Human Factors Interoperability within Multi-National/Multi-Level Operations Scoping Study

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Contents

1 Executive Summary

This report provides a summary view of research into three key areas of Human Factors (HF) and force interoperability from a non-technical point of view, across all lines of development and taking in to account operational and tactical command levels across all physical domains i.e. air, sea and more specifically land. This view looks at the national arena, international (including NATO) co-operation and coalition force operations. The key purpose is to fully define the area of multinational operations, identify research gaps through analysis, prioritise the research issues and to broadly propose follow-on research strands and options for further study and experimentation in years 4, 5 and 6.

In order to properly be able to take advantage of the huge knowledge base of information available regarding operations in multicultural, coalition based forces both technical and non-technically based; a literature review was required to collate and consolidate current knowledge and experience. The aim of the literary search is to:

Identify the key areas of concern within the subject domain, review these areas in as much detail as possible given the context and level of this document;

- Isolate and investigate gaps in knowledge and capability within the subject domain;

- Identify follow-on research strands be they experimental, further investigative research or ‘quick-win scenarios’ to take forward into subsequent HFI DTC phases.

It is in these culturally varied environments involving force contingents from a wide variety of countries coming together in order to achieve a common aim. The reasons these countries provide contingent forces is always one of self interest and the personnel assigned the task may not be particularly sensitive to the aims of the task. In any case, the barriers inherent in these kinds of combined operations will always present problems. The challenge is the need to understand individual nations’ aspirations, understand their culture, their hopes and the way each country’s people live their lives. Not only is language a barrier, but to understand people we must be able to communicate, be able to translate the intricacies of body language, voice inflection and dialect. We must be able to communicate conversationally and also be able to listen effectively and sympathetically.

The difficulty in applying scientific and robust methods for measuring the effectiveness of a process in these areas is well known. There are significant gaps in our ability to model and record the more cognitive activities; the participants are not in a position to be able to take part in workshops, interviews etc. that will detract from the dynamic and pressured environment of coalition planning or task leadership. Measures methodology must account for this and are therefore largely based on observation and retrospective anecdotal evidence. This paper aims to present a view on measures, current methods, effectiveness and experimental validity.

The report will also suggest areas (quick wins) that if concentrated upon, will reap large benefit return in a short time such as training. Training and preparation for coalition ops is not generally available for most participants as these types of operations take place in an environment of fast moving political, governmental and human interest considerations. Contingents from participating countries are generally assembled and deployed at short

notice. Given that this type of operation is becoming a normal part of force structure and projection, training for these types of deployment must be structured into ab-initio or early personnel training such that it is nor considered to be an out of the ordinary task to be allocated.

Conclusions will be made and recommendations drawn as to the best ways to proceed. This document is also likely to evolve. The mass of information, papers, previous studies and experimental evidence is vast and it is likely that continued analysis of this area of HF will require an up-issue of this report.

2 Introduction

2.1 Background

The topic of Multi-National and Multi-Level Interoperability was identified as an important theme for investigation by the HFI DTC as part of its scoping of the second phase of the research programme.

In a strict engineering context, Interoperability refers to the eventual seamless exchange of data in order, ultimately, to be able to inform commanders such that the right effects can be brought to bear given specific threats and targets at the right time, all factors affecting this decision being considered and informed.

From a technical point of view to be able to achieve this capability involves the specification of equipment, interfaces and software that will be integrated in order to provide the platforms and systems used to collect, collate and present the information to decision makers. The non-technical, human related view is equally important in the case of Effects Based Operations (EBO) but concerns fundamentally different aspects of interoperability.

The key issues facing effective communications between interoperating forces may in some parts be obvious. For example, the language barrier; the inability to be able to exchange information through either verbal, written or electronic means. However, other issues are less obvious but by no means less important or less of a barrier. Problems presented by differences in culture and/or in force organisation, perception, honour and capability have key roles to play and it is vitally important for force commanders in multinational, multicultural environments to ensure that as many mitigating processes and systems as possible are defined and in place prior to the deployment of forces.

2.2 Study Aims

This scoping report aims to investigate and capture current research in key areas within Human Factors (HF) interoperability at a non-technical level:

- Joint Forces Interoperability – the working procedures and processes used to carry out a tasking effectively and efficiently using contingents from a nations forces i.e. Joint Air Force, Navy and Army operations or part combination thereof;

- Multinational Forces Interoperability – the processes and procedures established and used by organisations in the multinational arena, NATO forces, established rapid reaction forces and forces who are generally accustomed to working together to achieve tasks and operations i.e. NATO allies;

- Coalition based Interoperability – where forces come together in a common overarching aim but generally on an ad-hoc basis. In these instances differences in equipment characteristics, familiarity of procedures, language, culture and national interests play major roles in the cooperation and interoperability between forces and their commanders.

- The document will aim to establish where the main thrust of research has been focussed until now and what the major issues are in terms of human interaction with systems and each other. This will form the basis of a general prioritisation for where research should be directed in the future and along what lines this research should be concentrated.

The report will concentrate on the following general areas of interest:-

- Communication Tools – what sort of tools are used, how, when and by whom in order to create an environment that effectively overcomes the interoperability barriers imposed by the main areas listed above;

- Cultural issues affecting planning activities – what factors must be taken into account in a multicultural force in order to successfully plan joint force operations?. This may include not only the obvious factors (i.e. a force made up of contingents where languages are boundaries) but also consideration must be given to forces within, for example, the British Army where soldiers from different and competitive regiments are cooperating (e.g. Scottish and Welsh regiments).

- Command Leadership within Coalition/Joint Force Operations, including Distribution of Commander's Intent. The key area to be covered will be the characteristics of the multicultural environment and what can be done to mitigate the inherent problems facing command and leadership, including adapting leadership techniques to suit the cultural and national characteristics of those being led.

Finally, the report will provide some conclusions and recommendations designed to provide a steer for future research and study in these areas.

2.3 Approach

There is an increasing abundance of research work carried out under the general heading of HF Interoperability and Operations in a multicultural coalition based environment.

Access to the internet, knowledge services at Dstl and other contributors own data repositories enforce the need to concentrate on a number of key themes within the over-arching requirement. These themes will then be broken down into separate subject areas that can be dealt with in an isolated manner.

2.3.1 Literature Review

The literature review was necessary in order to be able to properly identify the key themes and subject areas in order, therefore, to be able to separate these from the areas where little is known and prioritise areas for subsequent research.

Initially this included all free access sources where searches could be conducted electronically across the world wide web. Subsequent requests for information were also made through the Dstl Knowledge Services database search facility.

It was felt that such a review would be necessary in order to be able to fully take into account all the developments in this broad area from institutions world-wide, through academia, practitioners and real world user experience. These searches ensured that:

a. Well researched areas within the domain were fully captured;

b. Partially researched areas within the domain were identified with enough information gathered to be able to suggest research strands that would add to and complement the current resource;

c. Areas where little or nothing is known and may be candidates for investigation were identified.

2.3.2 Dstl

The following Dstl based resources and services have been used in the pursuance of this report:

2.3.2.1 Knowledge Services

Dstl Knowledge Services provide a Literature Search service of their extensive published and un-published literature across UK, US and other foreign sources of reports and information. A request to the Dstl Knowledge Services was submitted 27th February 2006. The results of this search have been received but not yet analysed.

2.3.2.2 Visit to Multinational Experiment 4 (MNE 4)

MNE 4 took place between Feb 27th 2006 and Mar 17th 2006 and explored the full range of effects based operations.

The author was able to observe the MNE 4 first-hand during a visit to the British MNE headquarters at Dstl Portsdown West, Portsmouth. During this visit, it very quickly became obvious that the problems inherent in distributed planning, virtual teams, communications tools, language and leadership were causing ineffective solutions and an almost complete lack of control over the scenario, the objectives and an agreed intent. During a ten minute observation of one chat room, two participants used at least four different means of communication. Whilst using voice chat to converse in one way, they had previously used text based chat, e-mail and a web based information sharing portal also available to the teams. This meant that the analysts tracking the experiment could not keep a proper and effective track of the data being used to support the decision thread, neither could the participants themselves and those other members of the chat room attempting to take part in the same discussion had no knowledge of the separate sources of information required for a full view of the issues.

2.4 Scope

This scoping report aims to quantify the issues related to non-technical interoperability across the following domains:-

- Joint National - Army Regiment to Regiment and Navy/Air Force/Army Joint Operations
- International/NATO - Combined Force NATO Operations and Exercises
- Coalition Operations - The joint effort provided by forces in an environment such as Afghanistan and Iraq amongst others

The key areas to be assessed across these domains are very likely to overlap and have multi-dependencies. All areas will be investigated singly and then consideration will be given to the mutual interaction of these areas.

Several overarching areas of interest emerged from an initial literature review:

1. The use of tools to provide effective communication in the domains described above;

2. The build up of trust between forces and force commanders in order to facilitate operations in these domains;

3. Distribution of the commanders intent and the leadership issues that must be considered when working in a multicultural environment;

4. Planning activities and associated issues within multinational operations.

Additionally, across the areas defined above, it is important to consider the command level and where to pitch the emphasis of the analysis being carried out. The three broad levels of Strategic, Operations (Brigade) and Tactical command have a huge bearing on the interoperability. This report will consider the issues and questions to be addressed at operations and tactical level. Strategic command cooperation either at the political-governmental level or at the high joint command levels are not considered here.

The operational environment is just as important. Joint and combined operations at sea and cooperation in the air suffer less from collaborative problems than those of land based operations, due their more strictly defined operational processes. The type of cooperation and information exchange experienced between naval and air assets either nationally, cooperative or within a coalition force tend to be entirely predictable and actionable within a process of events understood by all participants within a given task i.e. anti-submarine warfare. The land based environment presents many more unforeseen circumstances, disparate and unpredictable information sources and variables that will affect the planning and execution of tasks in alarmingly different ways. Thus, while the sea and air elements should not and will not be ignored, however, the emphasis will be placed on the analysis of the land based force domain.

Finally, in order to ensure that issues have been addressed throughout the constituent elements of military capability, each area will be considered across all lines of development as defined by the Smart Acquisition Handbook. The application of these eight discrete factors will ensure that the output of this document in terms of derived requirements, recommendations for continued research and/or possible short term implementation of improvement strategies such as training or doctrine changes are robustly based on the requirements for military system implementation.

2.5 Military Context

The operational context that UK and other major nation forces have found themselves operating within, has changed considerably over the last twenty to thirty years since the end of the Cold War. Military tasks and the operating environment are becoming less predictable, familiar and more extreme as force contingents operate in ever varied environments all over the world, conducting tasking that can be far from the primary aims for which these soldiers are able and trained to accomplish.

The plethora of international flashpoints, short term conflicts and the longer term operations such as those continuing in Afghanistan and Iraq mean that the UK armed forces are more likely to lead or contribute towards a multinational force reacting to developing situations. These combined forces or coalitions, outside of NATO, will probably differ considerably in organisation, structure, technology, training and, not least language and culture. In order to be able to successfully carry out tasking within this type of coalition force leaders at all levels of the command chain, from coalition commanders to tactical level command, will need to understand and adapt to the issues affecting effective communication, information sharing and leadership in order to minimise the time taken to achieve operational effectiveness.

