidance, Jul 03.

projection capability and we must be able to match the most demanding reaction times of close allies with credible day one capabilities.

FORCE READINESS

704. Strategically the notion of risk sharing is important and suggests that a balance must be struck between national quality and quantity in any deployment in order to achieve political and military credibility. Accordingly, force projection offers a strong conceptual base for the balance of movement across the 3 environments⁵ when considering the capabilities required for a given situation. Scale is one obvious metric for credibility but other important aspects are the ability to meet coalition aspirations for deployment timescale and what our partners judge as militarily significant capabilities. For the most demanding operations at medium scale or above we are likely to be under US leadership, therefore it is to their tempo of deployment that the UK must aspire. This does not mean providing proportionate force deployments but credible and valued operational capabilities that will ensure UK influence.

705. **Force Laydown.** Projection can be described as a function of combat capability, risk and time for deployment against which trade-offs will have to be made for a series of factors. The divisions between preparation, deployment, operation in theatre and sustainment are increasingly blurred.⁶ Staffs will have to judge where within the battlespace specific elements of the force are best placed. Fixed rules would be too simplistic, but certain factors will predominate, in particular the level of risk that a commander might wish to take and the resolution of the battlespace in the area of operation. Risk taking is a human-centric skill but minimising risk by maximising the flexibility⁷ of combat options can only be achieved if the warning and decision times exceed the deployment time of the least strategically responsive⁸ combat capability required. There will always be competing time pressures for a decision, for example political delay versus operational imperatives to accelerate, but if a decision is delayed so that it falls inside the time required to deploy a particular capability, then the Commander is denied an option. As a consequence he may be left with ever-decreasing flexibility and increasing risk. There are generally three options: accept the risk; improve the resolution of the battlespace; or extend the time for forces to reach the theatre to allow less responsive but more robust capabilities to deploy.

⁵ Land, Sea and Air.

⁶ *'The Deploy-Employ-Sustain process is an integrated whole.'* Exercise PI03 initial insights Sep 03.

⁷ Flexibility is defined in Chapter 3 - Operate as multiple paths to success.

⁸ Strategic response time is the period required to generate, deploy, complete immediate preparation and be ready to operate in theatre.

FORCE GENERATION

706. **Campaign Capability Requirement.** This Chapter is concerned principally with the physical attributes of agility.⁹ For the desired effect in a given situation, force projection is dependent upon the responsiveness of a force – strategically, operationally and tactically – that has a relationship with the robustness required.¹⁰ The essential factor of force projection is to determine what combat capabilities are required and when. Effects based planning will determine the range of effects needed to achieve the strategic objectives and hence the supporting military actions. These actions will be translated into military tasks against which the combat capability requirement will be determined. This combat capability will comprise a mixture of *dedicated* and *shared* joint capabilities,¹¹ the ratio of which will be influenced by the battlespace resolution. Therefore, for any operation each component of the Defence Capability will comprise *dedicated* and *shared* capabilities and it is the sum of the dedicated and total of the shared capabilities that defines the overall campaign capability requirement.

707. **Relationship between Battlespace Resolution and Responsiveness.** Battlespace resolution will be the key for determining the campaign capability requirement and will not only assist the calculation of the optimum ratio of joint capabilities, but should also inform the protective requirements of the force. For the highly resolved battlespace a force more capable of a network-centric model of protection, trading lower physical robustness for high mobility and therefore the ability to outmanoeuvre the threat may be appropriate. Conversely, for the poorly resolved battlespace a much higher degree of physical robustness afforded by the platform-centric model of protection will probably be required.¹² Figure 7.1 illustrates the relationship between battlespace resolution, physical robustness, dedicated and shared joint capabilities and ultimately responsiveness. We can see that as battlespace resolution increases so does the degree of strategic responsiveness.

Degree of Battlespace Resolution	Degree of Physical Robustness Required	Volume/Mass of Dedicated Capability	Volume/Mass of Shared Capability	Volume/Mass of Overall Campaign Capability Requirement	Degree of Strategic Responsiveness
High	Lower	Less	Greater	Less	Faster
Low	Higher	Greater	Less	Greater	Slower

Figure 7.1 – Battlespace Resolution versus Strategic Responsiveness

⁹ Agility is described in Chapter 3 - Operate as the mainly physical attributes of responsiveness and robustness and the more cognitive attributes of flexibility and adaptability.

¹⁰ See Chapter 8 - Protect for detailed discussion.

¹¹ See Chapter 3 - Operate for detailed discussion.

¹² Platform/System-centric protection is discussed more fully in the Chapter 8 - Protect.

708. **The Force Mix.** The variable nature of battlespace resolution will drive a requirement for a mix of dedicated and shared capabilities. Our ability to resolve the battlespace for a given operational situation is likely to be the key driver in our ability to ‘tailor’ the agile mission groups and share more joint capabilities. This should reduce the in-theatre operational footprint, time to deploy and lift required. By deploying first phase capabilities that can improve the battlespace resolution it should be possible to refine the mission requirement, therefore the ratio of *shared* and *dedicated* capabilities and associated force protection requirements. Better resolution should lead to a reduction in the overall campaign capability requirement, as illustrated at Figure 7.2. Taking this concept to its ultimate conclusion, by *shaping* the information fraction of the battlespace to improve the resolution, it is conceivable that the lesser capability required will be sufficient to exploit the situation and take pre-emptive action to prevent, stabilise, contain or deter the adversary. This potential for a lower scale of effort and lower risk to the deployed force is akin to the notion of anticipatory self-defence alluded to in the Strategic Defence Review - A New Chapter.

