

NATO RESEARCH FELLOWSHIP

**HANGING TOGETHER:
INTEROPERABILITY WITHIN
THE ALLIANCE AND WITH
COALITION PARTNERS
IN AN ERA OF
TECHNOLOGICAL INNOVATION**

by

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EXECUTIVE SUMMARY

The purpose of this study is to provide a conceptual framework for the discussion of interoperability in the military context. This analysis is then used to expose some ways in which coalition interoperability might be enhanced. It focuses on multinational interoperability. Interoperability is defined by NATO as 'the ability of systems, units or forces to provide services to and accept services from other systems, units or forces and to use these services so exchanged to enable them to operate effectively together.' The issue of interoperability is of concern within the Alliance. Interoperability is currently of concern within the Alliance.

The reasons for present concern include; the absence of a dominant threat and the consequential effect on missions and national force planning of the divergence of national military strategic concepts; the effect of intra-national joint initiatives in drawing focus and resources from the multinational problem; the increase in formal parties as a consequence of NATO Enlargement and Partnership for Peace; and differential rates of technological innovation.

Interoperability is a multidimensional concept. The 'types' of interoperability and factors affecting it are closely interrelated. Organisational interoperability refers to the formal and informal organisational structures that relate the various actors and parties in coalition operations. Behavioural interoperability is that dimension governed by human actions in response to the operational environment. It includes national institutional prescriptions and guidance in the form of government policy and national military strategy as well as military doctrine and procedures and informal cultural relations. It is influenced by national constitutions, law and custom. Doctrinal and cultural interoperability are the practical manifestations and are much enhanced by exercising, training, and by personnel exchange programmes.

Logistic interoperability is in many aspects closely related to technical interoperability as both relate to the provision of services and both are helped by commonality of equipment and standardisation. Technical interoperability includes connectivity between communication and information systems but there is a need to exchange information and to share awareness as well as unprocessed data. Although technical interoperability is generally considered to be the issue of most concern for coalition operations, the technology is and will be available to solve most technical interoperability problems relatively cheaply provided there is political will. Political will in this respect is reflected in harmonisation of national military strategic concepts as these ultimately affect allocation of resources and the equipment programme as well as dominating the development of doctrine.

The differences in national strategic concepts do not in truth reflect a US/European divide but one over the need for high intensity combat and force projection capability for expeditionary operations. European nations with expeditionary strategies share many similar views with the US. Work should be done to explore substantive similarities and differences while avoiding rhetoric.

Inevitably interoperability will not improve uniformly across the Alliance and with other coalition partners. It is important that those medium powers (including the US) capable of acting as 'framework nations' for operations achieve a high degree of interoperability among themselves and with regular operating partners. They can then form links to other less frequent partners. There are ways of living with poor interoperability in theatre including task and geographical separation and acknowledgment of co-operation and co-ordination as looser organisational bases for operations than full integration. In the end some nations will never be willing to engage in high intensity intervention operations or capable of doing so in any significant way.

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INTRODUCTION

The issue of interoperability among members of the NATO Alliance and Partnership¹ nations has been one of concern in recent years. NATO defines interoperability as 'the ability of systems, units or forces to provide services to and accept services from other systems, units or forces and to use these services so exchanged to enable them to operate effectively together'². Interoperability is, of course, not an end in itself. NATO has an incontrovertible aim for interoperability 'to enhance operational effectiveness and improve efficiency in the use of available resources'³.

Useful though they are, these definitions raise a large number of important questions relating among other things to the limits of interoperability. For example the definitions suggest that there is a direct relationship between interoperability and the efficient use of resources. If so, what are the constraints on maximising interoperability? And secondly, interoperability is an expression used in relation to many different aspects of the provision and use of military force and at various levels of military organisation⁴. Are there sensible limits to the use of the expression that preserve its meaning in a military context and prevent it from dilution?

The subject is not easy to address in all its aspects partly because of its breadth of application. Much technical language and jargon are used in connection with interoperability particularly when information technology (IT) is discussed whether as part of the problem or the solution. IT uses words and expressions from the general vocabulary such as 'semantic', 'open system', 'system high', 'architecture', 'domain' and

¹ Those nations participating in NATO's Partnership for Peace (PfP) Programme.

² AAP1

³ AAP1

⁴ For instance it might be said to have relevance to some or all of the traditional Levels of War; grand strategic; strategic; operational; and tactical.

'operating environment' in specific senses that can be confusing to a non-specialist particularly as the same words often have a broader non-technical meaning in other fields of the military sciences. Metaphor is often employed very loosely in expressions such as 'plug and play' which specialists might interpret in a number of ways. It is also used very vividly and precisely in expressions such as 'information mining' which nonetheless may leave a non-specialist with no clear idea as to what the activity entails.

The purpose of this study is first to provide a conceptual framework for the discussion of interoperability in the military context in as wide an application as is useful. This analysis is then used to expose some ways in which coalition interoperability might be enhanced. The study focuses on multinational interoperability. However the analysis addresses intra-national interoperability as its implications are high relevant to the multinational problem.

SOURCES

There is only a small amount of literature in open sources that addresses military interoperability in the post-Cold War strategic environment as it may be affected by recent advances in technology and technological trends for the future. The Swedish National Defence College has for a number of years conducted studies into issues of command and control in peace support operations and has produced excellent reports drawing insights from case studies principally of United Nations operations.⁵ In the United States (US) there has been a preoccupation with intra-national inter-Service interoperability. Joint Vision 2010 (JV2010) makes scant reference to coalition issues. However there is a growing awareness of the coalition dimension. The General Accounting Office reported on inter-Service interoperability in 1993 and considered the implications for multinational interoperability of NATO enlargement in 1997. The Defense Science Board Task Force on Coalition Warfare has recently produced a report but at the date of preparation of this report it has not been made available in the public domain. The Institute for National Strategic Studies, National Defense University, has recently published a study *Mind the Gap: How to Conduct a Transatlantic Revolution in Military Affairs*⁶. Both of these studies address US' aspirations to exploit the 'Revolution in Military Affairs' and the problem that this poses for interoperability with European militaries with very much lower levels of investment in research and development and differences in strategic vision.

⁵ Ed Captain Leif Ahlquist, *Co-operation, Command and Control in UN Peace-keeping Operations: a Pilot study from the Swedish War College*, Stockholm: Swedish War College, 1996.

Ed Captain Leif Ahlquist, *Co-operation, Command and Control in UN Peace Support Operations: a Case Study on Haiti from the National Defence College*, Stockholm: Swedish National Defence College, 1998.

⁶By David C Gompert, Richard L Kugler & Martin C Libicki, Washington DC: National Defense University Press, 1999.

There is a considerable amount of open source material now issued by departments and ministries of defence that are of relevance to a study of interoperability particularly papers and reports on concepts for the future, on doctrine, and on communications and information systems (CIS). However by far the largest amount of study of issues of military interoperability is conducted in the classified domain both on a national basis and within NATO. Insights are regularly presented from this work in the form of non-attributable briefings and in unpublished papers delivered to meetings and at conferences and symposia.

This paper draws on published material but to a large extent also on this non-attributable material as well as discussions both with officials at the senior and expert level.

As a contribution to taking forward this study efficiently the Royal United Services Institute has held two major conferences on interoperability in March 1998 and February 1999. At the first entitled *Interoperability in an Era of Technological Innovation* focused specifically on technical interoperability in CIS. The second entitled *Hanging Together: Achieving Multinational Interoperability* had a broader purview of the subject. The papers from these conferences have not been published.

The author was also fortunate in having been involved in the conference sponsored by NATO to celebrate the 50th Anniversary of the Alliance held at the Royal United Services Institute in March 1999 and entitled *NATO at 50* and to have benefited from the discussions at this event of the political and strategic aspects of the subject. The papers from this conference are to be published.

Finally the author is taking part in an ongoing study on *Coalition Warfare and Operations of the Future* involving four research institutes in the US, France, Germany and the United Kingdom and the respective Departments and Ministries of Defence⁷. Interoperability has been an important theme of this study which will report in 2000.

⁷The institutes taking part are US-CREST, Arlington Virginia, FRS Paris, SWP Ebenhausen, Germany, and the Royal United Services Institute.

THE INTEROPERABILITY PROBLEM

INTEROPERABILITY DURING THE COLD WAR

During the Cold War interoperability was no less important than today although it would be fair to say that the challenges were clearer and more specific. Indeed the threat to NATO was so immediate and the perceived balance of advantage was so unfavourable that there was a premium on any mechanisms for achieving greater military efficiency. However NATO had a robust strategic concept⁸ that was clear in its military implications. Flexible Response and Forward Defence placed heavy demands on the force planning processes of individual member nations. Command and force structures were designed for a single mission of territorial defence and the interfaces between the forces of different nations were clearly identifiable and fairly permanent. The requirement for integration of forces generally took place at a high level of echelonment⁹. For instance in the critical Central Command it was principally between national corps¹⁰.

Of course much integration took place at lower levels of echelonment particularly among naval forces. The Standing Naval Forces achieved high degrees of interoperability amongst single frigates and destroyers of several nations. There was considerable exchange of information among national and Allied headquarters and air operations centres throughout NATO's air defence system. There was and is a NATO Airborne Early Warning Force in which multinational crews man individual aircraft. In the ground environment the ACE¹¹ Mobile Force (AMF) was a standing ground formation that exercised integration among battalions of member nations. These examples were not so much exceptions to a rule that integration during the Cold War was achieved only at high levels of echelonment but rather instances where the requirements for interoperability were well understood at particular interfaces and for specific purposes.

Forces of NATO nations were operational in coalition operations during the Cold War. However with the exception of the Korean War and the Suez Operation of 1956 most of these operations were of the nature of what now is often called 'traditional peacekeeping' and under United Nations command. During traditional peacekeeping operations very modest levels of interoperability have been achieved among units of contributing nations. Although there has been much criticism of command and control arrangements for United Nations operations one might conclude that interoperability among the forces of contributing nations has in general been adequate to such peacekeeping tasks as monitoring, interposition and cantonment of weapons.

⁸ MC14./3

⁹ The organisation of formations at each level of command from lower level formations.

¹⁰ During the eighties the introduction of concepts of operational manoeuvre with their emphasis on the Operational Level of War heightened the requirement for interoperability but the focus for integration among ground forces was still at the corps and divisional levels.

¹¹ Allied Command Europe.

From the Cold War experience one can draw other conclusions about the ease or difficulty of achieving interoperability in particular warfare environments and among particular types of unit and this is a matter to which this study will return. Needless to say, Allied interoperability was never tested in combat although it was exploited extensively during 'presence', 'freedom of navigation' and other peacetime deterrent operations and in intelligence gathering and air operations to prevent encroachment into Allied air space.