Technologically, there is the need to integrate with these foreign forces as quickly as possible in order to become operationally effective and to be able to exhibit a required state of readiness. However, the non-technical, soft aspects of force integration, a fundamental requirement to successful force integration, are at least as important. It is vital that nations commanders within the multinational force are of the single mind that each others roles within the coalition are clear, effective and understood; that the cultural factors affecting operations are understood and planned for and that confidence that the common goal can be achieved, pervades the attitude of the coalition.

The roles carried out by multinational forces or by single nation forces are not necessarily isolated to offensive military action. Increasingly around the world, force contingents are used in the peace-keeping role or other such non-offensive Military Operations Other

Than War (MOOTW). In these cases it is the cultural and language barriers inherent to the local population that needs to be considered.

2.6 Document Structure

This document is structured into the following sections:

Introduction – Presents the purpose and reason underpinning this report.

Focus and Context – This section sets the scene and context for the key subsequent sections of the document. Both technical and non-technical background is presented.

Issues – Presents the key questions being asked by the study and provides analysis and evidence in each specific area.

Conclusions – Draws conclusions from the evidence presented.

Recommendations – Presents recommendations that could be advanced by subsequent study, experimentation and/or implementation through the military capability lines of development e.g. training and doctrine.

3 Focus and Context

3.1 Introduction

Issues of interoperability are well documented. Even within those nations that have English as a first language there are cultural obstacles which impede interoperability. Within Treaty organisations (e.g. NATO) there has been a major effort at standardisation and there are currently many Standardisation Agreements (STANAGs) which seek to create a common procedural format for a given task. In this way the major issues of compatibility can be addressed, however, paradoxically the largest barrier to interoperability is the issue of trust between the individual nations.

Different groups of nations will continue to contribute to international and regional security in response to the actions of rogue states, terrorism and trans-national threats. In this context, UK forces, in addition to working with the growing coalition of nations now in Iraq, are likely to continue their current deployment pattern in support of NATO, EU and UN operations. However, the UK may also have to operate with unfamiliar partners and address consequent problems with force packaging[1], standardisation of procedures and equipment, and Combat Identification[2] (Combat ID). In this context, the significant contribution by UK Defence and Liaison staffs overseas, including Defence Attachés, to the planning and prosecution of the Iraq operation, underlined the importance of understanding the particular national sensitivities and objectives of allies and other nations.

3.2 Technical Context

This section aims to present the concept of Interoperability in the context of Network Enabled Capability (NEC). This information is presented purely as context in order to support any views and technical references made later in this document. NEC is defined as:

" The ability to gather knowledge; to share it in a common and comprehensible form with our partners; to assess and refine it to turn into knowledge; to pass it to the people who need it in an edited, focussed form; and to do it in a timescale necessary to enable relevant decisions to be made in the most economic and efficient manner "

The advantages and benefits perceived in implementing a network enabled force include having precision of control, precision in applying force, rapidity of effect, the force multiplier effect[3], improved force protection and improved combat effectiveness.

1 Selection of force elements appropriate to tasking

2 The use of procedures to prevent fratricide

3 A factor that dramatically increases the combat-effectiveness of a given military force

The Ministry of Defence (MoD) White Paper: Delivering Security in a Changing World [1] describes NEC as "the capability enhancement achieved through the effective linkage of platforms and people through a network". The MoD's web-site has the working definition: "linking sensors, decision makers and weapon systems so that information can be translated into synchronised and overwhelming military effect at optimum tempo". Wheatley (2004) [2] observed that these definitions are helpful in that they include human agency in the form of people and decision makers, and so represent an advance on earlier concepts of information superiority or exploitation of information.

Interoperability in the technical context refers to the ability of disparate forces operating in an alliance or coalition, cooperating and co-working in order to achieve an aim or complete a mutually beneficial task, be that military or non-military. In so doing, forces will need to communicate, plan, cooperate, understand and interact with each other. In order to achieve this the ability to exchange information accurately, in a timely manner and across the natural barriers imposed by coalition operations must be established as soon as is practicably possible within the bounds of technical compatibility.

The following sections provide overviews of the key NEC programmes and applications currently in-service or under-development. The general categories are limited to Tactical and Operations Level communications and situational awareness, National and Strategic level systems and NATO and/or international data sharing.

It is important to note that if potential coalition allies do not have the same abilities as ourselves in terms of technology and capability then the cooperative ability of the coalition force is only as effective as the equipment of the least capable partner and inter-working processes must be established to make the best of the situation as possible.

3.2.1 Tactical and Operations level communications

3.2.1.1 BOWMAN

BOWMAN will meet the tactical communications needs of those elements of the three Armed Services that take part in, or provide direct support to, UK land, amphibious and air manoeuvre operations from early 2004 until at least 2026.

BOWMAN is replacing the Army’s ageing Clansman radio and certain elements of the Ptarmigan trunk communication system with a secure digital voice and data communications service, including situational awareness capability. BOWMAN is a staged delivery programme where capability is developed and delivered in increments. It is a step-change in capability from what has gone before; an extremely complex system that brings together a range of software functionality in a number of different hardware configurations.

BOWMAN’s key capability improvements will be:

- Secure Tactical Communications - digital cipher technology and a cipher management system will provide continuous secure communications;

- Enhanced Situational Awareness; BOWMAN has built in Geographical Positioning System (GPS), programmed to update all other radio users connected to the network. This will increase effectiveness by reducing unnecessary radio traffic and removing any doubts regarding the location of own forces;

- Reliable Data Network; This ensures secure digital communications and supports automatic position, location and navigation reporting of individuals and units.

The system is designed to keep pace with technology; BOWMAN is already in service but is being fielded incrementally. This means that the most up to date software and functionality can be added as required in a timely manner.

3.2.1.2 Common Battlefield Application Toolset – ComBAT

ComBAT is the software application used with BOWMAN hardware and will be available on all User Data Terminals (computer laptops) with the exception of the handheld Personal User Data Terminal. A useful analogy is that where a PC uses applications such as MS Office, BOWMAN uses ComBAT. ComBAT will provide the core of the Battle Management System, from fighting platform up to divisional level.

Integrated into BOWMAN, it will provide enhanced situational awareness and common operational, intelligence, personnel and logistic planning tools to improve the tempo, survivability and effectiveness of land forces. It will also facilitate mission analysis and the provision of orders, map overlays, route planning and provide standard reports and returns formats.

3.2.1.3 Common Operational Information Subsystem (COInS)

The purpose of COInS is to support the establishment of the trusted and selective exchange of timely and accurate information delivery between ComBAT components, Battlefield Information System Applications (BISAs), other UK national systems, and agreed international information exchange programmes. The COInS will provide access to shared information and ensure that information is consistent and accurate across the battlespace.

A contract defines the characteristics of the agreed exchange, including the structure of the information, the conditions that trigger the exchange and the communication medium and protocols that are to be employed.

Contracts will be defined and agreed pre-deployment, according to the Information Exchange requirements defined by the deployment and the business rules that apply between the different players in the deployment.

3.2.2 National Command Level Information Sharing

3.2.2.1 Joint Operational Command System (JOCS)

The Joint Operational Command System (JOCS), brought into service during 1999, is the common strategic planning system at Permanent, Joint Force and single service component Head Quarters. JOCS provides Command, Control, Communications, Computers and Intelligence (C4I) software tools and communication assets to support the Joint command environment.

JOCS provides a federated Command and Control (C2) system in the MoD for all Joint and Combined Operations at Strategic level in London, other major Operational HQs in UK and abroad and can be deployed to the tactical level worldwide. JOCS provides connections throughout the command structure including connections to a deployable

Joint Force Headquarters (JFHQ). HMS Illustrious and HMS Ark Royal are fitted with the System to support a JFHQ Afloat.

The attributes of JOCS include:

- Extensive support to joint staff business processes;
- A secure web infrastructure;
- Decision and planning aids;
- Creation and management of the Joint Operational Picture (JOP); a representation of the battlespace which presents a consistent data set to all users;

3.2.2.2 RNCSS

The Royal Naval Command Support System (RNCSS) provides C4I facilities to control all aspects of maritime/amphibious operations.

RNCSS produces and manages the Recognised Maritime Picture (RMP); collates and displays strategic and tactical data; disseminates and actions formal signal traffic; produces and disseminates plans; and provides interoperability to co-operating land and air forces. It is hosted on all major RN ships and command centres ashore. The underlying infrastructure is a client server architecture based on NT clients and UNIX/NT servers. Ships communicate with each other over SatCom via a central hub located at Northwood.

3.2.2.3 RAFCCIS

The Royal Air Force's Command, Control and Information Systems (RAFCCIS) provides C4I facilities to control and plan many aspects of RAF operations. It is located at major headquarters and airfields.

3.2.2.4 ARRC/GP3

Allied Rapid Reaction Corps **(**ARRC**)** - Headquarters ARRC is a highly capable, multinational, operational headquarters, fully digitised and ready for rapid deployment worldwide. Multinational by design, the ARRC can deliver exacting combat power through the ability to draw on resources from international armies combat capability and expertise.

GP3 – Development of GP3 started in 1996. It was adopted by ARRC in 2000 and continued development becoming ARRC's core command and control application and is now used as the primary Situational Awareness (SA) tool. GP3 is analogous to MS Office in that it is a number of applications that, together, form the Command and Control (C2) and SA capability.

3.2.3 International Data Sharing

3.2.3.1 Multilateral Interoperability Programme (MIP)

The aim of the Multilateral Interoperability Programme (MIP) is to achieve international interoperability of Command and Control Information Systems (C2IS) at all levels from corps to the lowest appropriate level, in order to support multinational, combined and joint operations and the advancement of digitisation in the international arena, including NATO.

The MIP emphasis is on exchanging information which is relevant for the full spectrum of operations from war-fighting to MOOTW. Specifically, MIP will build upon current NATO programs and interoperability work.

The MIP has two objectives:

Phase 1: To develop a capability to exchange fixed formatted messages at formation and battle group level between land component C2IS of participating nations both horizontally and vertically.

To provide data exchanges using fixed formatted ADatP3 messages (NATO Level 4). Implementations include Oracle databases, C2IEDM, with scripts to exchange messages.

Phase 2: To develop a capability to push selected data at formation and battle group level between the land component C2IS of participating nations, to be field-able in 2005. MIP is evolving its Baseline 1.0 solution to incorporate a new set of requirements that will improve the ability to exchange information amongst allies. This will include collaboration, messaging, automatic sharing of the situational awareness and common operational picture, in a combined and joint environment.

The MIP concept involves each participating nation deploying and providing an interface mechanism, referred to as the MIP Common Interface (MCI). The MCI's form the gateway between the national C2IS Systems as well as between the different national fielded communication networks.

3.2.3.2 US Systems

United States and UK Forces increasingly deploy co-operatively as a coalition force. Therefore there is the over-arching need for exchange of information between the coalition partners.