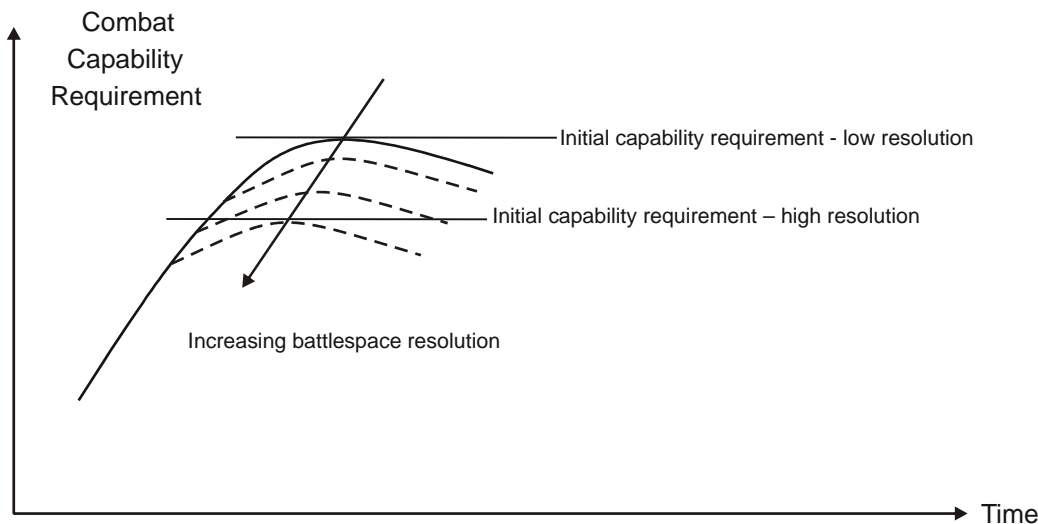


Figure 7.2 - Effect of Battlespace Resolution and Time on Initial Combat Capability Requirement

709. In force projection we will need to consider those assets required to support stability/transition operations. With the priority given to deploy the assets required to respond rapidly to a developing conflict, the unique requirements for stability and transition operations can be overlooked. Addressing this issue will require the marriage of plans, operations logistics, interagency and coalition participants. It will also require recognition on the part of decision-makers, both civilian and military, that the end of hostilities is not the end of military engagement. Deployment of assets that are unique to stability and transition operations will have to be sequenced later in the force projection stream. It is important to achieve this early enough in planning not to prejudice overall success.

FORCE PROJECTION

710. **Improving Responsiveness.** A key goal for future operations is freedom of manoeuvre and the ability to manoeuvre implies both mobility and reach from the strategic through to the tactical level. But it is the relationship between reach, responsiveness, vulnerability and physical robustness that provides a key driver for future capabilities. Moreover, it is the relationship between responsiveness and reach that has a direct bearing on our capability to project combat power. Network Enabled Capability (NEC) has the potential to decrease significantly the impact of distance by exploiting the information domain to act quickly. However, laws of physics dictate that distance will always take finite time to cover. Therefore, the only ways that the strategic responsiveness can be improved is by increasing warning time, reducing the distance to be travelled or increasing the speed of deployment.¹³

711. **Home Based Capabilities with High Responsiveness and Global Range.** Operating from home base with global range is an attractive concept with great versatility and responsiveness that more easily provides an element of surprise and therefore the potential to apply rapid initial pressure on an adversary. Such capabilities are optimised at smaller scale, biased toward higher speed air and maritime capabilities and must be capable of immediate action in theatre, with little or no immediate situational preparation – the classic high readiness force. The smaller scale attracts relatively low in-theatre initial sustainment costs and is therefore efficient. However, precision demands high battlespace resolution and higher readiness attracts high home-based sustainment costs. The initial inability to provide significant ground presence from such a posture, a requirement for most sustained operations, means that we must not consider high readiness global reach as a panacea.

712. **Access, Basing and Overflight.** Access must be underpinned by a combination of long-term basing and overflight contingency planning. Alignment of defence relations strategies, planning assumptions, treaty processes and overseas security policies are all critical to this process and it will require a co-ordinated cross-government approach for best effect. It is imperative that we develop and maintain a broad engagement with countries that might provide access to build mutual trust. What we must strive for is a sufficient level of freedom to apply diplomatic, economic and military effort that will enable us to gain access and move freely to a position of advantage. However, wherever this long-term investment fails, we will need capabilities for anti-access environments; even close allies can, at times, find it difficult to offer support. The initial tasks will be to provide and protect access or to manage risk levels until the conditions for greater freedom of manoeuvre have been achieved. The military capabilities to reduce the risks of not having access to

¹³ That includes increasing the readiness profile (i.e. having less notice to move and operate). Moreover, some capabilities, including small scale and light forces, can more easily be configured to 'fight off the ramp' i.e. operate immediately they are in theatre.

contiguous land bases could be described as a capability to perform operational joint manoeuvre from strategic distance. This joint capability will allow greater options for decisive joint force at the depths, times and places of our choosing without complete dependence on other nations. If access is not assured then the combat capability that we provide must be physically robust. In these cases, long reach high persistence systems in general, but unmanned vehicles in particular, may provide the initial footholds.

713. Pre-Positioning and Sea Basing. The pre-positioning of military capabilities is an appealing option for increasing strategic, and in some cases tactical responsiveness, by reducing the distance over which to project. Closer location to the battlespace could also mean that the physical environment will be better resolved and equipment better optimised. However, permanent pre-positioning of a wide range of capabilities is prohibitively expensive. Nevertheless, strategic analysis must identify areas of the world where our forces are most likely to operate and qualitative analysis and investment appraisals must identify where pre-positioning could be viable, particularly for sustaining deployed forces. This evaluation must include the force protection bill. Besides identifying where we might pre-position we must also consider what we pre-position. Identifying critical path capabilities – particularly those that take the longest time to project – could improve overall responsiveness. These capabilities need not be confined to materiel as pre-positioning of the ‘sustain’ infrastructure at forward operating bases could also provide enhancements in responsiveness. Finally, improving the responsiveness of capabilities that can shape the information fraction of the battlespace by pre-positioning or early forward deployment should expedite faster resolution of the battlespace and so help enable the shaping of our response. Not all situations allow for immediate deployment of logistics from the outset. In these circumstances a Forward Mounting Base (FMB) not in theatre could make use of a support networks concept. One way of achieving this is to base logistic assets and stores at sea, using shipping to support an operation from over the horizon or, when the situation permits, bring stores alongside and provide floating warehouses. The concept is flexible but expensive.¹⁴ In most cases it is unlikely that the entire force will be able to operate from sea and the volume of stores that can be provided would be unable to sustain the whole Joint Force in depth. However, it could be used to support initial theatre entry.