PRESENT CONCERN

There are a number of reasons for the heightened concern over military interoperability in the Alliance and in national capitals in recent years

Missions and Force Planning

The lack of a single dominant threat to NATO has allowed a divergence of national strategic and operational concepts among members. The Alliance no longer has a grand strategic concept that is robust enough to spawn a single military strategic concept and clearly defined subordinate operational concepts. There is a weakness of NATO's post Cold War strategic concepts (whether that of 1991 or 1999) in that they lack the intellectual force to shape national strategic concepts and to drive national force planning and equipment programmes in a coherent way. The twin concepts of Forward Defence and Flexible Response of the Cold War¹² were a good deal more effective in this respect.

Since the end of the Cold War there has been a far greater diversity of types of possible coalition operations. Alliance forces could face a range of missions from those that are essentially benign such as disaster relief, through peace support operations in which combat on a significant scale may or may not be likely, to a major regional war. Whether the Alliance itself conducts these operations or Alliance members form an ad hoc coalition, they are likely to be 'coalitions of the willing'. The nations represented in the participating forces will so ultimately as a matter of choice as the conditions for an operation under Article V of the Washington Treaty will not have been met.

Command and force structures will vary hugely to reflect the nature of the mission and the extent and also degree of participation. Even when the Combined Joint Task Force Concept is fully implemented, there will be huge variations in composition and role of forces. To achieve adequate flexibility requirements for interoperability will be generic rather than specific.

There are special problems of technical and doctrinal interoperability associated with different tasks. There is not a simple model that will fit all types of operation. Nor is it sufficient to argue that a model that fits high intensity combat will have general application. The trend the development of high intensity warfighting systems largely in

¹² MC14/3

the US is towards electronic integration of smaller, dispersed systems into a single 'system of systems' that can be universally aware and that can apply huge amounts of violence discretely. There is an inherent mutual dependency between the small unit and the large system of which it forms a part. Whatever the doctrinal language of concepts of manoeuvre embracing personal initiative and mission command, the elements of such a system have limited opportunities for individual initiative except to the extent that they may have the best awareness of their immediate environment.

In contrast in the business of much of peace support and counter-insurgency operations it is old-fashioned human qualities of initiative and personal style that are of great importance. They may be better deployed if they are supported by comprehensive intelligence but they are qualities that are not well exercised if the doctrinal focus is on high intensity combat.

National Joint Initiatives

Since the end of the Cold War individual nations have been engaged in integrating their national forces among the Services¹³ and environments. The chief impetus has been to achieve greater efficiency and cost effectiveness as defence budgets have declined. Joint initiatives are designed to reduce redundancy, enhance synergy and exploit advantages of scale. They also address on a national basis the issue of diverse missions in striving towards joint formations with coherent capabilities and enhanced flexibility.

From a multinational point of view national joint initiatives are a mixed blessing. On the one hand they raise the profile of interoperability and tend towards a rationalised set of national capabilities that should theoretically simplify the problem of multinational interoperability. The larger nations may as a result be better placed to form the core or 'framework nation'¹⁴ for a coalition force. On the other hand they can divert attention and national funding from multinational interoperability projects. Furthermore the very process of developing coherent national capabilities in response to specific national strategic requirements can lead to a new emphasis on national autonomy in particular for larger nations that can complicate multinational interoperability.

NATO Enlargement, Partnership and Ad Hoc Coalitions

The expansion of NATO and the acquisition of formal Partners have increased the scale of the problem for NATO's various agencies working towards interoperability. New Members and Partners have interoperability goals. NATO has a responsibility to ensure that these goals are clear, consistent, optimised, achievable and relevant. There is also a financial cost for the Alliance and for existing Allies¹⁵ in assisting in the achievement of these goals as well as for new Members and Partners in meeting the challenge.

¹³ The Army, Navy, Air Force &c

¹⁴ This expression is used in NATO in a specific sense which will be discussed later in the study.

¹⁵ Capitals are used in this study for 'Ally' and 'Member' to mean a member of the NATO Alliance.

In many instances nations who are neither Allies nor Partners will contribute forces to multinational operations. Indeed the 'coalition of the willing' in this inclusive sense is likely to be the norm in the future. There is therefore a range of interoperability demands with a dimension that cannot be addressed purely within NATO and the Partnership Programme. Some Allies will have interoperability initiatives with friends and allies in arrangements other than NATO.

Technological Innovation

The issue of overriding concern in achieving multinational interoperability within the NATO Alliance and beyond is that of differential rates of technological innovation. There is a wide disparity as to the rates and levels to which NATO members are able or willing to incorporate advanced technology into their military systems and to address the implications of technological advancement into their military doctrine. The problem is most acute in the field of information technology in which the rapid increase in computer processing power now offers possibilities for new military concepts of operation.

The comparative willingness or otherwise to spend on advanced technology and to adapt to its implications is an important factor in achieving interoperability. In this respect in 1998 the US Chairman of the Joint Chiefs of Staff launched JV2010, a military strategic concept¹⁶ for the future that among other things sought to address and exploit the potential of information technology for future military operations. Although in its unclassified form JV2010 made little mention of coalition operations, it has been perceived in some quarters as a challenge to other Allies either to keep pace with the offerings of technology or to be excluded from full participation in future operations in which the US intends to play a leading role.

However the problem is not only that the US owns and will introduce systems that are technologically in advance of those of its allies and partners. The technology itself provides opportunities for the development of strategic and operational concepts that may not be available to or welcomed by partners of the US. And these concepts are likely to spawn new generations of equipment that will enhance the division both technologically and doctrinally. There are likely to be technical remedies for technological divergence. Doctrinal divergence is a problem of a different order. If two nations are intent on using forces in fundamentally different ways, no amount of technical connectivity will weld their units into a coherent fighting force.

This study will develop this important issue of strategic congruence between Allies.

Defence Capabilities Initiative

¹⁶ JV 2010 actually calls itself a 'conceptual template' but it contains the crucial element of a military strategic concept in that it answers the 'how?' question from the perspective of the national military headquarters.

The North Atlantic Council has recently expressed its concern specifically over the issue of interoperability in the Defence Capabilities Initiative (DCI) launched at the NATO Summit in Washington on 25 April 1999 by NATO Heads of State and Government. The objective of DCI is 'to improve defence capabilities to ensure the effectiveness of future multinational operations across the full spectrum of Alliance missions in the present and foreseeable security **environment with a special focus on improving interoperability among Alliance forces, and where applicable also between Alliance and Partner forces**¹⁷'.

The DCI communiqué notes that future Alliance military operations are likely to 'extend multinational co-operation to lower levels', and to include force contributions from Partners and other non-Allied nations. They will 'make new demands on the capabilities required of Alliance forces, in particular in the field of interoperability'. Special attention must be paid to the challenges of interoperability, specifically human factors (such as common approaches to doctrine, training and operational procedures), standardisation, and 'the challenges posed by the accelerating pace of technological change and the different speeds at which Allies introduce advanced capabilities'.

The High Level Steering Group that has been established to oversee DCI is charged among other things with 'co-ordination and harmonisation among relevant planning disciplines with the aim of achieving lasting effects on improvements in capabilities and interoperability'.

It would be wrong to cast the DCI purely as a statement of intent as to interoperability. It is of much wider importance in that it acknowledges implicitly that there is a need to reinforce NATO's force planning process with public guidance¹⁸ as to the capability requirements for the new non-Article V missions in particular those involving intervention beyond Allied territory. Nonetheless the repeated references to interoperability in a short document of a mere page and a half in length speak for themselves.

¹⁷ Author's emphasis.

¹⁸ In addition to the regular issue of classified Ministerial Guidance.

ANALYSIS OF THE DIMENSIONS OF INTEROPERABILITY

A Definition

NATO's rather dry definition of interoperability quoted in the Introduction¹⁹ is adequate as a basis for further analysis although the use of expressions such as 'systems' and 'services' tends to emphasise the technological aspects of interoperability and to downplay cultural and doctrinal aspects. Interoperability is by no means exclusively a military concept. There are non-military definitions such as 'the ability of systems to exchange, extract, process and display data to yield the same final product'²⁰. Typically these general definitions do not reflect the multi-disciplinary nature of military science and they further invite a debate as to the applicability of particular models of information or organisation theory to military structures.

Interoperability in an Operational Context

In the context of the DCI interoperability may be said to be one of the 'family of abilities' that characterise what is required of armed forces. The British Secretary of State²¹, George Robertson, used this form of words in a speech to a conference celebrating NATO's 50th Anniversary. The other qualities he mentioned as members of this family are deployability, flexibility, sustainability, mobility, and survivability²². This description places interoperability in a practical and functional context as one of a number of requirements for effective intervention operations in response to security concerns of the future. Other NATO nations do not share the United Kingdom's expeditionary military strategic concept. Nonetheless in terms of requirements for interoperability the intervention scenario in a coalition context is the likely to be most testing that NATO nations will face. The perceived need among members of NATO for the DCI bears out this conclusion.

However interoperability differs from the other 'abilities' listed by George Robertson as it is not a discrete concept and is a factor in all of the others. The deployability of coalition forces is enhanced by the interoperability achieved through training and mission rehearsal. The movement of forces into theatre and mobility within theatre is enhanced by interoperable use of strategic, operational and tactical lift. Flexibility is enhanced if forces share a Common Operational Picture as a product of intelligence, surveillance and reconnaissance and can provide engagement quality target acquisition data to one another's weapon systems. Sustainability is enhanced by the rationalisation afforded by shared logistics (logistic interoperability) and survivability by the protection that one

¹⁹ The ability of systems, units or forces to provide services to and accept services from other systems, units or forces and to use these services so exchanged to enable them to operate effectively together.

²⁰ Dr Frank P Engel, INRI, at a conference at the Royal United Services Institute 27 March 1998.

²¹ And Secretary General designate of NATO.

²² At the Royal United Services Institute on 10 March 1999.

force, formation or unit can provide to another, particularly if unique protective capabilities are provided and if they have the necessary interoperability. An important component of capability in this last instance is the trust that is necessary to permit such a dependence.

Dimensions of Interoperability

This brief survey of interoperability in an operational context reveals that it is a multidimensional concept. There are many different sorts of interoperability. It can in the first instance be described by reference to the **organisational level** or '**Level of War**' at which it is attempted or achieved. Secondly it can be described with reference to the **actors** among whom interoperability is attempted or achieved. Thirdly it can be described with reference to the services that are provided for which interoperability is required, in particular **technical** and **logistic** interoperability. Then there are types of interoperability that relate to perception and action that one might call **behavioural**. These include **doctrinal** and **cultural interoperability** both of which are influenced by constitutional, legal and customary factors.