To promote interoperability, NATO member nations have developed STANAGs and Allied Data Publications (ADatPs) that specify detailed messages and protocols for the exchange of information over digital communication systems. International message standards such as STANAGs 5511, 5516, 5522 and 5616, publications such as ADatP-11, ADatP-16, ADatP-22 and ADatP-33, and UK national Tactical Data Links (TDL) standards are continually being updated to meet emerging or changing operational requirements.

3.2.3.3 CENTRIX

CENTRIX is a global US/Allied/Coalition Information Exchange Network designed to establish an interoperable counter-terrorism, intelligence and operations information sharing capability.

The system provides email, web services, office automation, imagery, near real-time threat track data and voice over secure Internet Protocol (IP).

CENTRIX provides communications connectivity, data manipulation, and automated processes for bilateral or multi-lateral database access and information exchange among cooperating nations and international organizations. Specifically, it provides United States Central Command (CENTCOM) decision-makers, commanders, and units with:

- Common and consistent situational awareness of the battlefield;
- Access to a filtered version of deployed Order of Battle database;
- Access to near–real-time sensor report correlation;
- Aid in synchronizing the actions of land, sea, space, and special operations forces.

3.3 Non-technical Context

Operations in multi-national environments are common-place. Relationships established over many years have led to alliances that are so entrenched that trust, doctrine, training and familiarisation percolate through the relative force structures as liaison and exchange programmes expand, widen in scope and reinforce special bonds.

Different groups of nations will continue to contribute to international and regional security in response to rogue states, terrorism and trans-national threats. In this context, UK forces, in addition to working with the growing coalition of nations now in Iraq, are likely to continue their current deployment pattern in support of NATO, EU and UN operations.

The coalition secured important assistance in the build-up to the Iraq conflict from a wide range of countries. However, host nation support cannot be taken for granted. Regular training and cross-pollination with potential coalition force partners is required to promote interoperability when UK forces are deployed in a UK-led or backed coalition. Achieving interoperability requires extensive information sharing between the allies and partners.

The UK may also have to operate with unfamiliar partners and address consequent problems with culture, language, politics, religion and military capability. In this context, the significant contribution by UK Defence and Liaison staffs overseas, including Defence Attachés, to the planning and prosecution of the Iraq operation, underlined the importance of understanding the particular national sensitivities and objectives of allies and other nations. It is necessary to continue to develop ways and means of improving interoperability with trusted cooperative forces within our own military (i.e. RAF, RN, Army, regiment with regiment) and with our familiar allies in NATO and beyond. The cooperation of our own forces with unfamiliar nations will focus current processes and concepts of non-technical interoperability. Currently much effort goes into the combined practice and development of interoperability with established friends through

programmes such as the Multi-National Experiments, however, precious little is expended towards successful inter-working with unfamiliar and therefore less trusted and enforced alliances.

The need to develop shared perspectives among participants with dissimilar backgrounds, training, procedures and language is vital. The need to come to agreement on objectives, perceptions, mechanisms and progress will significantly increase operational complexity and the need to deal with mixes of activities involving bilateral and multilateral agreements, military coalitions, mixed civilian-military operations.

3.3.1 Multinational Experiments (MNEs)

3.3.1.1 Background

The multinational experimentation series, which began with the Multinational Collaboration Limited Objective Experiment (MN-LOE) in winter 2001, brings together NATO nations in an USJFCOM sponsored experiment to test different facets of warfare involving coalition forces.

There have been four multinational experiment series events. The first MN-LOE investigated how a combined joint force headquarters would conduct rapid, decisive operations within a distributed, collaborative information environment with coalition partners.

The second, MN-LOE 2, examined the development of a multinational Operational Net Assessment (ONA), as well as coalition multinational information sharing. MNE 3 and MNE 4 have been designed to examine effect based operations and distributed command and control processes. The purpose of MNE 5, likely to take place in 2007, has not been finalised but will probably extend the experimentation undertaken in MNEs 3 & 4.

The key evaluation aims of MNE 3 were to evaluate the ability of coalition nations and the NATO Response Force (NRF) to develop and assess processes and organisations with the identification of technology requirements to support the planning of a coalition effects based campaign. MNE 3 was a US led event with the NATO aspects operating from facilities in Germany and other nations operating from their own national experimentation facilities. The coalition partners agreed that this would assist the development of future processes, organisations and technologies at the Coalition Joint Task Force (CJTF) (Operational) Level of Command.

The core concept under consideration during MNE 3 was Effects Based Planning (EBP). Conceptually EBP seeks to translate strategic objectives into operational level effects. EBP is founded on the notion of Effects Based Operations (EBO), described by JFCOM as ‘a process for obtaining a desired strategic outcome or "effect" on the enemy, through the synergistic and cumulative application of the full range of military and non-military capabilities at the tactical, operational, and strategic levels.

To some extent EBP is already undertaken in some areas of military operations within the UK. Leveraging this experience, (JDCC) generated a prototype multinational EBP concept for MNE 3, which described a systematic approach for planning EBO. This concept was developed in a manner that attempted to support other core UK military tenets (such as mission command and the manoeuvrist[4] approach).

Insights from MNE 4 are intended to inform joint, interagency and multinational operations while transforming military operations. Creating a multinational collaborative environment for the entire range of EBO for future operations will allow decision makers to execute more informed operational decisions considering all elements of national power.

MNE 5 will be the next in the series of multinational experiments. It will build on MNE 4 following a thorough assessment of the experiment's results. Senior leaders from the MNE 4 participating countries will discuss an appropriate theme, scenario, a range of topics for experimentation, and the possibility of expanding the number of participating nations.

4 - *describes the flexible tactics which allow commanders in the field and at the main headquarters to adapt their plans in response to events on the ground*

4 Human Factors Issues

4.1 Introduction

In joint operations of any kind and with the involvement of many different nation state contingents the issues of multiculturalism, communication and leadership are intertwined and mutually affect each other to a great extent. There will inevitably be a significant overlap in the general sections that are defined within this part of the report.

Further assessment of the literature highlighted additional high priority HF related areas associated with multinational operations that required a more in-depth review. The following key areas will be presented:

- Common and Command Intent;
- Leadership;
- Collaborative Working;
- Communication;
- Language;
- Trust;
- Culture.

Each key area will be examined for its impact in the joint, multinational and coalition based operations environment.

The literature review will be used to detail the study history to date i.e. what has been looked at, how it was studied, what were the findings and conclusions and what work is there still to be done to ensure a proper understanding of these issues? Finally, a strategy for follow-on work will be suggested.

4.2 Common Intent and Commander's Intent

The UK Armed Forces' method of devolving responsibility down to low levels of command is known as Mission Command. The key to Mission Command is the clearly communicated and understood aim of the task to be achieved – Commander's Intent. Commander's Intent is shared with subordinates, who are told what to achieve and why, but are then left to decide how to achieve it. Subordinates are encouraged to use their judgement, initiative and intelligence in pursuit of the commander's goal.

Development of a mutual understanding of the operation is crucial to the success of multinational working and relies on effective communication between the contingents. Barriers to effective communication include language difficulties and differences in the way national contingents interpret information or command intent.

4.2.1 Linking Commander's Intent with Common Intent

Common Intent describes a socio-psychological phenomenon that seems to be evident amongst a team that has a singular purpose. Farrell (2004) [3]. A sports team may have a common aim of winning the game. A business company may have a common objective of increasing returns. A military unit may have a common goal of capturing territory and maintaining civil order as a desired effect. The aim, objective, goal, or desired effect should be more than a written statement or a Commander's order, but it should find its way into the hearts, minds, and souls of each team member so that consistency of thought and behaviour prevails and the team performs effectively.

Within the scope of this study, the aim is to assess the communication and articulation of Command Intent to contingent commanders who will be tasked with executing that intent. It is the understanding that subordinate commanders have of the Commander's Intent which drives their own Common Intent and their common understanding of each others roles. This awareness of each others command roles, the interaction between the groups and the understanding of each groups' tasks and the effect that multinational operations will have on these factors is the main area of analysis.

4.2.2 Commander's Intent

Commander's Intent is a keystone of current military planning and operations; its importance is not reduced in EBP, Cremin et al (2004)[4]. The Commander's Intent for coalition operations needs to be sensitive to potential cultural and language issues but the key aspects of intent (clarity, why, what and scoping the problem) should be enduring.

During MNE 3, the UK participants generally considered the Commander's intent to be lacking in substance, appropriate detail and clarity, and as a result did not assist the participants to identify their tasks. There was no evidence that Commander Task Force (CTF) sought to discover whether his staff outside the US had comprehended his intent. The limited development of Commander's intent was probably a significant detraction from the experimental aims of exercising EBP.

The EBP Concept of Operations (CONOPS) specified that the EBP process was a command led process. UK participants considered the process was not Command led. This divergence may have contributed to the participants not appreciating the Commander's intent.

4.2.3 Impact

Cremin et al [4] conducted a wide ranging analysis of Command Leadership which inevitably included Operational and above leadership within the multinational and coalition based environments. They found a number of limiting factors that affected overall HF Interoperability through command intent. The most pertinent factors are detailed below:

1. A complicating factor in attempting to achieve consensus (necessary to assuage political sensitivities) is the time it takes away from attending to, and conducting other tasks. The more countries involved in an operation, the more time is required to get all, or most to agree to an intent or mission.

2. Development of a mutual understanding of the operation is crucial to the success of multinational working and relies on effective communication between the contingents. Barriers to effective communication include language difficulties and differences in the way national contingents interpret information or command intent.

3. Even when an individual is able to comprehend English, the understanding or interpretation of what is being said may be different to that intended by the person providing the communication.

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

4.2.4 Common Intent

One of the key elements here is that the coalition must have high levels of Common Intent. Team members may have individual interpretations of the strategic objectives and individual expectations of the final product that are based on experience, training, values, and culture. The degree to which these interpretations and expectations are common amongst team members will impact goal achievement.

Common Intent is the combination of the explicit awareness or perception of Commander's Intent plus the implicit or internal expectation of Commander's Intent. Explicit Intent and Implicit Intent, together, may lead to a shared understanding of Commander's Intent. Common Intent also implies that team members understand each other's roles and responsibilities. Thus members can properly interpret the intent with respect to their roles. An outside observer may see different behaviours, but these actions would be coordinated and consistent with respect to the intent.

4.2.5 Impact

In the context of a military planning staff, Explicit Intent is Commander's Intent. It is publicly stated for all the Headquarters (HQ) staff members to perceive, think about, and act upon. The HQ staff should be able to reiterate Commander's Intent at any point during their activities. The first part towards having Common Intent is being aware of Commander's Intent. The degree to which these interpretations and expectations are common amongst team members will impact goal achievement.

Implicit Intent is an internal expectation of Commander's Intent. For example, if Explicit Intent is "to capture the hill", then Implicit Intent might be "to capture the hill with minimal battle damage" or "to capture the hill with Air Force assets only." These implicit expectations depend on the staff position (e.g., planner, operator, commander). The members interpret Commander's Intent from personal expectations based on style and experience, military expectations based on training, doctrine, tradition, and ethos, and cultural expectations based on societal values, cultural morals, and national pride.