714. Speed of Deployment and Contiguity of Flow. In addition to reducing the impact of distance, we should reduce the time to deploy. This embraces better strategic warning and higher speed deployment. Speed of air will be offset by its limited capacity and therefore follow-on surface lift will be required. Technological

¹⁴ The USMC uses Maritime Pre-positioned Squadrons that reduce the C-141 lift requirement for a Marine Expeditionary Unit from 3000 to 250 sorties. The equipment has achieved up to 98% combat availability but the sealed ships have a high maintenance tariff. However, from a strategic perspective the US judges the cost to be a small fraction of that potentially required in loans and guarantees to assure other forms of access.

improvements could extend the speed envelope for fast shipping,¹⁵ which could provide an option for better responsiveness. Given the argument above that forward basing is resource intensive with risks attached, it follows that we could balance the equation by maximising flexibility of options. This could be proven by experimentation and the approximate conceptual framework is at Figure 7.3. Best speed characterises Phase 1, followed by a balance of speed and lift in Phase 2 immediate support. Phase 3 uses the most economic means viable for optimum lift. We need to understand the quantitative balance of capability between phases to achieve contiguous force projection. For Phases 1 and 2 it is important that capabilities are able to be transported in a combat configuration for immediate use, whereas Phase 3 can exploit the greater efficiency of ‘administrative loads’ that make best use of available space.

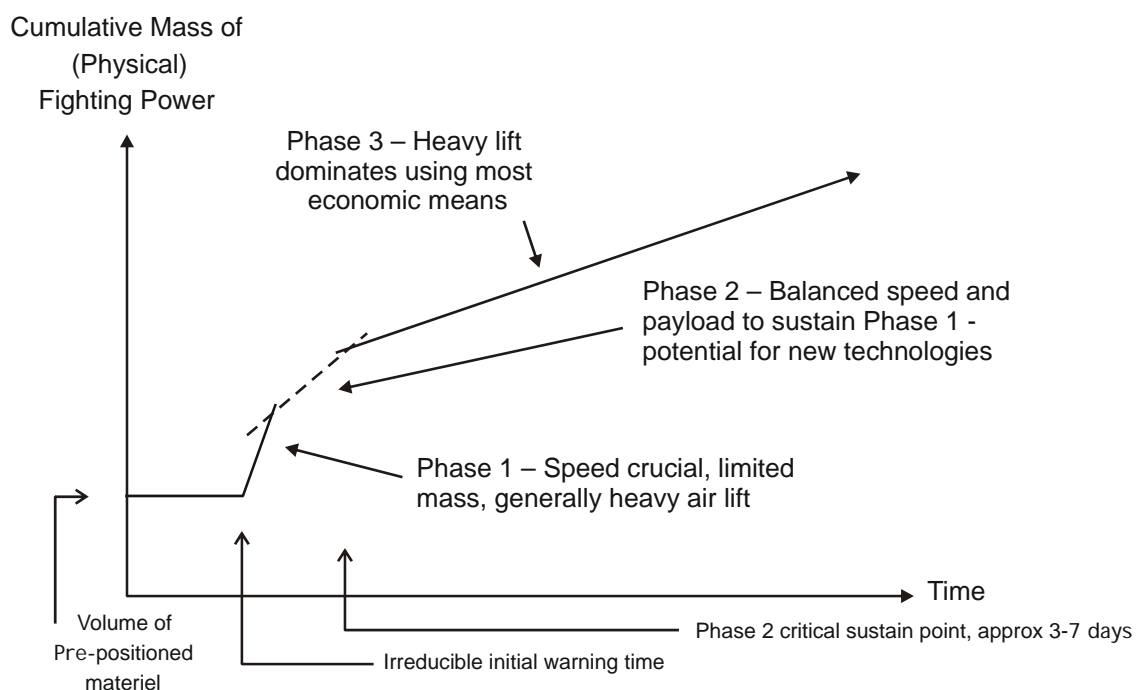


Figure 7.3 – Conceptual Framework for Force Projection

715. **Recovery.** The increase in coupling bridge responsiveness and reduction of the deployed footprint are not only good in terms of improving deployment timescales but are also essential for improving recovery. Given the anticipated rate of operations any reductions in recovery time will allow more time for recuperation and preparation of people and equipment for the next operation. This is one of the key tenets for the sustaining the moral component of fighting power.¹⁶

¹⁵ Dual-Use and Slender Hull (DASH) project by US Office of Naval Research and General Dynamics Bath Iron Works is looking to extend the speed envelope to 70kts. Jane’s Defence Weekly Issue No 40, 8 Oct 03.

¹⁶ See Chapter 9 - Sustain.

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CHAPTER 8 – PROTECT

PROTECT CORE CONCEPT

Exploit Information Age techniques to protect and preserve fighting power. Protection of the physical component demands a better balance between platform resilience and information-centric capabilities. Preservation of the moral component requires versatile command and leadership skills to meet Information Age challenges.

801. By current definition, Force Protection aims to conserve the fighting potential of the deployed force by countering the wider threat to all its elements from adversary, natural and human hazards, and fratricide.¹ However, increasingly ubiquitous adversaries that threaten our lines of communication and even the home base render the current definition too narrow. Fortunately, British Defence Doctrine provides us with the wider perspective of physical and moral components of fighting power. Therefore this concept, from the perspective of the conceptual component of fighting power, will address protection of the physical component and preservation of the moral component. Strategic analysis² indicates that the main threat to UK security stems from the possibility that the strategic environment will change faster than we can or will acquire and apply resources to counter that threat. This is a clear threat to the military's future moral component because we could find ourselves ill equipped for future threats.

802. This concept analyses the ways and means by which we might protect our people and their will to fight, their equipment, installations, materiel and information. The future Information Age battlespace will present the UK Armed Forces with new vulnerabilities. The security challenges posed by the future strategic environment will extend far beyond the immediate operations area, along our lines of communication and back to our home nations. We must wherever possible limit our – and increasingly our adversaries' – impact on the environment, that will include minimising collateral damage, dealing with adversaries that damage the environment for political or economic reasons and preserving our training areas.

803. **The Spectrum of Capability.** We need to be robust across a very wide spectrum therefore prioritisation of resource is a key issue. This component of capability ranges from physical protection of structures, equipment and the individual, which are embraced in traditional platform-centric concepts of armour, defensive aids and stealth through to personal immunisation against disease, protection from extremes of the environment, personnel recovery, Chemical, Biological, Radiological and Nuclear (CBRN) threats, combat identification, traffic regulation, fire protection measures and, most critically for the future, information assurance and denial, including counter surveillance. Information, from strategic intelligence to tactical

¹ JDP 1/99 'Force Protection' (to be replaced by JWP 3-64 following development in 04/05).