If one is to describe two headquarters, forces, formations or units as interoperable, one must have satisfied oneself as to their interoperability with respect to these all of these dimensions which are analysed more fully below.

Finally there is the question of degree. Can two or more systems be more or less interoperable in a military context or are they either interoperable or not?

Degrees of Interoperability

Interoperability is, of course, not an end in itself. NATO's definition of the aim of interoperability, also cited in the Introduction, 'to enhance operational effectiveness and improve efficiency in the use of available resources'. This aim implies that interoperability admits of degree. There is not a clear threshold on one side of which forces or systems are interoperable and on the other they are not. There is a view that the expression 'interoperability' should only be used in a restricted sense to mean a very close degree of integration achievable perhaps only within the forces of a single nation or only in the technical context. A word such as 'co-operability'²³ might better express looser forms of integration across national boundaries or in contexts other than the technical. If these definitions were accepted, there may indeed be a single threshold to cross to achieve interoperability. This study prefers, however, to use 'interoperability' in the broader sense as it is used by NATO in DCI and elsewhere and to accept that there are degrees of interoperability.

²³ I am indebted to Lieutenant General Edouard Valensi, DGA DCI, France for this expression.

There is clearly a relationship between interoperability (in any context) and efficiency or operational effectiveness²⁴ but it is not necessarily linear. Intuitively one expects that at certain levels of interoperability there might be benefits of synergy and, therefore a step change in effectiveness. There will therefore be thresholds within the general concept of interoperability. The cohesion of a coalition may be a source of military strength in that the resulting forces are bigger. They will almost inevitably be markedly less efficient than a national force of the same size. There is a threshold of nationality that exists in many of the dimensions of interoperability discussed later in this study. The need for security in particular is a major impediment to achieving interoperability across the national threshold.

Nevertheless one could plot a notional graph relating interoperability to efficiency from which one could relate total interoperability to maximum efficiency as a Clausewitzian ideal. Practically this maximum could never be achieved but the extent to which this should be an aspiration is a subject for this study. There may be other overriding considerations that may place a limit on the degree of interoperability. For instance the diversity of doctrines that a coalition might bring to an operation might greatly complicate the opposition's ability to assess 'enemy course of action'. A variety of radar and radio frequencies in a coalition's electronic order of battle may complicate an opponent's electronic countermeasures. And at the Grand Strategic Level a coalition brings political strength. For a nation such as the US political considerations may be the only ones that argue for a coalition with militarily inferior partners. A coalition that represents a range of cultures and span diverse strategic outlooks may carry far more political clout than that of a few like minded partners.

By the same token, however, the cohesion of a coalition is a source of weakness. Lack of cohesion may be the coalition's critical vulnerability or centre of gravity in the language of military doctrine. A coalition may therefore be politically and militarily sounder and safer for its interoperability as well as more efficient.

²⁴ One might distinguish efficiency and operational effectiveness. High efficiency in this sense suggests highly cost-effective military capability delivered to prescribed measures of operational effectiveness.

ORGANISATIONAL INTEROPERABILITY

Levels of Organisation

In a military context it is usual to relate interoperability to a particular organisational level. Military organisation can be described in a number of ways, functionally in terms of combat functions, or by reference to command or force structures which may or may not be functional. There are wide variations among nations and among the various Services and arms of particular nations as to permanent and contingency organisational structures. For specific operations in many cases ad hoc structures will be formed to meet the requirements of the situation even where national or Allied models exist. For ad hoc coalition operations organisation will almost invariably be *sui generis*. The Levels of War²⁵ are a useful way of discussing military organisation independently of specific examples. It must be emphasised however that these levels are abstractions and, if applied too rigidly, create as many definitional problems as they solve. The Levels of War are accepted throughout NATO and more widely as the Grand Strategic, Military Strategic, Operational and Tactical Levels. For simplicity this study defines the Levels of War as:

Grand Strategic The level of national governments and international organisations at which the instruments of national or coalition power (military, diplomatic, economic &c) are integrated. In the NATO context this would be the North Atlantic Council. The expression 'interoperability' is not normally used in connection with inter-governmental activity. Nonetheless it is a conceptually appropriate term. Consideration of the Grand Strategic Level is important as national policy considerations pervade all levels and aspects of military activity, notably the very significance of the issue of interoperability itself and implications for defence equipment budgets and equipment programmes. Interoperability at this level is characterised by commonality of national objectives, congruence of security policies, sharing of intelligence, resolution of legal differences and harmony between cultures. In short interoperability requirements are largely 'behavioural' although technical connectivity among capitals and with NATO, United Nations Headquarters, the Organisation for Security and Cooperation in Europe and other international actors is obviously relevant. In a NATO context multinational interoperability is reflected in the New Strategic Concept, periodic Ministerial Guidance and in the existence and procedures of the Atlantic Council and the International Staff.

Military Strategic The level of the highest national military headquarters and in the case of NATO the Military Committee. The Major NATO Commanders have roles that span the military strategic and Operational Levels. Interoperability is characterised by congruence of military strategic concepts and strategic doctrine both of which are influenced by national cultural and legal factors. NATO's International Military Staff and the processes of the Integrated Military Structure are evidence of

²⁵ Capital letters are used throughout this study for this expression and for the individual Levels of War to indicate that the terms are being used in a formal sense.

interoperability as is the exchange of strategic intelligence. Technical connectivity among national and Allied Headquarters and among national strategic command and control systems and with those of NATO is important and inherently more technically problematic than at the Grand Strategic Level.

Operational The highest level of command in a theatre of operations or theatre of war. In the NATO context the Major Subordinate Commander responsible for a theatre and also the Commander of a Combined Joint Task Force would both be operational commanders depending on the scale of the operation. At the Operational Level multinational interoperability is enhanced by congruence of Operational Level doctrines which is in turn influenced by national policies, strategic concepts and cultural considerations. Within NATO a common operational doctrine is an aspiration less easy to achieve in the complex security environment since the end of the Cold War. In this respect it is relevant that France does not belong to the Integrated Military Structure and does not formally take part in this process. Technical interoperability among command, control, communications and information systems is increasingly important at this level if interoperability is to be maximised. Information technology provides the potential to achieve this in particular in integration of Operational Level military functions such as intelligence, surveillance, and reconnaissance, operational planning, mission rehearsal, and battle management.

Tactical The level of command of specific formations and units within a theatre. Examples of multinational interoperability in an Allied context at this level are mentioned in the Introduction. Multinational 'environmental'²⁶ Component Commands of Combined Joint Task Forces would demonstrate interoperability at the Tactical Level. Other instances are the integration of British naval air defence and mine countermeasures forces into US maritime forces in the northern Gulf during the 1991 Gulf War and numerous contemporary and traditional peace support operations under the command or auspices of the United Nations. Behavioural and technical interoperability are both very important at this Level of War and both have been traditionally difficult to achieve.

Procedural Edward Luttwak²⁷ also defines a Procedural (or Technical) level below Tactical at which choices of course of action are dictated by the requirement to operate equipment effectively. For the study of interoperability the Procedural Level is a useful addition. Multinational interoperability is not usually associated with this Level of War because it is not normally attempted at very low levels of echelonment, for instance among individual infantry soldiers or members of a vehicle or aircraft crew from different nations. It is of course a factor in the crewing of NATO

²⁶ Maritime, Land, Air and Special Forces Component Commands would in the NATO model be Tactical Level commands subordinate to the Combined Joint Task Force Commander.

²⁷ Edward N Luttwak, *Strategy: The Logic of War and Peace*, Cambridge, Massachusetts: Harvard University Press, 1985.

AWACS²⁸ aircraft and wherever exchange²⁹ or loan personnel are employed operationally. A liaison officer of one nation serving within the headquarters of another faces issues of Procedural Level interoperability in using office and command systems and in adapting to the language, corporate culture and practices of the host headquarters.

In the context of major war the Levels of War bear some relation to the echelonment of forces, in particular of ground forces. The borderline between the operational and Tactical Levels has been generally considered to be at the divisional level of two star command. In modern intervention operations such as peace support operations there is no direct relationship between Levels of War and echelonment. The only force in a theatre may be very modest in size yet its posture and actions are likely to be strategically significant.

Traditionally the divisional level has been considered the lowest practical level at which integration of multinational ground forces can be achieved. Interoperability was principally an Operational Level concern³⁰. However the trend in operations is in favour of integration at lower levels. A multinational peacekeeping force may be composed of battalions of different nations or even smaller units.

One can derive four principles that govern interoperability at the various Levels of War:

1. The lower the Level of War the more difficult interoperability becomes. Forces of different nations operating at the operational and Tactical Levels completely independently may pursue a common purpose at the Grand Strategic Level relatively easily. Integration of Operational Level commands (whether by establishment of a single multinational headquarters or by connectivity between headquarters) is easier to achieve than the full integration of tactical units and formations of different nations into what is effectively a single fighting force.
2. Combat not surprisingly places demands on interoperability. The higher the likelihood of combat during an operation and the more intense the level of fighting, the greater the requirement for a high degree of interoperability and therefore the higher the Level of War and of echelonment at which interoperability can be achieved. Battalions of different nations may conduct traditional peacekeeping but interoperability in the ground operation of the Gulf War was only attempted at the divisional level.

²⁸ The Airborne Warning and Control System employing the E-3 Sentry modified Boeing 707/320 aircraft employed by the NATO Airborne Early Warning Force.

²⁹ Personnel from two nations each employed usually temporarily and individually within the armed forces of the other.

³⁰ The same is not true of air and naval forces which have traditionally been capable of integration at lower levels.

3. In the future the distinctions between the Levels of War will be blurred for two reasons. First, developments in information technology, in particular options that it provides for network centric activities³¹, will tend to blur the distinctions in particular between the Operational, Tactical and Procedural Levels. If units at very low levels of echelonment can be integrated electronically into and contribute to a common system that can among other things allow for the wide dissemination of Operational Level information, there is likely to be a delayering of command structures. Secondly, future operations especially in response to complex emergencies³² will be conducted in a very sensitive political and diplomatic environment. Actions by units at low levels of echelonment will be politically and strategically significant. There will be a political requirement for adequate purview and control which will have a tendency to short circuit intermediate levels of command particularly if these do not obviously add value.
4. Evidence from practice shows that multinational interoperability is most difficult to achieve among ground forces and easiest in the widest range of circumstances among naval forces.