4.2.6 Relevant Studies and findings

The Niteworks Study [5], on MNE 3 aimed to provide an overview of experimental findings of MNE 3. Specifically, Question 1060 – Commander's Intent "*[how]we articulate command intent in the information domain that is rich enough to convey critical factors in a coalition environment but simple enough to be ambiguous?"*

The study was carried out using three general methods of data collection;

- Interviews conducted prior to MNE were used to attempt to address the main issues associated with Commanders Intent particularly within the Effects Based processes to be trialled throughout MNE 3;

- Questionnaires were used to collect qualitative responses from participants seeking to establish opinion regarding the quality of Commanders Intent;

- Observation was used to gauge reaction to Commanders Intent as it was amended, updated and revised throughout MNE.

Within the scope of this document and in assessing the overall understanding of Commanders Intent, it was concluded that, within the UK team, where possible, the issuing of Commanders Intent to a distributed coalition team should be to a pre-formed team. It was also suggested that specific steps should be taken to ensure that, within that team, Commanders Intent has been properly understood by all individuals.

In general it was felt that Commander's Intent was:

- Lacking in substance, appropriate detail and clarity, and as a result did not assist the participants identify their tasks;

- There was no evidence that CTF sought to discover whether his staff outside the US, had comprehended his intent and the limited development of Commander's intent was probably a significant detraction from the experimental aims of exercising EBP;

- The EBP CONOPS specified that it was a command led process. UK participants considered the process was not Command led. This divergence may have contributed to the participants not appreciating the Commander's intent.

- Thus, Commander's Intent and the subsequent Common Intent is a factor within the following:

- Communication (section 4.5) where the commander must properly articulate intent with clarity and understanding;

- Communications Tools must be equal to the task of ensuring that Commanders Intent is distributed across the coalition force and the opportunity is given to all to question understanding, particularly across language and culture barriers.

Farrell (2004)[3] also used MNE 3 to conduct research into Common Intent. The results indicated that Common Intent was generally low. Individual nations had differing expectations of the Commander's Intent and therefore their own understanding of the task. It seems that these issues forced nation teams to revert to own nation Standard

Operating Procedures (SOPs) resulting in an unclear view of the way ahead. Although Farrell was investigating ways to measure Common Intent it is possible to derive that communicating Commanders Intent, ensuring understanding, distributed planning, language and different doctrinal expectations had adverse effects on Common Intent and achievement of task.

Leggatt (2004)[6] used MNE 3 to quantatively measure the promulgation of Commander's Intent in order to understand the ability of a force commander to be able to disseminate intent and for the people beneath him to decide how to carry out that intent. The measurements were conducted using specifically constructed probe statements designed to assess the understanding of Commander's Intent throughout the experiment. In general it was concluded that Commander's Intent was poorly understood outside of the Commander's inner sanctum. The author could not establish the extent of this influence, the assumption being that the close contact, face-to-face environment facilitated understanding whilst meaning was lost after the Commanders Intent was promulgated across the network and out to the distributed teams and locations. The measurements could not reveal the exact cause of the lack of understanding.

Proximity to the commander was concluded to be positively related to understanding. Proximity both geographically (co-located) and organisationally (not necessarily co-located but close hierarchically and through the network). The network was observed to facilitate understanding despite geographic separation. However, the less the proximity, organisationally or geographically, the less the understanding.

4.2.7 Future Research

The dissemination of Commander's Intent itself is a product of communication and language. The technology available in collaborative planning does not appear to suitably support the EBP process perhaps due to its nature i.e. In MNE, Information Workspace (IWS), is a hybrid system made up of several other applications made to work together to achieve a requirement for which none of the separate components were originally designed.

Devices, technologies and applications must be specified, designed and developed that support collaborative planning and consultation. These tools will need to include associated audio and video conferencing facilities underpinned by a variety of graphical tools.

Carry out a design and requirements specification exercise into a properly defined EBP collaborative planning system involving virtual and displaced interworking teams.

In terms of language and communications tools, these are covered elsewhere in this document. However, even when communicating in the same language there are obvious problems in ensuring that subordinates understand every aspect of commander intent such that they can form their own common intent for further dissemination.

Carry out an investigation into the means to ensure that the full meaning of Commander's Intent is disseminated to and understood by Subordinate Commanders. This might include recommendations such as format definition and/or template specification and investigation of different potential types and methods of articulating command intent.

4.3 Leadership

QinetiQ has concentrated on and contributed to the area of leadership through work carried out under the Human Sciences Technology Domain of the MoD's Corporate Research Programme. The aim was to identify the nature of cultural differences that could influence close team working with other nations' personnel, in multinational operations, and to provide guidance on training strategies, Cremin (2004) [4].

Through analysis of the commercial world, Cremin (2004) [4] found that some multicultural training is provided in global companies or other enterprises, but that this is not easily transferable to the military environment. The study identified the need for different types of multicultural training and drew a distinction between educational awareness throughout individuals' careers and specific pre-deployment training with respect to the local infrastructure and populace in the operational theatre. Providing cultural education throughout career lifecycles, supplemented by pre-deployment training, ensures that UK Armed Forces personnel will come to any multinational setting more prepared. This epitomises the findings of all the references examined by the author relating to leadership and the cross-cultural theme such as:

- What are the issues that our military personnel will face?
- What challenges do they need to be prepared for?
- Who will they be dealing with and what considerations should be factored into the way our personnel go about their tasks?
- How to maximise the output of allies on the other side of the cultural divide?

In asking these questions, it is the preparation for these situations that should be considered more urgently. The authors reading and questions asked of military personnel on an opportunity basis has suggested that pre-deployment training is more of a luxury than the norm. Instead, personnel may only have time to seek the advice of a more experienced officer and carry out some research of their own into the culture and background of the country they are being sent to. It is likely that for extended deployments there will be time for significant effort to be put towards familiarisation with culture, traditions, language and customs which should be made best use of. These will give significant insight into the lives of the forces to be operating with.

However, for Liaison Officers (LO) who pave the way for future coalitions and generally prepare nation contingents for a period of operation subordinate to a commander from a different nation, culture and background; there must be a more structured, entrenched and pervasive form of training that changes the mindset to one of adaptation, adjustment and compromise.

Stewart et al (2004)[7], breaks down command into Command Style and Command Structure. In the case of Command Style, the authors refer to the merits of personal compatibility with others and leadership qualities, including the ability to adapt to the challenges of leading coalition operations.

In the case of Command Structure, it is clear that the relatively simple command organisation that is the norm in single-nation forces is unlikely to exist in future multinational forces, especially in ad-hoc coalitions and in non-warfighting operations. The suggestion is that in a coalition based command and control system the achievement

of the task and the effort to achieve that goal are probably as much as one can hope for. They point out that “complete unity of command is seldom achievable in coalition operations”.

4.3.1 Relevant Studies and Findings

The Cremin (2004)[4] study involved a literature search followed by an interview stage. The literature study was also used to inform the development of an interview schedule for the interview stage although participants were encouraged to raise issues believed to be relevant if not directly related to the line of questioning.

The interview subjects were senior commanders from all three services. Six were at least 1- star rank or above. None were ranked lower than Colonel. All had a wide range of experience of multinational operations in both the command and commanded roles.

The study identified five key themes arising from the transcripts of the interviews:

- Balancing civil and military considerations;
- The Commander;
- Harmonious working;
- National cultures;
- Mutual understanding.

In general conclusions broadly cover:

Balancing civil and military considerations

- Multinational forces often represent a compromise between military capability and political constraints;
- Interviewees were concerned at attempts to achieve multinational integration below formation level e.g. the formation of a force of soldiers from different countries.

The Commander

- Effective multinational commanders exhibit certain key behaviours, for example adopting a flexible command and leadership style;
- In order to be effective, multinational commanders require core knowledge, skills and attributes including multinational sensitivity, adaptability, and self awareness;
- Future commanders need appropriate, well-managed, education and experience in order to develop the competency required to exercise multinational command.

Harmonious working

- A strong relationship between national contingents based upon mutual respect and understanding at all levels, including senior commanders, is key to the success of multinational forces;

- Owing to inconsistencies in command style between contingents, UK commanders, whether in the leader or follower role, are likely to have to adapt to a more centralised approach;

- Command is more challenging in:

    - Larger multinational forces owing to the increased requirement to build and manage relationships with and between a greater number of nations;

    - Coalitions, as opposed to alliances, owing to the need to develop common SOPs and to balance military, political and legal factors.

- Participants identified many non-technical command challenges specific to the multinational arena including: diverse Rules of Engagement (ROE), misunderstanding of capability of partners, diversity of decision-making styles and intelligence sharing;

- Methods for reducing non-technical frictions were proposed including: deployment of LOs, establishment of shared objectives and shared doctrine, accommodating diversity in socio-cultural norms and working practice;

- Commanders should recognise that operational context has a bearing on the salience of non-technical incompatibility, for example it is likely to be easier to manage inconsistent ROE more effectively in less volatile scenarios.

National cultures

- British arrogance was raised by the majority of allied participants as an area with the potential to undermine relationships and, potentially, the cohesion of the multinational force;

- Cultural intelligence and sensitivity with regard to multinational partners is essential to build relationships and to avoid unintentional offence. Education can help in this area;

- Similarity of organisational and professional culture, for example between aviators, can help to overcome differences between national cultures;

- Education and personal experience, for example via staff college and exchange postings, are central to the development of cultural intelligence.

Mutual understanding

- Since English tends to be the official language of multinational forces, a major source of tempo drag is competence in the English language;

- Care should be taken to ensure that a non-native speaker's understanding of a message matches that intended by the speaker;

- Foreign nationals may not feel comfortable questioning native speakers of English to confirm their understanding of what has been said;

- Making efforts to integrate all personnel, particularly those with poor English, can pay dividends.

Cremin's report then made recommendations for future research effort in this area in order to improve military capability. In general it resulted in the 'Ten principles for command in multinational operations' as laid out below:

1. Build 'national' knowledge.

2. Be prepared to adapt Command style.

3. Prioritise relationship building.

4. Understand national contingent capabilities – strengths and limitations.

5. Don't assume that your way is the only way.

6. Negotiation is commonplace – Command is by discussion not diktat.

7. Be prepared for variations in the standard of spoken English.

8. Establish a common sense of purpose.

9. Where possible, establish a common operating procedure.

10. Promote equity of risk and reward.

4.3.2 Future Research

There is no shortage of references analysing leadership in great detail in the area of multinational and coalition based operations. However, it must be noted that having done an extensive search for material and evidence regarding leadership, interoperability and multinational, coalition base operations, it is the authors opinion that there is little to be gained from investing time and resource further investigating the specifics of leadership in this environment.

To improve military capability, resources would be better employed examining the relevant lines of development associated with leadership and investing in these areas in order that personnel placed into these positions and these environments are better prepared and become more effective more quickly.

Three key areas for further study and research that fall within the scope of this study are detailed below. However, the original recommendations were made in 2004 it is unknown if any of the recommendations were taken up:

- A study is required to investigate the trade-off between military capability and command and control effectiveness and the political drivers for multinationality. Methods for assessing the balance of risk should be examined.