² JDCC Strategic Trends, Mar 03.

threat warning, is at the root of force protection and its greater, shared availability across the networked force will offer a most potent future enhancement. Collaborative environments could allow new protection techniques, balancing platform and information or system-centric techniques. This is important in coalition because we will continue to rely on close allies for many key capabilities from intelligence to theatre missile defence. We must also protect that scarce but most critical commodity, which is the commander at all levels. This has particular challenges relevant to the Information Age. Finally, the future battlespace may present us with an array of asymmetric threats. Asymmetry by its nature is often unexpected and therefore mental and physical agility is one of the best defences. Even when surprised, we must be able – if necessary – to reconfigure our equipment, structures and procedures to regain the initiative and prevail in the face of the unexpected.

804. **New Vulnerabilities.** The emerging information environment is probably decisive ground in an Information Age battlespace. Network Enabled Capability (NEC) is one engine driving change. However, the creation of a networked force will be accompanied by new vulnerabilities. Our aspiration to conduct Effects Based Operations (EBO) will place military operations within a broader context comprising all dimensions of the strategic environment. This expanded battlespace will afford our adversaries more opportunities to employ complexity, ambiguity and asymmetry to prevent, deter, disrupt and complicate outside intervention. In addition to this, the glare of the Information Age³ has already demonstrated its power to reveal all but the smallest details of a military operation to a global audience. Future adversaries will seek increasingly to exploit multiple media in this ‘information war’.

PROTECTION OF THE PHYSICAL COMPONENT OF FIGHTING POWER

“Conventional and asymmetric threats, including CBRN, will continue to increase in terms of their reach, impact and availability. We must ensure that we have adequate force protection across the full capability spectrum both at home and when deploying abroad. Our forces must be able to operate with confidence in all threat environments.”⁴

805. The physical component of fighting power is the means to fight and comprises manpower, equipment, collective performance, readiness and sustainability. This section of the paper will only consider the protection of information, manpower, equipment and materiel; collective performance and readiness are examined in Chapter 6 - Prepare.

³ Future War/Future Battlespace: The Strategic Role of American Landpower, Metz, S. and Millen, R.A., Mar 03.

⁴ UK Defence Strategic Guidance, Jul 03.

806. Information Assurance. Future protection of the physical element of the deployed force will continue to cover a broad spectrum of capabilities, demanding significant contributions from all components of the joint force. This factor, combined with the UK's expeditionary capability to contribute to global intervention operations,⁵ will demand protection within the Joint Operations Area (JOA), back through our lines of communication to the home base. Apart from the enduring requirement to protect defence installations both at home and in-theatre, the ubiquitous introduction of information technology has opened a new 'information flank' that is equally vulnerable to attack. Already the number of attacks on information infrastructures is increasing, as is the severity of their impact.⁶ These vulnerabilities present strategic threats to national security.⁷ Reducing information infrastructure vulnerability to attack is an inherently global issue that will require global responses. However the UK Armed Forces must ensure that strenuous efforts are made to guard against attack of this nature, particularly for equipment capability and information processing upon which much more of our future capability will depend. Information assurance currently refers to the protection and defence of information and information systems by ensuring their availability, integrity, authentication, confidentiality and non-repudiation. It incorporates computer network defence that is actions taken to protect against disruption, denial, degradation or destruction of information resident in computers and computer networks. The requirement for information assurance to keep pace with military applications of information technology cannot be over-emphasised. Indeed, the provision of timely, assured information may well emerge as the single most powerful enhancement to this component of military capability.

807. Missile and Chemical, Biological, Radiological and Nuclear Proliferation. The proliferation of tactical, theatre and strategic missiles capable of carrying a variety of payloads is set to continue, as are the efforts of state and non-state actors to acquire weapons of mass effect and the means to deliver them.⁸ As alluded to above, the traditional ways of protecting force elements and installations will, to a large extent, remain valid. However, the shift from the massed threat during the Cold War, to a less well-defined threat in which the use of CBRN materials is more likely, necessitates a matching shift in defensive posture.⁹ The UK Armed Forces will require the ability to undertake a wide range of operations despite CBRN threats. We may continue to rely upon close allies for theatre missile defence, but our defensive capability will be required to encompass not only direct CBRN warfare threats, but also toxic industrial materials and general environmental hazards such as endemic infectious hazards. The lines between CBRN, medical issues and environmental health look set to blur. This

⁵ JDCC Strategic Trends, Mar 03.

⁶ Protecting Critical Infrastructures against Cyber-Attack, Lukasik, S.J. Goodman, S.E. and Longhurst, D.W, The Adelphi Papers, Vol 359, Issue 1, Aug 03.

⁷ *'All it takes is one smart, young third-world hacker to bring FORCEnet or similar...to its knees.'* Exercise PI03 report 10 Sep 03.

⁸ JDCC Strategic Trends, Mar 03.

⁹ UK CBRN Vision, D/DJW400/2/7 dated Jul 02.

implies that the management of the consequences of attack will assume as much importance as the evasion or avoidance of its effect. A more focused approach to CBRN defence will see more effective risk management leading to less degradation of operational effectiveness – for instance, more discerning use of fully protective postures in CBRN threat environments. Future missile and CBRN force protection will require the same attributes of agility as those possessed by the force elements being protected. Above all it will require mobility and flexibility to meet a range of possible tasks, environments and scenarios and it will need to be available to widely dispersed forces.

808. Combat Identification. Fratricide will continue to be a politically charged issue and it must not be allowed to undermine either the moral component of fighting power or the cohesion of a coalition. Although technology will never entirely eliminate the risk of fratricide, shared situational awareness and target identification will become increasingly available as it matures and thus help achieve a robust combat identification capability. The current emphasis on tactics, techniques and procedures will change as we progress to a networked and joint capability, featuring a complex mix of complementary equipment, doctrine, training and battlespace management techniques.¹⁰ But we must exercise due caution because there may be greater danger in future that fratricide is more likely on those few occasions that otherwise reliable future technology fails and where sheer speed of action temporarily degrades battlespace resolution.¹¹ Unless we have a clear understanding of the associated cultural issues, future over-dependency upon combat identification technologies could indirectly lead to additional problems. One of the best safeguards will always be a political and military acceptance that, despite our best efforts, fratricide is an ever-present risk and we must know how to respond robustly to media attention when it occurs.