Organisational Models

In practice the command structures for recent multinational operations have in most cases been *sui generis* with the exception of traditional United Nations peacekeeping operations. There are in addition some models designed by multinational organisations, in particular NATO and the Western European Union (WEU) that are available. Of these the Combined Joint Task Force (CJTF) concept offers a flexible series of options using NATO forces alone under NATO command, or WEU forces under WEU command but drawing on some NATO assets and facilities, or either of these command arrangements including other nations in the structure. These nations might be Partnership nations or other nations or both. Some illustrative models of which diagrams are in Appendix 1 are described below:

- ***Traditional United Nations*** UN authority is vested in a civilian Special Representative of the Secretary General. A UN Military Commander (or Chief Military Observer) commands UN military forces composed of a number of national contingents each under a national commander. Staffs of permanent or temporary UN officials support the Special Representative and Military Commander. National forces

³¹ Network Centric Warfare is 'an approach to the conduct of warfare that derives its power from the effective linking or networking of the warfighting enterprise. It is characterised by the ability of geographically dispersed forces (consisting of entities) to create a high level of shared battlespace awareness...'. David S Alberts, John J Gatstka and Frederick P Stein, *Network Centric Warfare*, Washington DC: DoD D4ISR Co-operative Research Programme, 1999.

³² Such as peace support operations, disaster relief and other forms of humanitarian operations.

are offered in response to a request by the Secretary General. There are numerous instances of this model.

- **NATO Article V** The Major NATO Commanders (MNCs) would exercise command on behalf of the North Atlantic Council of forces transferred by nations to NATO command through a permanent command structure of geographic Major Subordinate Commanders (MSCs) and lower levels of command some of which are functional and some of which are geographic commands. MNCs and MSCs have permanent fully international staffs. Lower levels of command have permanent staffs some of which are fully international and some of which are effectively augmented national commands. National forces that are transferred comprise a permanently constituted force structure of 'assigned' and 'earmarked' forces. This model has been regularly exercised but had not been used for actual operations.
- **WEU (Pre-CJTF)** The WEU Council nominates a strategic and operational command of one of its member nations to exercise command of WEU forces. Staff from contributing members would augment the staff of these commands. A force package appropriate to the mission would comprise nations' forces transferred to the WEU Commander by member nations at the request of the WEU Council from lists of Forces Answerable to the WEU. This is a particular form of the 'Framework Nation' concept. This model was used for the WEU maritime monitoring and sanctions enforcement operations in the Adriatic during the Bosnia crisis.
- **CJTF** In its NATO manifestation a mobile Operational Level multinational command is formed from a permanent cadre headquarters staff spawned by an MNC or MSC headquarters and augmented with other international staff. A force package appropriate to the mission would comprise nations' forces transferred by member nations at the request of the relevant MNC. Command of forces of Partners or other nations may also be transferred to the CJTF commander and staff of these nations would be assigned to the multinational staff of the CJTF headquarters. The CJTF concept is designed for use also for purely European operations in which case the MNC³³ would report to the WEU Council rather than the North Atlantic Council and only European forces would be transferred. Command and organisational arrangements for the IFOR/SFOR operation in Bosnia and the KFOR operation in Kosovo approximate to the CJTF model although it has not been formally implemented by NATO and there were important modifications to permit the inclusion of Russian forces in particular.
- **Framework Nation** One nation provides the command and strategic and Operational Level headquarters for a multinational operation. Other nations transfer command or control of forces to these commanders and provide liaison staff or full members of staff to these headquarters. Usually the framework nation would be the largest provider of forces for the operation. This model has been commonly used for ad hoc

³³ Command would be exercised by a European deputy.

multinational operations such as the 1991 Gulf War when the US acted as framework nation³⁴.

Any of these organisational models require nations to pass some degree of command or control³⁵ of national forces to a multinational commander or commander of another nation. Transfer of command or control may be limited by national legal, customary or constitutional constraints (see *Behavioural Interoperability* below). The transfer of command and control does not in itself imply any high degree of multinational interoperability. Nor does adoption of any particular model in itself imply a high level of interoperability although some models place higher demands on interoperability than others (for example NATO Article V command arrangements). However transfer of command and control to multinational commanders or those of another nation is a requirement if higher degrees of interoperability are to be achieved.

A nation that is unable to transfer command and control of its own forces can still participate in closely integrated multinational operations if it is acting as framework nation under the Framework Nation Model or is able to circumvent its own national constraints by providing the multinational commander at appropriate levels within the command structure. The US has used these devices in the past to circumvent national constraints.

It is worth noting that in none of these models are logistics necessarily integrated to any degree on a multinational basis. Nor is the administration of forces in areas such as pay, discipline and welfare necessarily nor usually transferred to a multinational authority or that of another nation.

ACTORS AND PARTIES

Implicit in the discussion so far is the notion of multinational interoperability - interoperability among the forces of different nations whether within an Alliance command structure or in a looser coalition arrangement. However considerations of

³⁴ The term is also used to describe a nation that provides the command and core staff for a permanent NATO headquarters and formation. An example is the Allied Command Europe Rapid Reaction Corps for which the United Kingdom is framework nation.

³⁵ NATO distinguishes between Full Command, Operational Command and Operational Control. Full Command is not transferred to a multinational commander or commander of another nation. Operational Command allows a commander to **assign missions or tasks to subordinate commanders to deploy units, to reassign forces** and to retain or delegate operational and/or tactical control as necessary. **It does not of itself include responsibility for administration or logistics** Operational Control is the authority delegated to a commander to direct forces so that the commander may accomplish **specific missions or tasks which are usually limited by function, time or location**; to deploy units concerned, and to retain or assign tactical control of those units. It does not include authority to assign separate employments of components of the units concerned. Neither does it of itself include administrative or logistic control.

interoperability apply within the forces of nations, among the Services of a particular nation and within these Services among specific arms and specialisations. Indeed for many nations inter-Service interoperability and the requirement to achieve 'jointness' or 'jointery' is a more immediate problem than multinational interoperability. Indeed interoperability among forces of different nations of the same Service or arm is sometimes better than among the Services of the individual nations. In the past NATO's naval forces have achieved higher degrees of interoperability amongst themselves in some theatres than they have shared with the ground forces of the respective nations.

Interoperability can further be analysed by reference to the actors and parties involved. **Joint** interoperability is that among arms essentially within the forces of particular nation. There are organisational, behavioural, logistic and technical aspects to joint interoperability. A shift towards joint command and force structures is organisational. The adoption of a common doctrinal hierarchy is behavioural. The integration of logistics into a single national logistics command and the integration of single service command systems into single joint strategic, operational and tactical command systems would be examples of logistic and technical interoperability - that is, among services.

Multinational interoperability can be sub-divided into that:

- among **Allies** who agree to accept certain standards and to work together towards standardisation where formal standards do not exist;
- with **Partners** who may be presented with Allied standards to which to aspire;
- with **other allies/friends** of NATO members who may be aware of NATO standards and make use of them where they are commonly available - other alliances may of course derive their own standards and *modus operandi* may be developed among friends ;
- with **ad hoc coalition** partners for whom Allied standards may or may not be available or acceptable.

These categories bear further analysis. Depending on the nature of an operation interoperability may be required among the following national and non-national actors:

- **Military headquarters and units.** Some models of discrete organisations are discussed under 'Organisation' above. It is also possible that more than one military organisation will be operating in the same theatre, for instance UN and NATO forces (as during the UNPROFOR operation in Kosovo).
- **Supra and inter-governmental organisations** and their **headquarters** such as those of the UN and its agencies, the European Union, the Organisation for Security and Cooperation in Europe (OSCE) and other regional organisations may have missions and staff in theatre.
- **Other governmental departments** of coalition governments. Typically national component commanders in a theatre of operations will need to liaise for a variety of operational and administrative reasons with the ambassadors and staffs of their embassies in theatre. Foreign ministry officials of coalition nations may be engaged in negotiations in theatre. Police and civil affairs staff may be seconded by nations to a theatre of operations and may bring their own national component managers.

- **Non-governmental organisations.** These might include the International Federation of Red Cross and Red Crescent Societies which is likely to have a presence in a theatre in which there are humanitarian concerns.
- **Private voluntary organisations** which span large, well-established and experienced charities on the one extreme to small inexperienced groups formed to respond to humanitarian needs of a specific crisis. Some may be ideologically motivated. Some may deliberately eschew traditional methods of organisation. Many will be wary of close involvement with any military organisations regardless of their mission seeing all armed force as part of the problem rather than as instruments for protection of for containment and reduction of conflict.
- **Private military and security companies** under contract to provide protection to other actors such as commercial companies with large installations and considerable numbers of employees and families in theatre. Non-governmental and private voluntary organisations frequently arrange for protection of their staff by contract with private military and security companies and other providers of security.
- **Civil authorities** in theatre in particular those of a host nation or of territory under the control of a coalition force.
- **The leadership and forces that are parties to or victims of a conflict** Where coalition forces are inserted into theatre to protect one or more parties against aggression by another, there is clearly a need for contact between coalition forces and the forces of the parties under aggression who may for many reasons not themselves be part of the coalition. In complex emergencies the situation may develop in such a way that intervention forces are on a temporary or permanent basis no longer impartial but operate in support of one or more parties against another. In these circumstances there will be a similar need for contact which will be of a different nature to that for instance between peacekeeping forces and parties to the conflict. For example there may be a need to transfer intelligence.

BEHAVIOURAL INTEROPERABILITY

Less tangible and open to neat analysis is behavioural interoperability which for the purposes of this study is defined as that dimension of interoperability that is governed by human responses in the form of behaviour patterns (actions) by individuals and groups to their perceptions of the security environment. In a specific military context two groups (forces, formations, units &c) have a high degree of behavioural interoperability if they are likely to respond in similar ways to a particular military situation.

In a military context the behaviour of an individual or group will be governed by transient features of the environment in which they are operating but also by some enduring factors. Specifically behavioural interoperability may be described with reference to institutional prescriptions and guidance on the one hand in the form of **security and defence policies, military strategy and doctrine** and wider social prescriptions and modifiers of behaviour on the other such as **national constitution, legal system, custom and culture**. These categories are not completely distinct. For instance military custom and culture may affect doctrine and security policy may be mandated by law³⁶

Legal, Constitutional and Customary Factors

National legislation and constitutional arrangements limit may how military forces of that nation can be employed. Limitations may relate to missions on which a nation's forces might be employed. The extent to which German forces may be used for tasks other than national defence is a subject of internal debate. There are legal limitations on the use of the armed forces of many nations in internal security roles. There may also be restrictions on the transfer of a nation's forces to multinational command or to the command of another nation. Where no formal legal or constitutional constraints exist, there may be customary limitations. As a result a government may not feel that it could achieve political support for certain uses of its forces. There are also legal provisions that affect technical interoperability in particular where classified information is to be transferred between nations.