- A study is required to explore the feasibility, in both military and political terms, of forming multinational units at battlegroup level or below.

- The current research study could usefully be expanded to obtain the views of foreign nationals on commanding and being commanded by British forces.

Investigate the outcome of Cremin's report [4] and identify the progress made against the recommendations.

The key factor affecting successful leadership or command in the multinational/coalition based environment is the preparation of those individuals tasked to command or be commanded either at the strategic or high operational levels. All research into this area has pointed to the proper training of those to be deployed not just in the leadership aspects but also in the many associated factors affecting the ability to lead and the willingness to be led.

Authors assessing the same questions in the commercial world also conclude that equipping the participants with the necessary tools for success will encourage achievement. The range of conclusions and recommendations made by others can be categorised very simply as informing personnel and training personnel to take advantage and maximum benefit of that information.

The military education process is, as it should be, one of continual update and education. However, in terms of multinational coalition based operations, potential commanders should receive information about potential deployment nations and their cultures as part of their on-going military education and training.

Investigate current training policy with respect to multinational coalition operations and the training provided pre-deployment. Additionally, an investigation is needed into the type, quantity and quality of information available to individuals prior to deployment.

This information is vital to the manner in which initial contact is made with 'foreign' contingent force commanders who will need to be trusted and relied upon.

Continuing to develop the application of the lines of development:-

Generate a set of requirements that describe the changes and additions to military culture itself in order to fully implement the doctrinal inclusion of all aspects of multinational, coalition operations into general military life.

These requirements must be categorised by lines of development with a clear and defined end-state to be achieved in terms of military capability. This will ensure that the outcomes, if any, of this and any other related follow-on work will offer a firm foundation for training processes and content in the appropriate colleges, centres and trainees' deployment base.

4.4 Collaborative Working

"Virtual teams" are groups of distributed people working together to achieve a common goal or solve a shared problem through the use of computer-mediated communication technologies, linking them across time, space and cultural barriers.

Virtual teams, small groups of geographically separated people working together, are an integral part of today's society. In the commercial world, virtual teams routinely provide nearly continuous coverage on projects, most notably in automobile and airplane design and development.

The US, UK and allied military forces are particularly interested in the successful implementation of virtual teams to support its participation in an increasing number of joint and coalition operations, to provide alternatives for a downsized force and to serve as a test-bed for exploring alternative techniques for C2, particularly in the area of network-centric warfare (Loughran (2000)[8]).

4.4.1 Impact

Virtual teams offer many benefits over co-located teams. Because members of a virtual team can work from anywhere at anytime, the team's reach and redundancy are expanded. Teams grow "richer" because they can be assembled based on the respective team members' skills as opposed to their physical location. Virtual teams also reduce travel expenses and other costs associated with face-to-face meetings. However, this is in the authors opinion, false economy in terms of efficiency, task achievement and capability of current collaboration communication tools.

From a negative perspective, virtual teams have some serious drawbacks. Studies indicate that virtual teams have less overlap in their representation of the (shared) task and are less cohesive than co-located teams. In addition, virtual team members often have cultural differences and their lack of a shared history can negatively affect the team's ability to develop a sense of trust, impacting the team's ability to accomplish its mission.

Cultural issues are linked to values, and values may clash within a multi-national coalition. The mere fact that a coalition exists means that some values are aligned, and this must be the starting point for collaboration. Iraqi Freedom is an example where France, Germany, and Canada had differing core values from the US and UK who ended up forming the US led coalition. Note that this discussion needs to take place long before countries can enter into a coalition agreement with one another.

4.4.2 A wider view

The rapid increase in cross-cultural, geographically dispersed teams results not only from a new global economy and changing political-military situations, but also from the rapid and substantial growth of information and communication technologies. Traditional communication tools, telephone, fax and traditional postal correspondence, retain their usefulness in certain applications; however, the advent of networked information technologies, including video teleconferencing (VTC), text chat and application sharing, to web sites, packaged groupware programs and information downloaded to wireless devices can create a vast environment packed with data, information and communication which if not managed very carefully quickly becomes overwhelming and counter productive.

Virtual Team research, case studies and experiment observation indicate that it is more difficult for virtual teams to achieve success than teams that are co-located and have face-to-face interaction. The more common problems associated with distributed working are discussed below:

4.4.2.1 Cultural Differences

Cultural differences can simply be a lack of understanding of team members geographic location and origin (time-zone etc.), where in the world they come from, their background and their culture. Understanding cultural profiles will help overcome this type of obstacle, but the emphasis must be on general tendencies towards familiarity and compromise rather than cultural expertise "across the board" in order to prevent the generation of hostile cultural barriers.

Familiarity and compromise can engender a mutual understanding of individuals and teams needs and limitations. It is a factor of training and will hopefully prevent unintentional antagonistic exchanges due to cultural insensitivities.

4.4.2.2 Lack of Shared Goal

Prevalent in MNE 3 was the lack of an overall plan and the flexibility to be able to take action outside of the established EBP planning process; the "this isn't how it would happen in the real world" factor. In MNE 3 this was largely due to the peace-time scenario underpinning the experiment and the experimental processes being practiced and trialled.

Successful team activity relies on the detailed definition of the overall goal and the specific tasking of team members whose contribution will form a necessary and important part of the goal. This is true for closed, co-located teams as well as distributed virtual teams.

It is a common observation however, that distributed teams lack cohesion, operate with different agendas and structures and can have a significantly different perspective of the problem-space despite having a well defined overall goal.

4.4.2.3 Communications Problems

Even with "always-on" communications (a system that is always live), where visual capability is constant, and data handling alongside voice and imagery is simultaneous, communications in a virtual environment will suffer from a number of problems that face-to-face interaction routinely avoids e.g.

- Body language – facial expression, involuntary hand and arm movement and body positioning revealing unconscious and hidden intention;
- Vocal intonation and inflexion – can be lost in a difficult communications environment and can also be misinterpreted without visual cues.

4.4.2.4 Other Visual and Auditory Cues

Process and procedures must be used to ensure that the message conveyed has been received as intended by all the other distributed groups and parties. The non-

communicative nature of a team can be interpreted in many ways by the other teams. The lack of two way interaction or the inconsistency of communication is detrimental to the team individually and globally. In addition, the uncertainty generated by difficult interaction engenders, rightly or wrongly, other problems such as trust; lack of trust breeds uncertainty. This vicious spiral becomes very difficult to break out of once established particularly due to reputation.

The advantages of virtual teams are considered by many, particularly in the commercial world, to far outweigh any disadvantages. It is also accepted that well trained members of virtual teams who are well briefed and properly focussed bring great benefit to the distributed planning process.

4.4.2.5 Lack of Trust

Trust has been mentioned many times in this document but its importance cannot be stressed greatly enough. Trust develops through familiarity and identification. For obvious reasons it is far easier to build trust and familiarity in a co-located group. Therefore, co-located teams build trust quickly, if that trust is diminished in some way, it can be repaired relatively quickly. Distributed team trust building and repair is quite different; once trust has been lost it is very difficult to re-establish. This is due to the disparate nature of the participants and the difficulty in establishing the familiarity and identification between individuals within teams or the teams as a whole.

The results of studies examined during the literature search suggest that global virtual teams may experience a form of "swift" trust, but such trust appears to be very fragile and temporal. These studies raise a number of issues that should be explored and debated by future follow-on research to this study.

4.4.3 Relevant Studies and findings

Extract from USJFCOM website [23]. There have been four scheduled multinational experiment series events:

4.4.3.1 MN-LOE 2

In MN-LOE 2, several observations were made on culture indicating that there will still be cultural and value differences even after nations agree to work together, as follows:

- Frustration at time for nations to agree on issues. Separate nations take different times on different decisions. Culture and military methods will be different. What a country spends 5 mins on another may prefer 15 mins on;

- Messages and communication between countries tend to get distorted. Intent and context of messages are not understood. Initially, this is a language problem with non native English countries. Subsequently, English speaking countries have different ways of saying things causing slight morphing of messages and misinterpretation;

- Military culture was a unifying effect for the MNE coalition. It became the de-facto way of doing business with briefs and debriefs, communication protocols, and so on. This was a common language that most participants understood and felt comfortable with. However, there was a strong civilian element to contend

with. Interestingly, they were amenable to receiving commander's guidance, particularly if it made sense to achieving the overall goals;

- As with problem-solving, observers were asked to record any issues related to culture, but there was nothing in the design of the experiment that would expose any cultural differences. Subsequent experiments should, perhaps, consider a scenario that would significantly impact the culture and values of the participants and allow them to be studied.

4.4.3.2 MNE 3

The MNE 3 experiment was designed to simulate a distributed Coalition Task Force (CTF) that was required to follow the NATO Response Force (NRF) into a nation for the purpose of conducting stability and support operations. Six nations participated in the CTF organization: Australia, Canada, France, Germany, the U.K., and the U.S. A command element of NATO comprised the simulated NRF headquarters. CTF members were distributed between sites in each nation and the NRF was co-located at one site in Germany. Participants, including the NRF headquarters, used a commercial collaborative tool to complete the planning process.

The proposition upon which the MNE 3 EBP was built was that the application of this new process would improve an operational commander's ability to broaden the range of effects and actions considered, respond in a more agile fashion to changing conditions, co-ordinate actions with multinational military and non-military participants and better enable the exploitation of military and non-military knowledge. Perhaps because the experiment was so intensely focused on completing a process with which most participants were unfamiliar, in a distributed environment and with unfamiliar data processing technology, participants were less focused on relationship building than they were on task accomplishment. By the end of the experiment (which lasted three weeks), there was a decided increase in camaraderie within and across cells.

It was generally found that effects based planning, as experimented with in MNE 3, was a concept in need of further refinement. This was especially noted in the organisation problems, which impacted the ability of the staff to complete the process steps. These inadequacies were noted by experiment staff and appropriate steps taken to reduce these risks in future experiments Yerace and Bowman (undated) [9].

4.4.3.3 Niteworks and MNE 3

MNE 3 introduced participants to a new organisation, with a new process, employing new technology and a novel distributed way of working with only a minimum of training. Therefore, causality of failures within activities was sometimes difficult to ascertain. The findings are mainly based on observations and interviews with a small number of experiment participants in the UK only. The monitoring of IWS gave only a small amount of insight as to the views of the other participating nations.

Recommendations from the Niteworks [5] review of MNE 3 were:

- Joint Force Headquarters (JFHQ) should ensure key elements of the Plans and Operations Cells are always physically collocated to enable the intellectual rigour required by the planning process. Coincidentally, this was a major observation of

MNE 4. Teams split by location often found that the whole team lacked SA and cohesiveness;

- JFHQ might consider the use of Liaison Officers within the command team to help effectively coordinate distributed military and non-military teams located within or alongside the Headquarters;

- UK should develop an appropriate set of business rules for the command and control of distributed operations.

Leggatt (2004)[6] concluded that outside of immediate organisational contact with the commander, Commander's Intent was not well understood. The reasons why were not clear, this analysis was purely designed to measure understanding not necessarily the methods used for attempting to distribute the Commander's Intent meaning.