809. Disease and Non-Battle Injury. The requirement to combat disease and non-battle injury will endure. Indeed, the shift of the UK Armed Forces to a growing expeditionary capability set against a proliferation of biological weaponry will increase that requirement. Past operational experience has demonstrated that the casualty rate suffered through disease and exposure to environmental extremes can assume significant proportions.¹² Non-battle road traffic and other accidents continue to create unnecessary and wasteful attrition of trained personnel, with statistics often

¹⁰ Combat Identification, T Banfield, Defence Management Journal, Issue 19, May 02.

¹¹ ‘Timely assessments were hampered by the speed at which US ground forces advanced through the Iraqi desert’ Adm Giambastiani quoted in War Review article, ‘Speed and Complexity of Attack made US Troops More Vulnerable to Friendly Fire’. Associated Press 10 Feb 03.

¹² In Chechnya (94-96), some Russian units lost as many as 10-30% of their strength due to poor field discipline. In the Falklands Campaign, the number of casualties caused by the cold and wet climate was equivalent to 27% of those wounded in combat.

exceeding those for operational casualties.¹³ Commanders at all levels must be trained to recognise and manage this risk.

810. Defending Against Asymmetric Threats. Asymmetric attack, by its nature, is often unexpected, and therefore mental and physical agility will be key to our response. Even when surprised, the UK Armed Forces must be able, if necessary, to reconfigure our equipment, structures and procedures to regain the initiative and prevail in the face of the unexpected. The strategic environment will continue to offer potential adversaries a range of asymmetric vulnerabilities that includes capitalising on civilian casualties or collateral damage caused by UK or coalition military action. Sustained media pressure arising from such scenarios is highly damaging to both public confidence and coalition resolve. Again, we must be well prepared for appropriate rebuttals.

811. Defending Against Symmetric Threats. Recent military operations have taken place against relatively poorly equipped and led adversaries. Although judged unlikely in the medium-term, there remains the possibility of a truly capable adversary emerging at some time in the future. Much of the above remains valid when considering force protection in this case, but it is likely that more emphasis would have to be placed on the ‘traditional’ methods of defence against forces capable of large-scale, force-on-force attacks, such as aerial or artillery bombardment.

PLATFORM AND INFORMATION-CENTRIC PROTECTION

812. The Platform and Information System Balance. The dominant current concept of protection is platform-centric and equipment is traditionally designed to be physically robust where possible, especially where absolute values of mobility are relatively poor. Therefore armour, camouflage, concealment and deception in its many forms – including defensive aids – tend to predominate. Another protection technique is to use long weapon reach to achieve stand-off from a threat. The advent of NEC makes this increasingly attractive because target acquisition assets can be decoupled from the weapon system itself to achieve flexible sensor-shooter-decision maker groupings, both within and across components. Stealth is an option that allows penetration of defences to a degree that on-board sensors may be able to provide resolution and discrimination. However, whilst stealth techniques will always have their place, they are perpetually vulnerable to countermeasures and inherently expensive. Significantly, information in its own right will comprise in future a much greater fraction of overall capability. The challenge for the future therefore lies in striking the correct balance between platform and information or system-centric models of protection.

¹³ See accident statistics for Gulf War 90/91, Op RESINATE and Op TELIC.

813. **The Value of the Information Fraction.** Sharing information between force elements will allow future agile mission groups to be more dispersed in the battlespace for optimum force protection and pattern disruption, combining physically only at critical junctures. This must be balanced with the need for sufficient mass in defence, but the high information fraction of any given force element should also better enable pre-emptive defensive manoeuvres.¹⁴ Threats would thus more easily be held beyond the limits of their weapon reach and a combination of shared awareness, tactical mobility and high levels of tactical interoperability will allow traditional protection to be enhanced and in some cases possibly superseded by cross-component responsiveness and tactical innovation. The traditional concept of a reserve force could be re-evaluated. Whilst the fundamental tenets for operational and tactical reserves will endure – to be appropriate and uncommitted – the networking of information within and cross-component should in time allow more flexible combinations of reserve combat power. However, relying upon information alone has vulnerabilities and we should not forsake completely the value of physical robustness, which retains its value even when the ‘fog of war’ reduces battlespace resolution to very low levels.

814. **The Relationship between Responsiveness, Reach and Vulnerability.** One goal for future operations is freedom of manoeuvre. The ability to manoeuvre requires responsiveness and reach and there are implications for the protection of future force elements that lie in the relationship between those 2 factors and vulnerability. In general terms, the full range of environmental capabilities will continue to be characterised by variations in responsiveness and reach. For example, a stark contrast in reach can be drawn between strategic air assets and land tactical formations, such as manoeuvre brigades. Strategic air, by definition, retains a high degree of strategic and operational responsiveness, whereas the manoeuvre brigade, even at its highest state of readiness, requires a considerable period of time to achieve forward-deployed operational capability. However, the same comparison at the tactical level shows that until air power can overcome its relative lack of persistence, the values for both responsiveness and reach could be reversed. Implications for future protection capabilities begin to emerge when the factor of vulnerability is added to the analysis. Vulnerability for any force element is a function of the protective ways and means and the time spent exposed to the influence of threats. Air assets tend by design to rely upon speed, countermeasures and stand-off rather than physical resilience. They also tend to be employed where the risk of their exposure to unforeseen threats is acceptable, in other words, in areas of higher battlespace resolution. A manoeuvre brigade will invariably be physically robust, designed to withstand unforeseen threats in unresolved areas of the battlespace. Therefore the protective requirements for force

¹⁴ This has been demonstrated with networked force elements such as the E3D and Tornado F3 communities. They exchange dynamic threat data in near real time to allow an extremely high degree of survivability against adversaries with otherwise more capable weapon systems. (Results observed from US-UK large scale air exercises and operations over the last decade following introduction of Tactical Data Links).

elements will vary according to their environment and the degree of battlespace resolution available. As always, staffs will have to judge which elements of the force are best placed within high or low resolution areas of the battlespace but it is clear that no single capability will ever dominate the vulnerability equation and a force must seek the correct balance of physical resilience and high responsiveness. Most importantly, if the information networking between these different capabilities is robust, commanders at all levels will be able to bring all of the relevant strengths to bear in ways that are not currently possible.