These factors may also govern military actions during operations. National Rules of Engagement (ROE) may differ between the forces of nations contributing to a particular operation. Where a common set of ROEs is agreed, there may be national differences in interpretation. For instance nations may have different interpretations of the concept of self-defence. Indeed the very process of agreeing a common set of ROE for a particular operation may be beset by the constraints applied by the various nations for reasons of law or custom.

National Policies, Strategy, Doctrine and Procedures

³⁶ As in the case of the US.

These expressions are used very loosely, and occasionally interchangeably. For the purposes of this study it is perhaps helpful to make some distinctions. Policy is a matter for governments and supra- and inter-governmental groupings. Policy may be expressed purely as a set of objectives, whether enduring or devised for a particular situation. Objectives may be prioritised or in a hierarchy. Policy may also contain a concept, that is an indication as to how objectives are to be achieved and may include allocation of resources. In its simplest form it may, however, be no more than a statement of objectives. Security policy addresses all the instruments of national or coalition power, economic, diplomatic, informational and technical as well as military.

Defence Policies

Defence policy principally addresses the military instrument. In the language of Levels of War, security policy is devised at the Grand Strategic Level; defence policy at the Military Strategic Level. Importantly defence policy will drive nations' defence programmes³⁷ and force planning. It will therefore govern the acquisition of equipment and the resources that are devoted to technical interoperability. A nation whose security and defence policies emphasise the importance of coalition operations can be expected to devote more resources to issues of technical interoperability than one whose policies favour autonomy of action.

As a factor in multinational interoperability defence policy will also govern:

- The commitment of a nation to the structures and practices of a formal alliance such as NATO;
- operational planning and the degree to which national headquarters will engage in contingency planning with potential coalition partners;
- military training and the resources that a nation will devote to training in a multinational as opposed to a national context.

Defence policy will also influence military doctrine but the relationship between policy and doctrine is usually a complex one.

National Military Strategic Concepts

Military strategy is needless to say, a Military Strategic Level function. A robust strategy should contain at least two elements, a coherent set of objectives³⁸, and a broad concept as to **how** the objectives are to be achieved. It may also address allocation of resources. Defence policy may be expressed as a strategy if it contains these elements. Indeed a nation's military strategy (if such a thing exists) should be viewed from the outside as a subset of the defence policy of that nation rather than a subordinate product.

³⁷ In short the planned allocation of funds provided by a government for defence.

³⁸ That is objectives that are prioritised or arranged in a hierarchy under a single unifying goal or aim.

The congruence of the **military strategic concepts** of nations is a particularly important factor in achieving multinational interoperability. If at the Military Strategic Level nations have similar views as to **how** resources are to be used in achieving military objectives, it is likely that their equipment programmes, command and force structures, operational plans and doctrine can be brought into harmony if there is political will. For instance other factors being equal it is more likely that two nations who both have an expeditionary strategic concept³⁹ will achieve a high level of interoperability between their forces than if one of the two nations has a strategic concept focused, say, on territorial defence. Congruence of military strategic concept is a necessary but not sufficient requirement for very close interoperability. The other requirement is political will and therefore some acknowledgement of the importance of partnership between the nations in question in their security policies⁴⁰.

Even within NATO there is considerable variation in military strategic concepts. The New Strategic Concept agreed in April 1999 in Washington is of course a grand strategic rather than a military strategic document. It is the product of the North Atlantic Council rather than the Military Committee. Within its text are very few indicators of a robust military concept. There is mention of NATO's involvement in operations beyond those associated with Article V and perhaps further afield than the Article VI area but nothing about the role of emergent technology for instance. And certainly none of the prescriptive guidance that was presented in the strategic concept of the latter part of the Cold War, MC14/3.

The expeditionary concepts implicitly presented in the US JV2010 and Britain's Strategic Defence Review are not necessarily shared by all NATO members and would certainly not be embraced by all possible coalition partners. Indeed only France who has not traditionally been party to NATO's 'military implementation' documents, obviously accept the full implications of expeditionary capability. These include a level of national autonomy (for Britain and France at least at the Operational Level), investment in defence that goes beyond what is strictly necessary for territorial and collective defence, and an acknowledgement of the relevance of a capacity for 'escalation dominance'⁴¹ across most military operations.

National autonomy should not be seen in this context as militating against interoperability in coalition operations. It is a matter of self-sufficiency in terms of information management, firepower and command capability at a particular Level of War. This self-sufficiency lends itself to command of multinational formations as a framework nation at a particular Level of War.

It is a paradox that this self-sufficiency brings with it the need for levels of interoperability that may not be so necessary for a nation with more modest military

³⁹ A concept that emphasises the projection of forces to influence events at considerable distance from the homeland.

⁴⁰ Whether declaratory or not.

⁴¹ The phrase has Cold War overtones but there is not a better one.

aspirations. There is some onus on a framework nation to provide the attachments and connectivity for other contributors. In the case of the US whose forces are so much larger and whose investment in equipment, research and development is so much greater than any conceivable partner, it is likely to wish to define the nature of these attachments. It follows that interoperability is not necessarily a concern that will be uniformly felt by all possible coalition partners. In the foreseeable future interoperability need not be a huge concern for a nation concerned principally with territorial defence (within or outside an alliance) with the occasional contribution to traditional peacekeeping operations.

National military strategic concepts for the future can be described in simple terms in a number of ways. First there is the commitment to territorial defence which may range from none to the dominant national characteristic. Secondly there is the intention to project forces at range from the homeland which can range from none to global projection. Thirdly there is the commitment to advanced technology and to leading edge military capability⁴².

Notional illustrative military strategic concepts of NATO and other European nations can be represented graphically against these three dimensions (Figure 1).

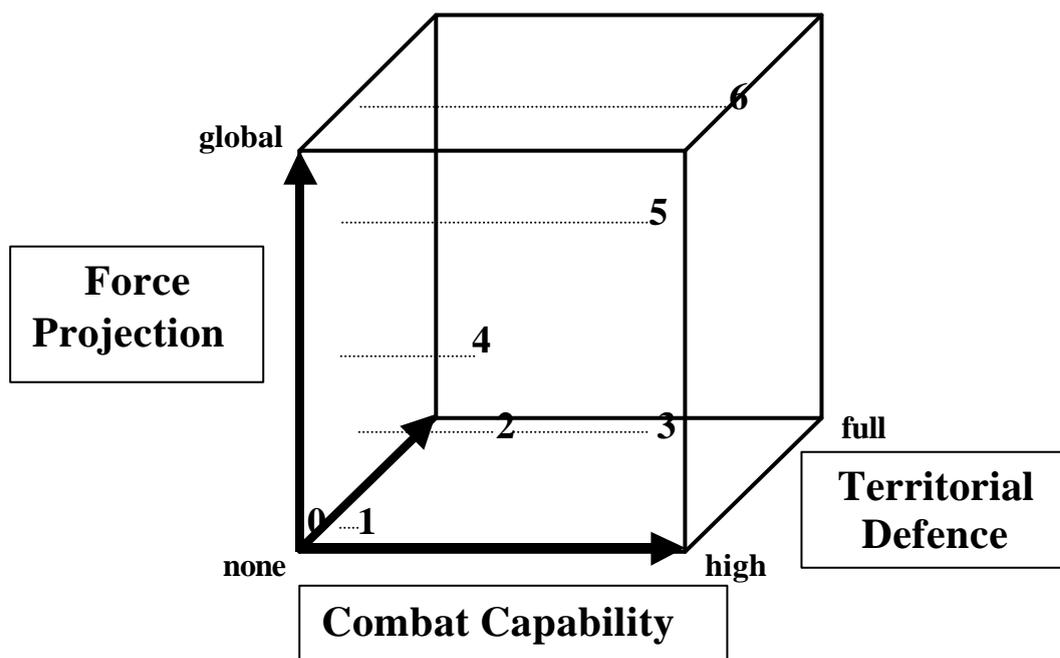


Figure 1: National Military Strategic Concepts (Short Term)

⁴² A fourth category is a national perception of its dependence on coalition activity on the one hand or of national autonomy in security matters on the other. This final category is of fundamental importance to interoperability but is arguably a higher level matter of security policy rather than military strategy.

The numbers represent nations whose military strategic concepts could be summarised under the following headings:

0 No Defence

- 1 Territorial Constabulary** Provision is only made for police and perhaps paramilitary forces for internal security and coastguard forces for the protection of territorial waters and the Exclusive Economic Zone
- 2 Modest Territorial Defence** The priority is territorial defence but the nation does not feel seriously threatened and a high level of military capability is not maintained. Contributions to peace support and humanitarian operations will be small and there will be no contribution to other forms of intervention.
- 3 Robust Territorial Defence** The priority is territorial defence and the nation perceives its territorial integrity to be seriously threatened. Contributions to peace support and humanitarian operations will need be small and there will be no contribution to other forms of intervention.
- 4 Modest Expeditionary** There is a commitment to peace support and humanitarian operations as a national priority and forces are tailored appropriately. There will be only limited contribution to other forms of intervention as forces will be unsuitable for high intensity combat.
- 5 Robust Expeditionary** There is a commitment to all forms of intervention that is limited principally by considerations of range and the affordability of equipment and large-scale forces.
- 6 Dominant Expeditionary** There is a commitment to all forms of intervention world-wide and to maintain the capability for military dominance in any foreseeable combat situation.

Joint Vision 2010

It is necessary at this stage in the discussion of the congruence of national military strategic concepts to be specific. The potential divergence of military capability between the US and its European Allies and other potential coalition partners is the principal concern of many studies and commentaries on multinational interoperability.

It would be wrong of course to see potential divergence as simply between the US and its European Allies. As this study has indicated, there are considerable differences among strategic concepts within the European members of the Alliance. There is furthermore a disparity in means between the larger and smaller military powers, between the richer and poorer nations, and between older and newer members of the Alliance. Beyond the Alliance in terms of integration are the Partnership nations and beyond these other possible coalition partners.

JV2010 demands careful consideration first because of the NATO nations it is the only national strategic concept in the public domain that addresses the longer term. Secondly, the US is more or less committed to this concept. Most NATO nations expect at least in many situations in the future to have the US as a major partner in future coalition operations. They need individually to decide to what extent they will be following the same route in developing concepts for the longer term and if there are any individual or collective alternatives that address future security needs.