Loughran (2000)[8] concluded -

- To fully leverage the collaborative distributed team's potential, new tools and methodologies for communicating and sharing information must be adopted;

- There are techniques for effectively employing the information and collaboration technologies to address some of these obstacles. These techniques include using the same tools and technologies for training environments, creating web-portals for sharing information and fostering a sense of community. Other techniques include the use of team leaders, structuring communications to build common pictures of team's shared goals and finally, attempting to occasionally meet face-to-face to build trust and reconvene on the team's objectives.

4.4.4 Future Research

Commercial companies use distributed virtual teams routinely across all sorts of industries and for a wide range of collaborative ventures. However, the needs of a military coalition with globally distributed teams engaged in operations that require real-time adaptability and cohesiveness pose altogether different problems.

The MNE arrangement uses impressive technology and provides a credible capability but it is not a sufficiently advanced capability to overcome some of the inherent problems associated with collaborative working that are described by this study. The teams are highly trained and, for the most part, experienced. Their value and ability must be drawn out not carved out. It is commendable that these personnel can adapt to their environment such that they can improve the process and achieve more, but ideally the tools provided should support the teams with what is needed to succeed. The team members themselves should be part of the capability definition process.

Conduct a study into collaborative distributed team-working tools such that a requirements definition is produced that can form the basis of a proposed future collaborative distributed teamwork system. The study should carry out detailed consultation with military personnel who will be able to properly advise on the issues and requirements of systems that must be provided in order that the EBP process can be conducted effectively and successfully.

The relationships between key elements described in this report i.e. language, culture etc. have been very thoroughly investigated and documented across civilian and commercial

concerns. However, the investigation into virtual teams in the military context was based largely on the multinational experiment series.

Basing studies on the MNEs is problematic. The nature of MNE and its credibility as an experiment rather than simply a large trial or military exercise conducted into distributed networked effect based operations suggests that results and conclusions are questionable given the experimental basis and the confounding factors.

Devise an experiment or trial through which it is proposed real quality data can be gathered that answers questions relevant to HF interoperability issues in coalition based operations and across virtual teams.

In addition, this could be supported through other sources of data such as real life experiences from serving personnel.

This action is to propose a devised system only. The issues associated with creating an experiment, trial or exercise on a large scale are evident from MNE and would be counter productive for exactly the same reasons as MNE. The scale of such an activity and how it will be taken forward should form part of the proposal. The importance of creating this proposal cannot be understated. MNE provides a platform in order to be able to observe many HF issues in action, however, it does not provide the robustness and rigour required to make properly informed conclusions about why something is the way it is, what the causal factors were, when it happened and how all the data was recorded and tracked in order to be able to claim such deductions.

4.5 Communications

Communication and conflict are inextricably bound together since misunderstandings and miscommunication escalate disagreement and conflict. Effective, considered communication that accounts for understanding of how cultures use language and communication is often the key to making progress towards resolution in conflict. Implementing an effective communications policy where all the factors affecting intercultural interaction are taken into account requires significant effort on the part of all involved.

Wheatley (2004)[2] provides insights into the human perspective of communications capability in highly integrated scenarios such as multinational experiments or, far more broadly, NEC. The key fundamentals to effective communication are shared situational awareness and interoperability; these are common to any level of co-working but become more problematic the more cross-cultural the team and the more strategic its goals.

Within the scope of HF Interoperability, communications is an overarching subject area encompassing other factors which deserve consideration in their own right e.g. language and trust.

Within this document the communication discussion will focus on the transfer of information, by whatever means, from one person to another maintaining the integrity, meaning and structure of that piece of information. The intention is to show that in a multinational, multicultural environment, despite the technology and availability of systems that improve our means to communicate, the message transmission still might not convey the required meaning and intent. This is possibly due to a number of circumstances and might be independent of communications;

- The originator of the message did not compile the message with enough care;
- The inherent barriers of language and culture remain confounding issues despite the message carriage being effective;
- Human fallibility.

It is clear that state of the art technology may offer a route to overcoming the problems associated with communication. However, it is not the single point of solution. Further questions need to asked of the capability and knowledge gaps present in the multicultural environment. Identifying these gaps and putting forward possible ways of investigating and overcoming them will lead to improvement in the use of communications. Potential solutions may include:

- A robustly networked force improves information sharing;
- Information sharing and collaboration improves Shared Situational Awareness (SSA);
- SSA improves synchronisation and thereby mission effectiveness." [5]

4.5.1 Impact

The extent to which the 'right amount' of situational awareness and interoperability can be brought to bear and made to work in the battlespace depends unquestionably on the quality of the personnel resources, the shape and values of the organisations involved and the amount of training (from individual to collective) and shared experience of those people. Wheatley (2004) [2]. Wherever they are in the network, individuals will have to deal with others; people with other roles from other services, whom may be located elsewhere, people with different terminology, priorities and values. These people may be far away in all these senses, yet still have authority over the individual.

4.5.1.1 Multinational Experiment Observations

The author visited Dstl Portsdown West to observe a day in the life of Multinational Experiment 4. Within an hour it was plain to see that the communications technology employed across the distributed collaborative environment was having a distinctly adverse effect on the following:

- Tempo – not withstanding the purpose of MNE 4 to trial EBP planning processes across a distributed collaborative network, tempo was achingly slow. This was due to numerous factors:
  - Training - although it was intended for the teams and participants to ‘hit the ground running’ in terms of use of the systems and software, the first week of experimental time was effectively taken up with familiarisation and scaling the almost vertical learning curve.

5 http://www.mod.uk/issues/nec/nec_vs_ncw.htm updated 7 Apr 03

- There were at least four different forms of communication; e-mail, voice net, text chat and an interactive web-portal. In one observed exchange, chat room meeting members used three of these capabilities within ten minutes. Text based chat, e-mail and voice referred to information exchanges that not all members of the team were aware of or could access. This left the team members with different spatial views of the problem with the obvious issues this would bring to a planning exercise or other task.

- Voice exchange is inevitably faster than text chat. However, add in the issues associated with language and the necessity of some participants to communicate through text chat in order to alleviate translation issues, tempo is significantly reduced whilst the translation dictionary is reached for. Therefore text chat maybe more effective but is detrimental to tempo through the need to consult a dictionary.

- Situational Awareness – discussions with participants revealed an almost total lack of awareness in terms of traditional situational awareness, map displays, locations and dispositions. In fact, because maps were not provided, requests had been made for wall mounted maps of the scenario area in order to provide some sort of geographic awareness. The background screens on one participant's monitors had been changed from the MNE 4 flash to a hastily downloaded background map of the scenario area for quick reference to where towns and major geographic reference points could be identified.

- Dynamic Collaborative interworking – problems associated with distributed planning are well documented, section (3.4). However, participants in MNE 4 saw no advantage to individual team members being distributed across the network. The inherent problems of local groups of the same team excluding, consciously or unconsciously, the distributed members was evident. Participants agreed with the general paradigm of distributed working but not when applied at the level where teams are not co-located.

4.5.1.2 Non Verbal Communication

LeBaron (2003)[10] talks of nonverbal communication being hugely important in any interaction with others and particularly important across cultures. This is because we tend to look for nonverbal cues when verbal messages are unclear or ambiguous, as they are more likely to be across cultures (especially when different languages are being used).

Since nonverbal behaviour arises from our cultural common sense, our ideas about what is appropriate, normal, and effective as communication in relationships differs. We use different systems of understanding gestures, posture, silence, spatial relations, emotional expression, touch, physical appearance, and other nonverbal cues. Cultures also attribute different degrees of importance to verbal and nonverbal behaviour.

The practice of distributed planning is degraded significantly through the lack of face-to-face interaction mitigated either by co-location or through the use of Video Teleconference Communication (VTC). Non-verbal gestures and nuances give a great deal of meaning to the interactions of a group and the meaning of an exchange can be significantly misconstrued through the lack of facial expression, body language and other non-verbal explicit external and meaningful characteristics.

4.5.2 Bridging the Communications Gap

The following sections briefly cover a wide range of methods that can be used to bridge the cultural issues of a coalition force's communications gap:

- Tools to assist in developing shared perspectives;
- Support for coalition formation and interaction;
- Support for human interaction;
- Shared plans and processes;
- Assistance in managing coalition operations.

4.5.2.1 Tools to assist in developing shared perspectives

Coalition members will typically have different perspectives of the battle-space, as well as different interests and objectives. Software that enables exploration (say through simulation) of alternatives could assist in developing a shared set of objectives. Tools to portray the physical and operational environment could assist in reaching agreement about methods for achieving objectives. Knowledge-based planning tools that elaborate intended operations could help participants to understand their roles and the interdependencies among activities.

4.5.2.2 Support for coalition formation and interaction

Knowledge-based tools that enable analysis of potential interactions among coalition partners could assist in the formation of teams and help avoid future difficulties. For example, coalition members may have religious beliefs, dietary restrictions, and living standards that differ significantly and that could lead to internal friction. Software that helped to anticipate these difficulties would assist those responsible for forming, structuring and deploying coalitions to avoid potential difficulties.

4.5.2.3 Support for human interaction

Coalition members are likely to bring a variety of languages and different levels of technical sophistication to an operation. Multilingual system interfaces will ultimately be necessary to provide effective technical support. Machine aided translation will help in sharing information.

Policies for releasing information to coalition members will differ based both on individuals' functional roles and national origin. Intelligent systems that manage and protect the flow of information will be necessary for smooth and proper functioning of coalition operations.

4.5.2.4 Shared plans and processes

To ensure the success of integrated operations, all participants must share an understanding of the activities comprising the operation and their temporal, spatial, and functional relations to one another. Tools to manage centralized plans, keep them up to date, facilitate authoring by different planners, and disseminate changes will be essential

to maintaining a common, consistent shared view and to ensuring that participant's responsibilities are understood and met.

4.5.2.5 Assistance in managing coalition operations

Intelligent process management tools that extend current workflow management concepts may greatly aid in ensuring that complex operations are carried out efficiently and correctly. Key advantages that could be provided by such tools include assistance in determining that task preconditions will be met and that resource requirements will be satisfied.

4.5.2.6 Visualisation Tools

Distributed teams find it very difficult to convey complex concepts. Shared visualisations – and shared annotations - are a way in which such concepts can be disseminated. Using whiteboard technologies, visualisations can be shared synchronously, allowing users to add their comments as annotations. In addition, most office product software allows team members to make their own changes in different colours or add the electronic equivalent of "post-it notes."

A team may create a visualisation that encompasses all project information to display to various team members how much of the project information had been accessed (viewed, read) by other members. This would help team members develop pictures of other team member's mental models.

4.5.2.7 Group Decision Support Systems

In addition to collaboration tools, Group Decision Support Systems (GDSS) potentially offer great benefits to distributed teams. Virtual team members are repeatedly called upon to contribute to group decisions. GDSS tools have been designed to facilitate the process of developing a shared understanding of the issues that face the team and then providing tools for acting on decisions made by the team.