815. Dedicated and Shared Force Elements. The notion of dedicated and shared force elements being employed in low and high resolution areas of the battlespace respectively, as introduced in Chapter 3 - Operate, is relevant. Dedicated forces operating at the tactical level within unresolved battlespace would, in general, require physically robust systems both to withstand the blows from an adversary in reach and to deal with a higher level of uncertainty. Shared force elements, dispersed throughout the better-resolved areas of the battlespace and concentrating force only when required, demand information-centric capability to optimise freedom of manoeuvre and responsiveness. Persistence can be achieved by shared force elements in these high-resolution areas by exploiting high responsiveness over short time periods. However, dedicated platform-centric force elements in lower resolution areas can also provide persistence of effect by withstanding greater punishment over time. Fixed rules, whilst tempting, would be too simplistic. But certain factors will predominate, in particular the level of risk that a commander is willing to accept. A high level of resolution will permit a commander better to manage force packages with only a limited or shared reserve capacity, thus increasing economy of effort.

PRESERVATION OF THE MORAL COMPONENT OF FIGHTING POWER

816. Command Versus Leadership. Leadership is the principal factor in the maintenance of morale and the moral component of fighting power is about getting people to fight.¹⁵ There are myriad factors that influence an individual's conviction that they are pursuing a morally and ethically sound purpose and their will to engage the enemy. The will to fight requires motivation, leadership and management.¹⁶ Successful commanders will still have to generate confidence and trust within their subordinates. However, they will have the means in future to exercise effective command from a more physically secure position, rather than necessarily leading from the front. Evidence from Operation Iraqi Freedom indicates that a senior US Marine wrestled with this balance. Whilst he elected to go forward to get the true feel for the battle and the morale of his troops, it was in fact with a high degree of situational awareness and he indicated that, although he remained in close touch with his troops at

¹⁵ The moral component of fighting power is discussed further in the Chapter 9 - Sustain.

¹⁶ British Defence Doctrine (BDD) (2nd Edition).

the tip of the spear, he was not personally at risk for much of the war.¹⁷ Future training must help achieve this optimum balance between command and leadership skills in an information rich environment.

Psychological Demands of Future Operations. The need to conduct robust and demanding live training complemented by simulation will endure to replicate the fear, friction and uncertainty of operations. However, the psychological demands made on an individual operating in a dispersed, networked environment are less clear. Strains imposed upon individuals in future conflict may be amplified due to the effects of constant media scrutiny.¹⁸ The latter may alter the perceptions of those outside the theatre of operations. Therefore greater attention must be paid to the psychological impact of future operations as social and technological trends influence our servicemen and women and the way in which they fight. Future use of weapons such as theatre ballistic missiles or CBRN, whether as part of an asymmetric attack or a conflict involving the UK Armed Forces, is likely to have psychological effects that far outweigh the physical. Even the threat of use or a hoax attack might have substantial impact, not least on coalition partners and host nation civilians. It is within the moral component that we must seek to mitigate such impacts through the combined use of information operations, training and education.

¹⁷ 'E Bird' article by Lt Col G P Russell USMC, 16 Oct 03. It is interesting to reflect that in the same article, the author suggested that the USMC general was '*...the antithesis of the modern day warrior image some Pentagon leaders have sought to cultivate*'. It is therefore possible that the author was in fact drawing the wrong conclusions about the relationship between command and leadership in the Information Age, despite the fact that the USMC general had exploited situational awareness tools to great effect.

¹⁸ '*Increasing influence of the media to shape public opinion and thereby influence democratic governments.*' JDCC Strategic Trends, Mar 03.

CHAPTER 9 – SUSTAIN

SUSTAIN CORE CONCEPT

Network-enabled logistics to sustain the physical component of an agile joint force. Sustaining the moral component requires administrative agility and a strategic perspective for the joint force that inculcates mental resolve to sustain protracted operations

901. Sustainability is the ability of a force to maintain the necessary level of combat power for the duration required to achieve its objectives.¹ It is affected by a number of interdependent factors: the expenditure of men and materiel, equipment availability, availability of resources, the ability of the force to restore² itself and command support that is essentially the visibility of assets. It is the latter factor that has most potential for future sustainability in a networked information environment. Moreover, Network Enabled Capability (NEC) proffers obvious potential to improve all five recognised principles of logistics, namely foresight, economy, simplicity, co-operation and flexibility. However, it is important to note that the Sustain concept affects both the physical and moral components of fighting power.

902. In the past logistic planning sought to provide all force elements with the materiel for any mission which they might be called upon to undertake. This was achieved through the provision of Days of Supply of consumables, which is inefficient as it fails to focus on need. The advent of NEC and the subsequent ability to both monitor and predict consumption will free logistic planners from the legacy of Days of Supply and permit them to focus the logistic flow where it is needed. The logistic requirement must be more precisely tailored to the task and the overall logistic footprint optimised. To achieve this, logistics must become an integral part of the collaborative planning and not be viewed as a response or support to an operational plan.

903. The logistic requirement of an agile mission group will be defined by the task to be undertaken and the degree of battlespace resolution³ achieved. The emerging Defence Logistic Vision⁴ indicates how closely the logistic component must be networked to the operational component in order to provide robust tactical responsiveness. This will balance operational aspirations and logistic realities, resulting in far more precise logistic packages, tailored to the task to be undertaken. The greater the level of resolution of the battlespace, the smaller the necessary logistic

¹ JWP 4-00 (2nd Edition) '*Logistics for Joint Operations*'.

² Restoration comprises: Regeneration - the strategic activation of existing force structures and dormant capabilities; Reconstitution - the strategic level expansion of a force; or Rehabilitation - the operational or tactical level post combat phase of refurbishment and replenishment.

³ See Chapter 3 - Operate.

⁴ The Defence Logistic Vision addresses the physical component in some detail and sets out a series of capability goals. This Chapter offers a short description of these next steps, whilst addressing the moral and conceptual components in considerably more detail.

reserve as the risk can be more precisely assessed at both the tactical and operational level. Much of this improvement will be achieved in the same way that latent combat power will be unleashed by the horizontal synchronisation of force elements across traditional environmental boundaries. It will, however, require the equivalent levels of trust to be established between the logistic elements and the forces they are supporting, which can only be achieved by close association in prior training.

904. The moral component of fighting power will demand increased levels of support to deployed personnel because of changes in their expectations of what is acceptable. This will move beyond the basic physical necessities of food, accommodation, medical care and welfare into the underlying mental attitude necessary to understand the much longer-term strategic perspective required to undertake many future military operations.