There is another practical problem in resolving differences in nations' military strategic concepts. Nations may have defence policy for the future of which a military strategic concept may be a part. They do not, however, typically have future defence policy, that is a distinct set of objectives and perhaps a concept that addresses the future security environment as opposed to that of today. It would be difficult for any democratic government to maintain current policy if it was clear that current objectives were not sustainable into the future. Yet however the security environment evolves, there is one certainty that the defence policies of all nations will change. Furthermore defence policies are the result of today's political compromises. Yet it is defence policy as it is today that drives defence programmes and provides the funding for them. Future capabilities are based on today's perception of future needs such as they are - a perception clouded by compromise which is distilled in itself from a range of political perceptions. For this reason European perceptions of JV2010 are as important to progress in multinational interoperability as the view or views within the US.

JV 2010 is usually presented as a process of achieving information superiority, dominant manoeuvre, precision strike, focused logistics and full dimensional protection, as a means to full spectrum dominance. This last term means that the concept is intended to be applicable in all military situations from high intensity extended combat to peace support and humanitarian operations, that is across the full 'spectrum of conflict. The language of the concept is nonetheless predominantly of high intensity warfighting.

JV2010 can be described as a concept essentially for power projection, the conduct of operations at considerable distance from the homeland in which combat is threatened or used. It is global in its vision and requirements for reach.

It intends to make use of leading edge technology, particularly information technology, arguably for two principal reasons. First, it is important to maintain technological advantage over possible opponents for its own sake. Secondly it is only through technology that the efficiencies can be achieved to counter rising equipment costs and the shortages in and expense of manpower. Other nations may not be so concerned over technological advantage but should certainly consider the efficiency arguments seriously. By the same token successful implementation is dependent on a high level of research and development and therefore allocation of the necessary resources. It requires investment in expensive equipment such as sophisticated sensors, precision munitions and stealth. It is also an experimental concept. Many of the subordinate concepts such as

digitisation of the battlespace and network centric warfare⁴³ are evolving and entail technological risk.

Although some NATO nations, France and the United Kingdom in particular, share US aspirations for power projection, and may have aspirations to reach well beyond the vicinity of Europe, many other NATO nations do not. Clearly the concept could not be adopted uniformly and in its entirety by all NATO nations. Cost is the major problem for many Allies, of collaborating in research and development and of purchasing systems exploiting leading edge technology. For the same reasons medium powers and smaller nations are averse to the necessary technological risk. Nations are furthermore saddled with old equipment that cannot be modified. Nor can they afford to replace it sufficiently rapidly to keep up with US developments.

Then there is the question as to the relevance of JV2010 to the most likely scenarios of peace support and humanitarian operations where disruption is an inappropriate concept and coercion will only be used occasionally in tightly controlled circumstances? Indeed reassurance may be as important as coercion. What relevance has a concept predicated on concentrating overwhelming violence, albeit highly selectively, to the more likely constabulary operations in which force is only used in minimum amounts and as a last resort in the enforcement of international law or a mandate.

A more fundamental reservation voiced in some quarters relates to the relevance of military force in any form to future challenges to security⁴⁴. The emphasis on global power projection in JV2010 represents a US disposition to use the military instrument to contain or 'put the lid on' security problems rather than investing in non-military means to resolve the underlying causes. Identification of rogue states and emphasis on counter-force solutions to the problems of weapons of mass destruction are often cited as evidence of this emphasis.

Finally there are some who claim that JV2010 presents a threat of political and industrial hegemony by the US. They would argue that the concept imposes a military system of systems of systems that other nations must either accept and join or be left forever unable to take a full part in coalition operations of the future. By joining national autonomy and freedom of action would be sacrificed. By the same token, if a nation cannot afford to be a major partner in collaborative development with the US, it will be forced to buy the required systems from the US who will control the necessary CIS interfaces. In particular military capability requirements for future coalition operations would be distorted in favour of US solutions developed and marketed by US companies.

⁴³ This concept is discussed fully in David S Alberts, John J Garstka, and Frederick P Stein, *Network Centric Warfare*, Washington DC, DoD C4ISR Co-operative Research Program, 1999.

⁴⁴ For instance Professor Paul Rogers of the Department of Peace Studies, Bradford University, England who invented the expression 'liddism'.

There are of course some equally forceful US criticisms of European approaches to defence. First is the lack of European investment in defence and in the military systems that will be essential for a secure future. Secondly, a lack of global vision amongst Europeans, limited awareness of the vulnerability of western security, and in particular, western economies, to instability elsewhere through the effects of globalisation. These two criticisms are frequently presented together as a lack of 'burden sharing'. There is a need, it is maintained, to support successive US Administrations in their commitment to European security in particular by agreeing to support the wider security interests of the US with military commitment.

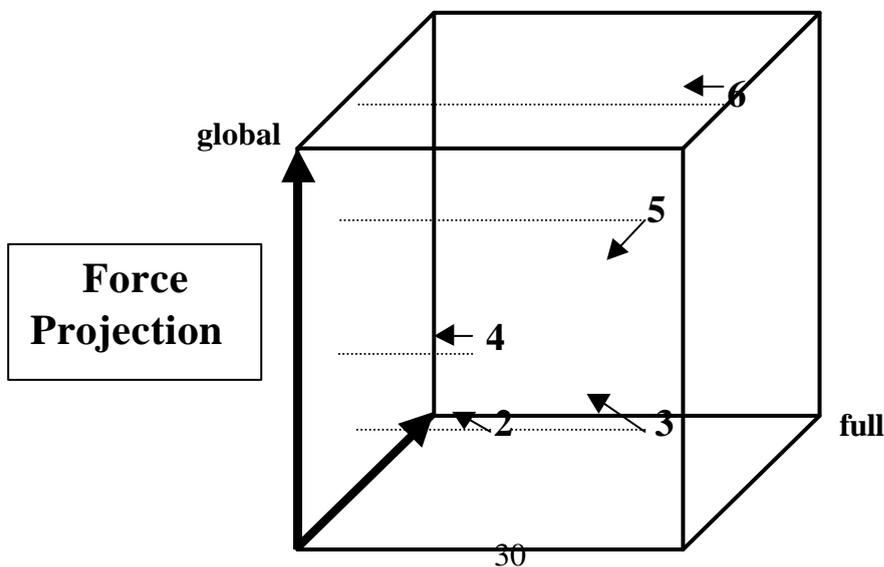
Harmonising Strategic Concepts for the Longer Term

If multinational interoperability is to be enhanced in the longer term it is essential that there is progression towards alignment of national strategic concepts for the future. This is not to say that NATO nations must all adopt identical national strategic concepts. Full congruence will be patently unachievable as national security objectives will not be identical. There are political, cultural and customary constraints as to ways and huge differences in means.

In the longer term one can predict some trends in the evolution of these strategies if one assumes that:

- defence budgets will not increase and will probably fall;
- no major threat to European territory emerges;
- the rise in unit costs of equipment will outweigh the economies that may be obtained through the use of information technology to enhance military efficiency;
- western forces to not suffer a major disaster involving severe losses in any future peace support and humanitarian operations;
- the positive and negative effects of globalisation on world stability generally balance one another out.

Under these conditions one might expect a general overall reduction on combat capability and a shift in emphasis from territorial defence to expeditionary operations. The result would be some convergence of strategic concepts amongst Europeans but a widening of the capability gap with the US.



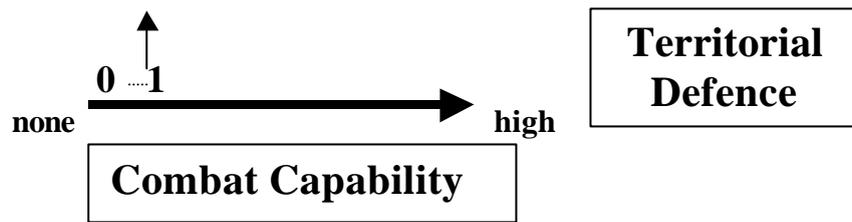


Figure 2: National Military Strategic Concepts (Longer Term)

It is not sufficient to work towards alignment on the basis merely of common ground. That has been the process that has generated NATO's two strategic concepts since the Cold War, the existing 'military implementation' document and the command and force structures that the Alliance adopted at the beginning of the decade. Nowhere in these documents are there clear answers to the 'how' question.

The Alliance has since accepted new missions and other extensions of its competence as circumstances have demanded. The Combined Joint Task Force concept is built on the hidden premise that member nations will take part on a case by case basis in intervention and other expeditionary operations. The Defence Capabilities Initiative discussed early is a positive attempt to identify the capability gaps that a commitment to expeditionary operations would expose. But event driven evolution of this nature does not provide the intellectual material to nations to project into the more distant future in their processes of identifying capability needs and long term force planning.

If full congruence is a hopeless ideal and consensus insufficiently definitive, there remains the option of harmonisation of military strategic concepts for the longer term. Differences in concept would be acknowledged and accepted where these were born of genuine higher level differences. However similarities in assumptions, process and conclusions would also be identified, in particular the need to confront the challenges of technological innovation.

There will be two features of the outcome of a process of harmonisation. First, it will be acknowledged that the forces of some nations will be best equipped for certain roles and less well equipped for others. There will therefore be acceptance of a degree of 'role specialisation' at the Strategic Level (which will have implications for the operational and Tactical Levels). Of course strategic role specialisation already takes place. Only the US possesses certain expensive capabilities. Only a few NATO nations are genuinely expeditionary. Only a few could fulfil the role of a framework nation for a major operation. Some NATO nations feel sufficiently insecure to see territorial defence as a genuine priority. Some nations specialise in peacekeeping.

The second outcome will be an acceptance that some nations will continue to be more interoperable than others. Interoperability is likely to be greatest where strategic concepts are more closely aligned although other factors such as geographical proximity and frequency of exercising are also relevant.

There is the danger in such a process of harmonisation that role specialisation will proceed to the extent that the majority of NATO and other European nations will only be capable of a limited range of intervention operations. There could as a result be a division of missions into those tackled predominantly or exclusively by European and Canadian forces, perhaps principally extended peace support and humanitarian operations, and those that the US will undertake which will be chiefly short operations in which dominant military force is used decisively. Those European nations that maintain and develop robust expeditionary strategic concepts will be particularly important in helping to span this divide and, perhaps in acting as enablers for achieving adequate levels of interoperability with less capable European nations.

DOCTRINAL INTEROPERABILITY

While alignment of strategic concepts is an essential enabler to achieving high levels of multinational interoperability, it is at the operational, tactical and Procedural Levels that interoperability such as it can be achieved is actually practised. The behaviour of forces at these Levels of War is governed to a large extent by their doctrine and culture. Doctrine is typically defined as 'fundamental principles by which military forces guide their actions in support of objectives'⁴⁵. Military doctrine is intended to be 'authoritative but requires judgement in application'. (There is such a thing as military strategic doctrine but the distinctions between this, a military strategic concept and other Strategic Level material are not important for this study).