Although technology is an enabler, it also may lead to virtual team failures. It is important to remember that people are more critical to a virtual team's success than technology. These barriers must be addressed through training and applying techniques to foster team collaboration.

4.5.2.8 Relevant Studies and Findings

As part of the three-year Corporate Research Programme (CRP) project "Organisational and Sociological Factors of Multinational Forces", conducted on behalf of the Research Acquisition Organisation (RAO) in the Human Sciences Technology Domain, Wheatley (2004)[2], conducted an overview of the aspirations for NEC when applied to multinational operations, with a focus on the human aspects that may lead to enhanced or reduced effectiveness. It identified number of questions about how networked human resources can enable the effects and the tempo required in the future, in a variety of types of military intervention and with a variety of partners. An attempt is made to indicate how further research and analysis might explore some of these gaps.

The aim was to discover and describe what we do not yet know about how to make NEC work well in 'coalitions of the willing', and propose ways in which at least some of these matters might be explored further.

Wheatley concluded:

- The impact of differences in doctrine, cultural perceptions, and 'agendas' in multinational inter-working on fully shared understanding and hence on effects-based operations is not well understood.

- Controlled experimentation in the area of communications is difficult (as evidenced by MNEs) and may not be the most appropriate means of exploring this area.

We still do not understand:

- Communication barriers to, or enablers of, dynamic collaboration across cultural boundaries, and this is seen as being wider than merely language difficulties;

- How understanding is both shared and known to be shared, when this relates to interpretation, decision making and co-ordinated action. Whether a picture on a screen is the same as a 'picture in the head';

- Whether there is a real willingness and ability to share information where trust is in doubt and time is short, and how 'publication' is influenced by what others are already deemed to know.

4.5.3 Future Research

There is no evidence to suggest that the recommendations of the Wheatley report have yet been instigated. Considering that the MNEs are our only real source of data regarding distributed team communications the realisation must be that a more robust and rigorous source of data is necessary in order to work through some of these issues.

Establish what follow-on work has been conducted following recommendations proposed by Wheatley and propose subsequent research and implementations in the communications domain.

Once it has been established exactly where, if any, progress has been made, a plan can be formulated to investigate what is still not understood in the dynamic collaboration communication environment.

Investigations need to clarify key communications problems and be able to begin to re-think and specify in HF terms the key requirements and capabilities newly-designed systems should carry.

Conduct studies addressing problems of communications in carrying out the actions suggested above and by Wheatley; other factors such as trust, language and information dissemination must be examined.

This study research makes it clear that face-to-face communication either co-located or across a VTC system improves dramatically the ability to understand, trust one-another and exchange verbal and non verbal meaning. If it were possible to link via VTC all

members of all teams across a distributed dynamic collaborative environment, how would issues of language, trust etc. affect the planning process with this type of capability? Indeed, is it a sensible proposal to put such a capability in place on a small scale and extrapolate the results to try to gain some idea of the large scale improvements?

It is the authors firm belief that examination of the technology and systems, ensuring that teams are enabled by their technology, not presented with barriers, will vastly reduce the non-technical issues inherent in distributed team working. These inherent problems will never be removed completely, as is the case with co-located teams. Technology is not the 'be all and end all', but if the technology is in place then the problems that remain can be considered to be caused by other factors rather than by the technology and can therefore be tackled from a different perspective.

4.6 Language

Verrall (2003)[11] writes that language is often commented upon with respect to multinational interactions; the single largest barrier to effective coalition communication, co-operation and performance.

Commonality of language is an important command and control consideration, especially in coalition structures. Potential partners in future coalitions will not necessarily speak the same language and the passage of information and orders could become a serious hindrance to success. Recognising this, more and more armies are taking the time to educate their officer corps in different languages. The United Nations and NATO, for example, have generally adopted French and English as the working languages for interoperability. Palin (2005)[12].

Countries will have to continue to ensure that the education of personnel is in place to have the necessary language skills needed to interact with other forces. What is of concern, even for those that have learned the working language, is that communication is more than the passage of words. The phrasing of an order, or a particular statement made can mean different things to different people.

4.6.1 Impact

The problems and hindrances created by the lack of understanding through simple lack of language skills will have an effect on the continuity of command and the effectiveness of the force to achieve the tasking. It may not be as simple as the inability to communicate intent through words, but the inability to understand the context and implication of those words given them by inflexion, dialect and military environment.

As the Multi Force and Observer Force Chief of Staff Sinai stated:

" One of the challenges that I and the staff face is the same challenge that members face throughout this Force – the ability to communicate with people of eleven different nationalities. As I learned quickly … what I say to an American may not always be interpreted the same as if I say it to a Canadian, an Australian, or a Fijian … You can issue orders and edicts, and demand that things happen, but that doesn't get the job done in this multinational environment." Elron et al (1999) [13]

These nuances of language and communications may be easily understood by compatriots, but an ally who is disadvantaged by language could misinterpret the direction and by doing so, not follow the direction as given.

Essentially, without a guaranteed means of translation that accounts for all aspects of communication i.e. dialect, inflexion, facial expression, implied meaning, then there is a significant risk that, without further clarification, the intended meaning has not been understood by all the participants in the exchange.

4.6.2 Description

4.6.2.1 High and Low Context Communication in Language

High Context and Low Context Communication refers to the degree to which speakers rely on factors other than explicit speech to convey their messages. Hall (1971) [14], suggests that communication and understanding varies according to its degree of field dependence, and that it can be classified into two general categories, high-context and low-context. Field dependence refers to the degree to which things outside the communication itself affect the meaning. For example, a request for a child to "shut the door" relies comparatively little on context, while a comment containing meaning other than what is on the surface relies largely on context for its meaning to be received.

LeBaron (2003)[15]. High context refers to societies or groups where people have close connections over a long period of time. Many aspects of cultural behaviour are not made explicit because most members know what to do and what to think from years of interaction with each other. A high-context message of disagreement might be communicated to a spouse or a co-worker by the words chosen or the way they are spoken, even if no disagreement is explicitly voiced.

Low context refers to societies where people tend to have many connections but of shorter duration or for some specific reason. In these societies, cultural behaviour and beliefs may need to be spelled out explicitly so that those coming into the cultural environment know how to behave.

High-context communicators interacting with low-context communicators should be mindful that:

- Nonverbal messages and gestures may be as important as what is said;
- Status and identity may be communicated nonverbally and require appropriate acknowledgement;
- Face-saving and tact may be important, and will need to be balanced with the desire to communicate fully and frankly.

Low-context communicators interacting with high-context communicators should be mindful that:

- Things can be taken at face value rather than as representative of layers of meaning;
- Roles and functions may be decoupled from status and identity;

- Efficiency and effectiveness may be served by a sustained focus on tasks;

- Direct questions and observations are not necessarily meant to offend, but to clarify and advance shared goals.

Cultural fluency is needed, meaning familiarity with culture, the ability to act on that familiarity and therefore adapt communication context to suit the local cultural environment. Cultural fluency means understanding what culture is, how it works, and the ways culture and communication are intertwined with conflicts. This actually requires significant, continuous effort.

Hall's theory is that every human being is confronted by far more sensory stimuli than can possibly be attended to. Cultures help by screening messages, shaping perceptions and interpretations according to a series of selective filters. In high-context settings, the screens are designed to let in implied meanings arising from the physical setting, relational cues, or shared understandings. In low-context settings, the screens direct attention more to the literal meanings of words and less to the context surrounding the words.

Humans engage in both high-context and low-context communication. There are times we "say what we mean, and mean what we say," leaving little to be "read in" to the explicit message. This is low-context communication. At other times, we may infer, imply, insinuate, or deliver with nonverbal cues messages that we want to have conveyed but do not speak. This is high-context communication. Most of the time, we are somewhere nearer the middle of the continuum, relying to some extent on context, but also on the literal meaning of words.

Most people can and do function at both ends of the high-context, low-context spectrum. There are times when direct, clear communication is most appropriate, and times when it is preferable to communicate in layers of meaning to save face, spare feelings, or allow for diffuse interpretations. Most people rely on a whole range of verbal and nonverbal cues to understand the meaning of what is said. Even in the most direct, low-context setting, meanings will be conveyed that are not explicitly spoken.

As people communicate, they move along a continuum between high context and low context. Depending on the kind of relationship, the situation, and the purpose of communication, they may be more or less explicit and direct. In close relationships, communication "short-hand" is often used, which makes communication opaque to outsiders but perfectly clear to the parties. With strangers, the same people may choose low-context communication.

Low- and high-context communication refers not only to individual communication strategies, but may be used to understand cultural groups. Generally, Western cultures tend to gravitate toward low-context starting points, while Eastern and Southern cultures tend to use high-context communication. Within these huge categories, there are important differences and many variations. Where high-context communication tends to be featured, it is useful to pay specific attention to nonverbal cues and the behaviour of others who may know more of the unstated rules governing the communication. Where low-context communication is the norm, directness is likely to be expected in return.

It is less important to classify any communication as high or low context than it is to understand whether nonverbal or verbal cues are the most prominent. Without this understanding, those who tend to use high-context starting points may be looking for

shades of meaning that are not present, and those who prefer low-context communication may miss important nuances of meaning.

As communicators factor awareness of high-context and low-context communication into their relations, conflict may be lessened and even prevented.

4.6.2.2 Dynamic Text and Voice Translation Tools

These tools are technology based systems that enable communication across the language divide. A good example would be the system characterised by Steven Hawkin where text is translated into voice with the additional capability of language translation.

Research analysis thus far suggests that these technologies are not yet mature enough to cope with the intricacies of inter-cultural working.

Text translation tools do not include the context, attitude of the speaker and nuances of language. For instance, in the English language, there are many ways to say, essentially, the same thing. However, despite the general meaning of the words being the same, different words convey subtle differences in context and effect. If the requirement is for a straightforward word-for-word translation of text then the tools are well capable and useful.

Voice to text translation tools, again, are less than mature. A good example of this type of technology is the BT SMS dictation service that uses the actor Tom Baker's voice to read SMS text messages sent to BT landline numbers. The translation tools read the messages verbatim, therefore meaning, nuance, subtlety and emphasis are lost resulting in the possibility that the meaning of the message can be misinterpreted and/or misunderstood.

Information regarding dynamic voice and language translation tools, along the lines of the "Universal Translator" made famous in the Star Trek series, is very limited. This lack of information and the general development readiness of these tools imply that there is still much work required to bring them up to the levels required by the multicultural, coalition operational environment.

Dynamic voice-to-voice translation

The University of Southern California has created a rudimentary but functional two-way voice translation system that allows an English-speaking doctor to talk to a Persian (Farsi)-speaking patient. "Two-way voice translation involves combining at least three highly imperfect existing disciplines, with the errors multiplying at every stage," Narayanan[6] explained. These include:

- Text translation. (Taking a written text in one language and translating it into another): Machine translation systems developed by researchers Kevin Knight and Daniel Marcus at the Viterbi School's Information Sciences Institute consistently rank among the world's best - but still make frequent grammatical and other errors;

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6 Shrikanth Narayan leads a large, multidisciplinary team that is developing the Transonics Spoken Dialog Translator. //sail.usc.edu/resources/news/originals /Spoken_English.pdf

- Spoken word recognition: Being able to reliably recognise a large number of different single words, in a variety of regional or foreign accents, is a difficult problem that is far from solved;

- Extra-verbal communication: Humans speak not just with words, but also with intonations. A rising tone at the end of a sentence to express a question is one familiar example, one that is extraordinarily difficult for a machine to assess. Additionally, teaching computers to detect human emotions in speech is a major challenge.