SUSTAINING THE PHYSICAL COMPONENT OF FIGHTING POWER

905. **Provision of Materiel.** Demand for materiel is not simply the aggregate of consumption or use of materiel, but also its pattern, rate of change and variability.⁵ Demand stems directly from command intent and is the sum of three elements. Steady state consumption and cyclical demand, the latter caused for example by seasonal conditions, are predictable and relatively easy to manage. However, surge demand is driven by the pattern of operations and it is this in future that will create the greatest challenges because it is difficult to predict, particularly for highly agile forces. This will drive much higher responsiveness for logistics and it can only be achieved through NEC that will provide collaborative near real-time logistic planning at the tactical level of command.

906. **The Impact of Globalisation and the World Market.** Industrial globalisation and a shrinking world-wide market for defence equipment will precipitate a reduced industrial base where competition is limited and where the emphasis is as much on service provision and through-life support as on manufacture. Within this base, there will be increased competition from long-term, large draw globalised civil customers. A secondary effect of globalisation will be to place much of the industrial base further outside the influence of national governments and hence their ability to mobilise industrial output unilaterally. Planning for the provision of materiel will therefore be crucial; analysis must identify those items which can be procured within the necessary timescales and those which will require stockpiling. Assurance mechanisms will include the regular exercising of the agreements for immediate provision to provide operational confidence in the ability of industry to meet the requirements. The majority of stockpiled materiel will remain within the UK home base although, as discussed in Chapter 7 - Project, certain items might be pre-positioned in areas of

⁵ JWP 4-00 'Logistics for Joint Operations' (2nd Edition).

likely demand. This would improve the speed at which an initial logistic capability⁶ can be provided to early entry forces, a critical part of rendering the force militarily credible. Pre-positioning may also be necessary because of the delivery time required for certain items; there is unlikely to be a step change in the transit times or volumes of lift that limit current logistic flows.

907. **Pre-Positioning.** Sea basing, as a form of semi-mobile pre-positioning, offers in certain cases the advantages of integral logistic support. It also avoids many of the problems associated with long-term storage in a third country, offering a controlled environment and the sanctuary of international waters.⁷ However, the volume of materiel that could be provided in this manner is likely to be limited and longer-term operations will need sustaining by other means. If materiel cannot be deployed directly into theatre from the outset, it may be necessary to provide a Forward Mounting Base (FMB); the choice of bases will be determined by access, basing and overflight⁸ agreements.

908. **The Service-Contractor Balance.** The use of lead Service status for logistic provision offers the chance to reduce the training burden and to increase the consistency of service. The ability to create and maintain an initial logistic capability with uniformed personnel will remain vital. The guiding principle will be that uniformed personnel get the force in, with contractors augmenting and taking over certain support functions as soon as practicably possible, freeing the military for other contingencies. The timing of the hand-over of these functions will depend crucially on whether the situation is sufficiently benign to permit the use of civilian personnel; perhaps unlikely in the early stages of an operation. Even when such deployments might be possible, the contracts which permit such employment will have to be robust and thoroughly tested. Materiel and personnel sourced from in-theatre can reduce the deployed total whenever possible, but the lack of assurance in the early stages of an operation will force initial dependence on deployable military assets. Both contractor and local personnel are more likely to be used during the later phases of operations, particularly long-term roulement, redeployment, and in areas where uniformed support is not essential, such as major headquarters, airbases and logistic support areas.

909. **Logistic Resolution.** The required logistic footprint for agile mission groups will be crucially dependent on the overall resolution of the battlespace. The level of resolution will determine the ratio of dedicated and shared assets within the agile mission group⁹ and permit an assessment of the level of operational risk involved; both vital factors. Logisticians will have the necessary early input to the collaborative planning process as it develops. In this manner, logistic issues will be taken into

⁶ Based on US concepts a high readiness force must sustain itself largely unsupported for 3 to 7 days after which an initial logistic capability to sustain the force is required.

⁷ Sea basing is discussed in more detail in Chapter 7 - Project.

⁸ Refer to Chapter 7 - Project for details.

⁹ Discussed in Chapter 3 - Operate.

account during development rather than forcing later changes upon a plan produced in isolation. When it comes to delivery of the required support, however, it is the level of integration within the force itself which becomes the most important factor. Only in an integrated force will there be sufficient overall shared awareness to permit the necessary agility of logistic support. As agile mission groups need equally agile and responsive logistic support, the level of logistic integration will be an important factor in the overall agility of a force.

910. **The Logistic Picture and Asset Tracking.** The integrated information systems within the force, enabling the precise delivery of the logistic package, will provide the logistic element of the joint operational picture when fully networked. This joint logistic picture will enable the efficient location, allocation, transportation, and delivery of assets to ensure they arrive in the right place at the right time. The ability to resolve the logistic picture will offer the chance to dynamically re-assign assets across the battlespace in response to changes in the tactical situation, thus enhancing logistic tempo. Access to the joint operational picture will give logistics staffs the ability to interact with the operations and planning staff,¹⁰ a fusion of the J3/4/5 roles which should on occasion permit pre-emptive action. With sufficient confidence in the networked system, further optimisation of the logistic footprint should be attained, as duplicate demands, placed to ameliorate risk, become a thing of the past, reducing both in-theatre stockpiles and the volume of materiel moving through the support system. This key element of the Sustain concept is critically dependent on information being regarded as an end-to-end commodity providing the ability to similarly track assets. This is a clear requirement for NEC that must enable tracking across the entire force, rather than the current chains which lead to individual unit requirements being dealt with in hierarchical isolation. Tracking of assets will be assisted in part through containerisation and enhanced by the adoption of commercial tracking technology and will not be limited to consumables. It is these areas which offer the greatest potential for logistic optimisation, however the benefits will only be achieved through effective logistic Command, Control, Communications, Computers and Intelligence (C4I).

911. **The Fleet within Fleet Syndrome.** Financial pressures often result in partial fitment of modifications within operational equipments, leading to the creation of 'fleets within fleets'. The resulting mix of equipments of different configuration and modification state has major implications for the creation of agile mission groups. The required capabilities may not be universally available throughout the theatre, possibly limiting the makeup of the groups. Unique equipment identifiers and accurate recording of the modification state will help enable the allocation of the correct force elements, with the correct capabilities, to the mission groups. This requirement will be particularly vital for scarce, specialist elements likely to form the major part of the dedicated assets of agile mission groups.

¹⁰ See Chapter 4 - Command.