Doctrine is usually written by the military for its own use. In a healthy military the crafting of doctrine should be a creative process born of experience but addressing the needs and possibilities of the present and short term future. It cannot, however, be prepared in isolation from military strategy. It must be coherent with strategy and derived from it. Operational Level doctrine may conversely influence the development of strategy in that it is in the development of Operational Level doctrine that options for a strategic concept may be revealed. And the Strategic Level cannot demand what is not possible at the Operational Level.

Nonetheless, the operational doctrine of a nation's forces will draw much of its character from the nation's military strategic concept. It is unlikely that two nations will have similar military doctrines unless there is some alignment of strategic concepts. Doctrinal interoperability is in part derived from congruence at the Strategic Level. Militaries do of course train and operate together and the use of exchange postings to operational units and training and educational appointments allows for mutual understanding of doctrine and perhaps resolution of doctrinal differences. Furthermore NATO prepares Allied doctrine which reflects the agreement of member nations.

Doctrine is usually expressed in the form of principles, tenets and guidelines. The expression

⁴⁵ Allied Administrative Publication 6.

'procedures' may be used for the mechanisms that allow for the practical application of doctrine. NATO fulfils an important role in the standardisation of procedures. Doctrine requires judgement in application. Procedures imply regularity of behaviour. It is not surprising, therefore that procedures become more important at the Tactical Level of War and are of overriding importance at the procedural or technical Level of War where there is less scope for judgement and where correct procedures are essential to the proper use of equipment.

CULTURAL INTEROPERABILITY

Cultural considerations pervade all Levels of War. In an operational environment, Culture has an influence on interoperability similar to that of doctrine. The lower the Level of War the more important cultural considerations are likely to be. If persons from very different cultural backgrounds are actually living together in small units or onboard single platforms, a very high level of mutual understanding will be necessary if there is to be cohesion.

The problem of integration of small groups at the lower Levels of War is mirrored within higher level multinational headquarters in which cohesion is essential within a relatively small group which may include personnel from a large number of nationalities. National representatives and commanders of national elements in a headquarters may furthermore feel that they have a duty to represent the cultural differences of their nations and demand that these are considered in operational planning.

Culture is clearly not an insuperable barrier, however, at any Level of War. The British Army contains Gurkha regiments where the majority of personnel are from Nepal. The French Foreign Legion has traditionally recruited from a wide cultural base. And within NATO some multinational headquarters achieve high levels of cohesion.

Culture is most obviously but not solely defined by language. This major hurdle to interoperability is also technical in that language differences hamper the transfer of information. Information technology may of course aid interoperability in providing automatic translation facilities. Some constraints on logistic interoperability may be cultural, for instance the will to accept certain provisions and medical services.

Cultural interoperability can be improved in ways similar to doctrinal interoperability, that is by regular proximity, by training and operating together and the use of exchange postings to enhance mutual understanding. Language training is another important enabler.

LOGISTIC INTEROPERABILITY

Of the aspects of interoperability the most easily understood are those that relate to material and equipment services, that is technical and logistic interoperability.

Logistic interoperability comprises the ability to provide and accept logistic services, that is fuel, spare parts, ammunition, provisions, medical services and transport. Customarily within NATO logistics have been a national responsibility and individual nations have maintained their own lines of support. The same has been true of United Nations operations. During the Cold war when NATO's mission was exclusively territorial defence the inefficiencies of parallel lines of support were accepted. NATO has, however, made considerable efforts to achieve standardisation of certain categories of fuel, connectivity for replenishment at sea, and ammunition and to standardise some logistic procedures.

In a contemporary expeditionary context these inefficiencies are magnified because logistic requirements and lines of support cannot be preplanned in any detail, logistics cannot generally be permanently deployed in theatre and distances are likely to be greater for most NATO members. NATO has developed a concept of shared (Alliance/national) responsibility for logistics. For an expeditionary operation it is clearly sensible to establish logistics bases and sites under a NATO logistics commander and arrange for protection and other services on a coalition-wide basis. Within these bases, common logistics services can be provided where commonality exists. Nations can also maintain their own logistics services where commonality does not exist.

The problems of achieving logistics interoperability depend on the nature of the service. These problems are exacerbated when a coalition includes partners who are not NATO members:

- **Food** There are cultural differences in accepting products of certain types and standards of quality.
- **Medical Services** There are cultural differences in medical practices. There are also variations in quality of service and therefore in the confidence that national authorities will have in the ability of the medical services of other nations to care for their personnel adequately.
- **Ammunition** Some standardisation has been achieved within the Alliance. However the highest levels of standardisation are not achievable without close integration of equipment acquisition practice and a high degree of commonality of equipment.
- **Fuel and Lubricants** Some successful standardisation has been achieved in the Alliance but the highest levels are similarly dependent on acquisition processes.
- **Spare Parts and Maintenance** Interoperability is largely a matter of commonality of equipment although the use of commercial off the shelf technology in some categories of equipment may allow for a greater exchange in spare parts in the future. Maintenance may be provided as a common service for simpler tasks only.
- **Transport** Nations will inevitably give priority to their own forces in the use of national transport assets. There are likely to be some technical problems in the common use of transport assets particularly when large vehicles and equipment or dangerous cargoes are to be moved but these will be minor in comparison to that of the willingness to provide scarce national assets for common purposes.

Problems of logistic interoperability fall therefore into three broad categories. First, there are some cultural problems which are likely to be of marginal significance to the success of an operation.

Secondly there is a range of problems relating to commonality of equipment. Much progress could be made in equipment standardisation particularly where commercial off the shelf technology will be used in future. However any final solution would entail integration of acquisition processes either on the demand or supply sides⁴⁶. The necessary politics for such an outcome are unlikely to manifest themselves in the foreseeable future across the Alliance. There may however be partial integration of acquisition processes among specific groups, in particular within the process of European security and defence integration.

Thirdly there is the matter of sharing national assets which is most crucial with respect to transport and strategic and operational mobility in particular. It could indeed be a showstopper if key coalition partners could not deploy into or within a theatre.

One should not think of the inefficiencies associated with replication of logistics purely in financial terms. A larger logistic footprint in theatre is more cumbersome to deploy, it is more vulnerable to attack and requires more military effort to protect. That military effort needs its own logistic support. The consequence is the 'logistic snowball' described by Admiral Eccles⁴⁷.

⁴⁶ Either nations would need to agree to buy the same equipment through a common acquisition process, or defence industries would need to integrate to such an extent that there was only one supplier for each category of equipment.

⁴⁷ Henry E. Eccles, *Logistics in the National Defense*, New York: Greenwood Publishing Group, 1981.

TECHNICAL INTEROPERABILITY⁴⁸

Technical interoperability includes connectivity between communication and information systems but also some other services such as the provision of nuclear, biological and chemical protection.

Interoperability can be understood as existing to a greater or lesser degree among headquarters and units at levels that equate to the Levels of War discussed earlier in the study under 'Organisation'. As a general rule the lower the Level of War, the greater the difficulty in achieving technical interoperability.

A major constraint on achieving technical interoperability among systems is that of legacy interoperability problems between old and newer systems. It may not be possible to modify systems employing old or minimal IT to be capable of interfacing with new systems. Nations are not able simply to replace older systems to achieve interoperability goals earlier than their programmed disposal dates for reasons of cost.

NATO has defined six levels of technical interoperability:

1. Exchange of documents
2. Exchange of liaison officers
3. Exchange of equipment
4. Electronic message exchange
5. Direct, controlled access
6. Direct - no constraints

Generally within NATO level 4 can at present be achieved among Allies. Level 5 is achievable in some environments for instance the maritime environment) among some Allies. For reasons of security level 6 is rarely achieved. Outside NATO progress is being made to achieve level 4 interoperability among NATO's Partner nations. It is also achieved (and indeed level 5 in certain circumstances) among certain allies and friends outside NATO, for example between the US and Japan, the US and South Korea, and among the nations of the AUSCANZUKUS⁴⁹ arrangement.

⁴⁸For many insights in this section the author indebted to the work of the Technology Sub-Group of the ongoing study on *Coalition Warfare and Operations of the Future*. The Sub-Group of which the author is a member is chaired by David S Alberts, Director Research, Office of the Assistant Secretary of State for Defense (Command, Control, Communications and Intelligence). The institutes taking part in this project alongside the US, French, German, and United Kingdom Departments and Ministries of Defence are US-CREST, Arlington Virginia, FRS Paris, SWP Ebenhausen, Germany, and the Royal United Services Institute.

⁴⁹ Australia, Canada, New Zealand, United Kingdom and US.

The NATO levels are useful in assessing the degree of connectivity achieved by actors or systems in executing a particular function. By connectivity is meant the ability to transfer data across systems. The view of the Director General Information and Communications Services, United Kingdom Ministry of Defence is that connectivity at Level 5 could be generally available today within a single security domain. It is also technically possible today to achieve basic connectivity across most security domains. Most incompatibilities could be quickly resolved through management action.⁵⁰

The exchange of data through basic connectivity is, however, insufficient in itself for full technical interoperability. There is a requirement to transfer information across system. Information consists of data arranged syntactically with consistent semantics. Transfer of information is only possible today within tightly managed domains. Furthermore for the highest degree of interoperability information from various sources needs to be integrated or fused into a Common Operational Picture which by definition is shared among actors and from which military judgements can be made. There are therefore degrees of technical interoperability that relate to the complexity of material transferred from data, through information to awareness understanding or cognition.⁵¹

In the military context there are furthermore demands on the quality of data, information, and awareness that is shared. These include: timeliness; assured delivery; security; privacy or confidentiality; authenticity; and non-repudiation⁵².

The operational functions that provide the context in which technical interoperability is applied are usually described by the acronym, C4ISR, that is command, control, communications, computers, intelligence, surveillance and reconnaissance. One might add to these 'target acquisition' and 'weapon control' to describe all the elements of a combat action fully.

More simply it is possible to design a functional hierarchy that can relate these functions to the NATO Levels. Within even the loosest coalition there is a basic need to exchange notifications of plans, intentions and the substance of Rules of Engagement. This need would exist even if there were no intention to conduct common operations. If it did not exist, there would be no coalition force. A coalition that intends to conduct common operations needs further to be able to conduct common operational planning. While speed may be important in notifying and in operational planning, low minimum NATO Levels of Interoperability may be acceptable.

If common operations potentially involving combat are envisaged, the forces of various coalition partners may operate on separate missions and in separate geographical areas in which cases minimum NATO Levels may be adequate. If they are to be integrated at the

⁵⁰ Andrew Sleigh, Director General Information and Communications Services, United Kingdom Ministry of Defence, at a conference at the Royal United Services Institute 26 March 1998.

⁵¹ Sleigh *ibid*.

⁵² Technology Sub-Group *ibid*

Operational, Tactical or Procedural Levels of War, and are to be employed on common missions in the same geographical area the interoperability demands are greater. Forces may be operating in a common geographical area in which case they will need to share a Common Operational Picture. Some units of one nation may require to be able to pass engagement quality data to units of other nations. If coalition forces in a single geographical area are to be fully integrated with the highest degree of technical interoperability, it will be necessary for the sensors and weapons of all units in the geographical area of operations to be able to share engagement quality data.⁵³

	<i>Functional degree</i>	<i>Minimum NATO level</i>
A	Planning (operational)	1
B	Notifications (of plans, intentions, Rules of Engagement, &c)	1
C	Common Operational Picture (COP)	5
D	Engagement quality data	5
E	General sensor to weapon connectivity	5

Enhancing Technical Interoperability

The *sine qua non* for longer-term coalition interoperability is development of CIS interoperability to that of a Common Operational Picture (Functional Degree C above). This is a requirement for all likely scenarios regardless of divergence of doctrine or strategic concept among nations. The key technologies for this are Internet related and are and will be available through commercial off the shelf (COTS) sources. The principal constraint will be that of national and Allied security requirements. Technologies that can provide the necessary protection to national standards will be critical. They will however be available in the medium term and could be employed provided there is political acceptance of residual risk. The issue of security is largely political rather than technical.

Priorities

The priority for most nations in the short to medium term is in practice likely to be to achieve joint interoperability intra-nationally. This will be a particular priority for those nations such as the US, the United Kingdom and France who are committed to expeditionary strategic concepts involving national forces with coherent capabilities under national command. In this internal national work it will be important that doors are not closed unnecessarily on multinational interoperability.

Integration of national systems and the development of NATO systems at the Operational Level would seem to be the priority as these would provide technical interoperability in the widest circumstances for the largest number of missions.

⁵³ Technology Sub-Group *ibid.*

The parallel development and integration of national strategic command, control and communication systems should be a secondary objective as technical integration at the Strategic Level is not a *sine qua non* for effective coalition operations.

Technical integration at the Tactical and Procedural Levels across all operational environments will be the most difficult to achieve and most highly constrained by differences in strategic concept and implications for doctrine. Realistically only a handful of nations are likely to make significant progress towards full digitisation of the battlespace within the next fifteen years. Of these perhaps only the US will be in a position or have the will to explore the full implications of network centric concepts. Integration of forces at the Tactical and Procedural Levels is likely to be very piecemeal between specific nations and specific types of force with greater general progress in the maritime and air environments than the ground.

Acquisition

In the longer term the autonomy and self-sufficiency implied in particular by the strategic concepts of the expeditionary European nations is unlikely to be affordable at levels of capability that meet the highest level of national objectives. There will therefore be a need for greater integration into some multinational structure. The question is whether the closest integration is likely to be on a European basis, on an Atlantic-wide basis or among some smaller groupings of nations. There will therefore in the longer term be more emphasis in balance of investment considerations on coalition interoperability.

Technical interoperability would of course be greatly enhanced if nations participated in integrated force planning and a common acquisition system. NATO has aspired to a degree of integrated force planning but the levels of integration that would be required seriously to enhance interoperability across the board have not and will not be achieved in the short to medium term for obvious political reasons. A common acquisition system is a European aspiration. In the short to medium term collaboration whether on a European or Atlantic basis will continue to be piecemeal and will not bring wholesale benefits in technical interoperability.

Experience of a wide range of collaborative projects shows that the most rapid progress in acquisition will be made in small collaborations rather than on a NATO-wide or Europe-wide basis. If future potential framework nations are highly interoperable among themselves, the interoperability of future coalition forces will be greater than if a large number of potential coalition partners achieve moderate levels of interoperability in tandem. There is a priority therefore on the main expeditionary nations, the US, United Kingdom and France and other medium powers who aspire to this status achieving a high degree of mutual technical interoperability.

In developing national CIS systems there will be a price to pay for interoperability both on the part of the nation developing the system and on the part of nations wishing to ensure connectivity. It must be generally understood that this cost is not optional.

Ultimately the principal impediment to technological interoperability is not technology divergence. In this respect the future is relatively rosy as commercial Internet technology can to a large extent provide the necessary 'fixes' relatively cheaply. The major impediment is strategic divergence and the implications this has for investment, acquisition and security risk. The solutions or ameliorations are therefore principally a political matter and one that the Alliance is in many respects better placed to handle.

Capability and Performance

Apart from doctrinal, cultural and technical differences there will be differences among coalition partners in capability and performance which will hinder integration even where CIS interoperability is of a high level. The forces of one nation will not wish to be dependent on those of another for critical operational functions such as protection if there are doubts about that partner's reliability.

CONCLUSIONS

From the foregoing analysis of the dimensions of interoperability it is clear that no single dimension of interoperability can be examined in isolation from the others. Language has both cultural and technical aspects. There are cultural issues in connection with logistics. Doctrine and technology have a close interrelationship and both affect organisation. And most importantly a nation's military strategic concept will shape both its doctrine and its use of technology.

Furthermore the solutions to multinational interoperability in an Allied context (and indeed more widely) will be multidimensional. Nevertheless most of the syndromes of interoperability that could be treated have a causal link to the problem of the divergence of military strategic concepts which itself derives from political differences.

For the foreseeable future it will be necessary to accept different degrees of interoperability among NATO nations. New members will not be able or willing to achieve levels of integration in all environments comparable to those to which the expeditionary nations might be capable of aspiring. However, if high levels of interoperability can be achieved among a few nations that are more advanced technologically, they in turn can be core or framework nations for other more modest military power

For this reason among others it is not practicable for NATO to be the sole engine of interoperability. However all Allied nations should accept that NATO should be the only repository for standards and vehicle for standardisation. In this respect there is a particular onus on the US to conform to NATO standards taking NATO with it as necessary on an experimental basis. The US should make every effort to harmonise procedural standards internally among the Unified Commands and Services. It is probable that an increasingly larger number of nations will aspire to NATO standards in the future either as Partners or through other alliances and agreements with NATO nations. Where possible, nations should encourage NATO to give the widest access to standards and to declassify material relating to standards and procedures where classification is not absolutely necessary.

Living with the Problem

Indeed, the time-honoured method of redressing problems of interoperability is through standardisation of equipment, of the features permitting connectivity of CIS, and of operating procedures at the (Procedural, Tactical and Operational Levels of War. NATO has well-developed mechanisms for implementing standardisation but progress is constrained essentially by failure to agree as to whose standards are to be accepted as common.

There are a number of means whereby nations can operate in coalition while accepting poor interoperability. One is the loan of CIS equipment. Another is role specialisation where certain nations accept certain tasks and there is task separation between forces of

several nations. A third is geographical separation in the execution of tasks to reduce mutual interference.

Task and geographical separation acknowledge that there is a hierarchy of levels of integration from the loosest, co-operation, in which requirements for interoperability can be minimal, through co-ordination to full integration or combination. Arguably the expression 'combined force', though often used loosely to mean any Allied force strictly implies that the elements are fully integrated and have achieved a high level of interoperability.

Co-operation, co-ordination, and combination or full integration are not rigid or easily defined categories. Much depends on the one hand on the degree of overlap between the political objectives of the participating nations and on the other hand the level of interoperability that can be achieved.

- **Co-operation** Forces co-operate when there is only modest overlap between political objectives or when there is considerable commonality of objectives but poor interoperability.
- **Co-ordination** Operations are co-ordinated when there is considerable overlap of objectives but there are constraints on interoperability.
- **Combination** Forces can only integrate fully if there is a high degree of interoperability and the political objectives insofar as they prescribe military objectives are common.

It is of course possible, indeed it is likely to be the norm for forces to be integrated differently at the various Levels of War. In general the higher the Level of War the easier it will be to integrate forces.

Strategic Harmonisation and Technological Consequences

It is essential that at the Strategic Level nations examine the real differences between their strategic concepts and acknowledge where these differences are substantial and where they are merely presentational. If they are substantial and likely to be permanent, there is little point in pursuing interoperability levels above that of the Common Operational Picture and both nations must accept the limitations on future coalition operations between one another and the implied risks. Continued discussion of the military substance of strategic concepts in a non-political environment (e.g. military to military) is essential if there are not to be unnecessary political barriers to interoperability.

The Atlantic military powers need to give maximum visibility one to another of their principal strategic, operational and tactical CIS programmes embarking on joint projects wherever feasible. It is important that this activity is not constrained by the perceived need to move forward on a NATO or Europe-wide basis.

In harmonising strategic concepts there are a number of steps that Allied nations might take:

- Develop a list of common missions defined by nature, relevance and intensity of combat activity and geographical scope as a substitute for a common strategic concept;
- As for the 'how' element of strategic concepts, avoid treating JV2010 as a package but consider the applicability of its elements. Indeed avoid the label JV2010 in multinational discussions of the requirements of multinational interoperability because of the baggage it brings;
- Emphasise the C4ISR aspects of JV2010 as prior requirements for interoperability as these are a requirement for maximising effectiveness in most types of mission;
- In particular acknowledge the significance of information superiority and of network centric activities as means of maximising efficiency in the use of military force in the longer term; work alongside the US in the conceptual interpretation of implications;
- Accept the problem that nations cannot afford to abandon legacy equipment and accept the need for incremental development;
- Accept that European nations will be averse to technological risk and will to some extent want to 'wait and see' for technology to mature.

However European nations need to strike a balance between collaboration with the US in research and development and in buying mature technology off the shelf that will be cost-effective and preserve adequate autonomy.

Finally all nations need to resolve the issue of the relevance of high intensity combat capability to operations such as peace support. The argument frequently used is that high intensity combat capability designed for the less likely but more crucial missions in terms of national security and interest can be used for the more likely low intensity operations of choice but not vice versa.

There is a stronger argument. It is high intensity combat capability that actually defines what military armed forces are and distinguishes them from other forms of organised force. If military forces do not bring with them evidence of the coercive edge that their high intensity capability gives them; they allow themselves to become victims of escalation and of perhaps the unlimited objectives of other parties in a complex emergency. The military forces of a nation that do not have this edge have a deficit in their ability to induce and will be dependent on the military forces of another nation.

In the allied context this means that European nations that do not have this edge will sacrifice autonomy and freedom of action. Furthermore there will be the danger of inadvertent role specialisation between the us and European nations; the us specialising in high intensity highly coercive and disruptive short duration operations - the Europeans providing the gendarmerie on the ground for long term messy complex emergencies.