912. **Personnel Tracking.** It is as important to track personnel, not just at entry to and exit from theatre, but at all times. A joint logistics picture must include such an ability, offering not only information on the location of a person, but also their combat capability. Although individual active tracking devices for all personnel might prove too demanding in terms of bandwidth, a system of ‘gates’ at critical nodes should provide sufficient visibility without excessive latency. Individuals within the medical chain will require particularly close monitoring.

913. **Maintaining Materiel.** A significant logistic presence is imposed by the maintenance of equipment in the field. Concurrent operations aligned with Whole Fleet Management¹¹ and Total Fleet Requirement¹² techniques will result in equipments working harder and longer. Rigorous implementation of Integrated Logistic Support (ILS) techniques¹³ in the design of new equipments and the imposition of controlled maintenance regimes will reduce the overall maintenance burden. The inclusion of prognostics and autonomies¹⁴ will result in a significant reduction in equipment failure rates, while availability based contracts will encourage industry to invest in such technology from the design stage. Similarly, Health and Usage Monitoring Systems will become mandatory given their proven success in enabling Whole Fleet Management.

914. **Impact of Technology.** Advances in technology, particularly in the electronic field, will further reduce the size, whilst increasing the complexity, of battlefield systems. Consequently, the ability of Service personnel to repair these items within the theatre is likely to be very limited. Cost benefit analysis will be required to determine when a disposable rather than a repairable support strategy is more efficient. Such a policy would reduce the number of repair personnel needed to deploy forward within the force. A more focused repair organisation could then remain in a central position, looking to conduct predicted maintenance at a time suited to the tempo of the operation. Such an organisation would be well suited to contract given its potential stand-off from combat operations. Major repair and overhaul will almost certainly require a return to the manufacturer, with the concomitant need to purchase additional

¹¹ Whole Fleet Management is the process of managing a fleet of equipment through global visibility in the most supportable, effective and economic way in order to meet the stated operational, training and support requirement.

¹² Total Fleet Requirement is the total number of vehicles, weapon systems, ancillaries, equipments and supporting equipments required to deploy on the most demanding Defence operational liability. Concurrently, it must also be able to equip fully all Permanently Committed Forces, enable essential training to continue, and to provide Operational Stocks (formerly War Reserve), a Repair Pool, and the mechanism for maintaining a Peacetime Attrition Reserve.

¹³ Integrated Logistic Support (ILS) is the management and technical process through which supportability and logistic support considerations are integrated into the design and taken into account throughout the life cycle of systems/equipment and by which all elements of logistic support are planned, acquired, tested and provided in a timely and cost-effective manner.

¹⁴ Prognostics is the ability to identify and isolate an incipient fault (including performance degradation), track progression of the fault and predict the time to failure, time to unacceptable performance degradation or remaining life. Autonomies is the automatic initiation of support network activity in response to a fault occurrence without any human intervention.

stock to cover the inevitable delays of transport. Any residual deployed repair facilities must be used as joint assets, even if operated by an individual lead Service.

SUSTAINING THE MORAL COMPONENT OF FIGHTING POWER

915. **Sustainability Cycles.** Personnel require sustainment as much as materiel. The core of the moral component – leadership and motivation – is well documented in British defence doctrine. Management is the third element and it is no substitute for leadership but a vital element of the moral component nevertheless. Increasingly, the emphasis must be to optimise sustainability cycles to match levels of operational activity. Sustaining the moral component of fighting power requires periods of recuperation and we can usefully view this as the start of the preparation phase, not simply the end of the last operational cycle. The difference is subtle but important. The ethos must be to charge an individual's psychological batteries before training and operations, not just to recharge them on an *ad hoc* and opportunity basis afterwards, although flexibility demands an element of this.

916. **Welfare.** The physical necessities of life will be provided in much the same way as now, although expectations will no doubt continue to exceed the reality of provision. Austere environments will remain a difficult challenge, particularly when considering long-term deployments. Future generations of Service personnel will be accustomed to instant and personalised communications. This will pose problems for military authorities whose own corporate communication activity will have to match the agility shown by commercial news media. The requirement to retain operational security in the face of demands for personnel contact with family members will require careful balance.

917. **Contractors and Reachback.** Deployed contractors will have expectations which must be articulated as part of the contract process. Careful monitoring of these requirements will be necessary to prevent adverse effect on the overall logistic footprint of the operation or on the morale of uniformed personnel, potentially living under different conditions. Medical care will adopt the latest practices and procedures, offering a standard equivalent to that available in the UK, increasing the pressure on the ability to transport and treat casualties. Reachback to UK specialists for advice, or even remote assistance, will aid in-theatre facilities, while new investigative and surgical techniques will increase survival chances.

918. **Reserves.** Reserves will continue to be a vital element of our forces, although their role may change. It is becoming increasingly evident that many of the specialist roles which were traditionally left to the reserves are those which are now increasingly in demand. After operations, reserves often take considerably longer to recuperate than their regular counterparts; not least because of the requirement to maintain their civilian employment. Employers may well regard large-scale call-up as a single shot

option, with recovery time measured in years. As a result, those who traditionally depend largely upon reserves – logistics, signals, medics – may be the slowest to recover and so come to dominate the operational readiness cycles. There is perhaps scope to rebalance the role of regulars and reserves, with a higher percentage of the specialist support functions returning to the regular ranks and reserves taking more of the traditional combat roles.

919. **Dilution of Experience.** There is a natural tendency to send the most experienced personnel at the outset of an operation, which can make it difficult to sustain combat power if roulement is subsequently required as the operation endures. A mix of experience is required at all times and it is here that a revised balance between regular and reserve personnel might prove advantageous. Certainly, the ability to continue the deep preparation of personnel concurrently with operations must be maintained if the cycle is not to grind to a halt.

THE STRATEGIC PERSPECTIVE

Finally, there is a wider principle at stake. There is a very Western tendency to achieve outcomes within pre-defined timescales and resource levels. Many other cultures do not share this perception and prefer to take the long view and emerging adversaries such as international terrorists are a good example. It will be necessary to inculcate a sense of purpose that transcends the modern culture of immediate expectation and which engenders a sense of strategic perspective. Such a perspective would enable personnel at all levels to see their immediate role on operations as part of a wider canvas, working to achieve the strategic aim of the campaign. The development of such an ethos would help the acceptance of difficult conditions of service, including sustained low levels of casualties, by inculcating a degree of mental resolve to see the task through. Creating and maintaining this sense of strategic perspective demands a great deal of trust in the eventual outcome – which can only result from the highest standards of command, leadership and management at all levels.

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