Much of the success of the interface grows directly out of an analysis of a large database of some 300 English-speaking-doctor/Persian-speaking-patient dialogs created by USC medical students, Iranian-heritage USC students and Los Angeles residents. The system itself contains about 23,000 English and 9,000 Persian words.

4.6.3 Relevant Studies and findings

Crucially, language is a function of communication, which, in-turn is a key factor in leadership and command within multinational, multicultural forces. Thus, the effect of language and its impact on the achievement of tasking is reported as a subordinate issue to the overarching problems related to command leadership.

Cremin et al (2004)[4], documented in eloquent detail the issues associated with language and command leadership in multinational forces and the techniques associated with ensuring that the command intent is carried forward through language supported by other means of effective communications such as the use of radio or e-mail. This report in particular uses evidence from many interviews conducted with senior officers from the British forces each experienced in the field of leadership in multinational operations across many differing campaigns.

Wheatley (2004)[2] describes further issues with language in the NEC arena. Shared intent and an understanding of adversaries' intent are crucial for co-ordinated action and for avoiding disasters arising from communication failures; ‘Blue on Blue’ or ‘Friendly fire’ would be just one example.

A recent visit to MNE 4 by the author revealed that across this multinational exercise where participants had long experience of cooperative operations, language is still a complicating factor in the sharing of information and the distribution of intent. One of the participants (a French Canadian) had such little grasp of English, and with the additional complications of the voice communications network, that almost by default he requested that all communications in which he participated should be conducted through text chat. This would allow him the time to be able to read and more carefully consider the information he was receiving. This person’s lack of confidence in his own ‘on the fly’ translation ability reduced the tempo of the tasks and elements he took part in considerably.

Stewart (2004)[7] concluded that language ability and the development of shared understanding based on effective communication are major hurdles in multinational forces. The UK, for example, requires more officers with second language ability and more availability of translators. It may be dangerous to rely upon the current pre-eminence of the English language in multinational forces; for example, this may be challenged in future European cooperation. In addition, personnel with English as their

first language can benefit from advice on how better to speak English to non-native English speakers. It is interesting that this point, is being addressed by an independent US initiative to deliver training to NATO personnel in former Yugoslavia, Zyblut (2003)[16].

4.6.4 Future Research

The improvement in the translation of dialogue from one language to another is the key theme arising from this section. However, as a theme that the author suspects will continue to run through this report, language itself cannot and should not be isolated as a problem or casual factor. Language and culture, language and leadership even language and communications tools pose issues that merit consideration.

Therefore, where the language of choice is English, we might say that we abrogate responsibility to our non-English speaking allies to improve their language skills. Not only is this arrogant and conveniently selfish, we leave ourselves at a disadvantage on other occasions where a multilingual capability would serve our personnel well.

Investigate the language capabilities of personnel in the three services and conduct a gap analysis to inform potential proposals for language competency for personnel within a suitable timeframe.

The literature and anecdotal evidence suggests that our forces must become more 'language capable' which is far easier to suggest than to accomplish. This has implications within the lines of development, particularly in training, doctrine and personnel.

Where language forms only a part of the overall issue as suggested above, an action of this report should be to keep a `listening watch' on studies and investigations in the HF, non-technical domains where language is a contributory factor.

Through the use of software and technology improvements, the ability for machines to translate text should not be ignored. Translated text supported with relevant diagrams and maps will still provide an effective briefing medium for participants who have no English language skills at all, particularly if clarification questions can be asked and answered through the same medium.

Investigate the progress being made in the area of language translation. This investigation should report on the technology and also be able to suggest likely avenues of functional improvement and how such tools could be integrated into current multinational coalition operations where needed.

Without a perfect universal translator that will transfer all nuance and implied meaning as well as explicit language, we will have to rely on the multi-lingual approach backed up with extravagant hand-signals, shouting and the desire to be telepathic (apparently language agnostic!). As if to reinforce the point, the suspicion is that we will still be left with the following:

An Englishman who thinks he knows French, walks into a French pharmacy to ask for a bandage but to his dismay, gets an argument (bandage, badinage).

4.7 Trust

Panteli (2003)[17] identifies trust as a state of a positive, confident (though subjective) expectation regarding the behaviour of somebody or something in a situation which entails risk to the trusting party. It is a dynamic and emergent social relationship that develops as participants interact with each other over time and depending on the situation.

Within the scope of this study 'Trust' has a number of different cross cultural and virtual team-working implications. Within a coalition environment trust is critical to ensuring that all coalition members can be fused into one homogenous fighting force, united by a common goal and approach to leadership. Participants who have not necessarily ever met, must trust in one another's ability and knowledge, if the tempo of operations and the speed of planning are to be maintained.

The challenge of building up trust within a distributed collaborative environment is difficult, but particularly within a multinational environment. Each nation will bring its own culture; there will be differences in terms of religion, class and gender customs, cultural tolerance, work ethics, standards of living and national traditions. These must be considered closely, not only in terms of the organisational structures employed but also in the way in which relationships will be built and trusting relationships formed, Niteworks[5].

4.7.1 Impact of Trust

The impact of trust has both beneficial and adverse effects on the ways teams interact in a multinational environment. Key impact areas where trust is a major contributor to the success of a team are detailed below:

Command Trust - When working in a distributed environment the role of the commander is critical to the motivation and build up of trust within the coalition. During MNE 3 the commander was always notable by his absence or silence. This meant that the participants felt that they were operating within a "command vacuum" and detracted significantly from their trust of the commander and his guidance.

Trust and Understanding - There is a need to 'level the playing field' between the various teams by wherever possible ensuring that the different constituent parts of the coalition are operating within similar limitations. The level of authority possessed by each team varied greatly. The main limitation identified was that German elements contained less experienced officers who were not equipped with the authority to interact with the team unless given specific permission by a senior officer. Therefore, the German participants were unable to respond quickly to initiations, which led to both distrust and an associated lack of utilisation.

Trust and Experimentation - Through the course of the experiment the participants expressed concern that the experimental construct itself detracted from the build up of trust. Some participants identified that within an operational environment the concept of a presupposed level of trust i.e. swift trust, would be easier to establish. They felt that the experimental construct, encouraged them to question everything about the process, organisation and technology thereby preventing trust.

Personal Trust - The lack of experience and training for all participants concerned with MNE 3 had a large effect on the levels of trust displayed within the experiment. Participants expressed concern that some were feeling daunted by the novel process and therefore were not very well equipped to get fully involved with the process. The effect of this was a reduced level of responses and in turn a reduced level of trust towards those members. This clearly reiterates the importance of training and practice in the new process prior to the establishment of real world operations.

Technology Trust – The initial unfamiliarity of participants with the tools and applications provided for the MNE was a factor of training. As competency grew, it quickly became clear that levels of trust in the capability of the tools was diminished either due to obvious gaps in functionality or as a lack of understanding of how the equipment was designed to work. In characteristically true fashion, participants devised their own 'workarounds' to problems and issues that not only solved a technical problem but had the secondary effect of improving trust through more effective collaborative working.

External to the experimental environment and within a real coalition based operation, trust is generally affected by the same factors because trust itself is inherently personal in characteristic. Some people are more trusting than others, some cultures are more trusting than others; mistrust is borne out of fear and unfamiliarity.

Stewart et al (2001)[18], describe how trust and confidence, which go hand in hand, are greatly affected by perception of capability, information and information sharing and security. Perception of capability is affected by other factors of multinational operations such as language. It is possible that distribution of tasks is considered to be unfair or biased for one reason or another and therefore issues of trust arise over capability and suspicion of ulterior motives. Trust through sharing of resource i.e. intelligence and information is affected by the perception that this exchange may be one way only or that the quality of information being received against that being released is markedly different. Previous studies have identified this area as having the most impact on C2 in multinational forces.

4.7.2 Harmony, Culture and Mutual Understanding = Trust

Command by its very nature requires trusting relationships to be built between the key participants such that the delegation of command can take place.

4.7.2.1 Swift Trust

It has been argued that in industry, when distributed cross functional temporary groups are rapidly formed and implemented, an alternative form of trust exists. This form of trust is known as "Swift trust" Meyerson (1999)[19] and was applicable and observable within MNE 3. Therefore at the outset of the establishment of teams, trust may actually be at its highest point, subsequently this level of trust will be reinforced or undermined by the individual's actions and ability to communicate effectively.

During MNE 3 boards, centres, cells and working groups were formed which utilised personnel from a range of military and civilian sources. These participants were distributed throughout the world, many of whom had not and probably never will meet, yet were joined together in teams for short periods of time to solve specific problems.

This relates directly to circumstances under which swift trust has been observed outside of the military environment.

The pressing time frames of MNE 3 implied that the group needed to move quickly to accomplish goals and act as though trust is already in place rather than waiting to see who can be trusted and who cannot. This process of "importing" trust could clearly be observed in all groups within MNE 3. The participants were willing to accept that their foreign counterparts were competent and therefore trustworthy (out of professional courtesy). This was clearly indicated through the course of MNE 3 in terms of the decentralisation of decision-making that could take place and the division of work between different members of different teams. Therefore, during MNE 3 through the initial "swift trust" all participants were considered trustworthy. However, because Swift Trust is a transitory concept that is gradually replaced by actual trust in another's capability, through the course of the experiment, differences were observed in the levels of trust displayed.

Tucker and Panteli (2003)[17] found support for the need for face-to-face interaction and this observation is supported by evidence of build up of trust within teams taking part in MNE 3 and brief observations at MNE 4. However, the opportunities to meet face-to-face depend either on geographic location or on technology such as the use of VTC. Teams that were able to undertake regular communications through live systems such as VTC or via voice-net facilities such as those provided by IWS during MNE 4, were better able to synchronise their efforts and work well together. This was facilitated by the inclusion of operating procedures and 'business rules' that governed the general use of these systems and eased the burden of inadequate technology and the lack of familiarity and training.

4.7.3 Relevant Studies and findings

While trust has been identified as a key feature for the success of virtual interactions, empirical research in this area has remained limited. Jarvenpaa and Leidner (1999)[20] have conducted one of the most detailed research projects into studies on trust and virtual teams thus far. Their eight-week study of seventy-five teams of university students each consisting of four to six members, highlighted significant differences in the behaviours between high and low trust teams and supported the existence of trust. This type of trust presumes that roles are clear and that each member has a good understanding of others' roles and responsibilities. Trust might be imported, but is more likely created via a communication behaviour established in the first few keystrokes:

- Communication that rallies around the project and tasks appears to be necessary to maintain trust;

- Social communication that complements rather than substitutes for task communication may strengthen trust;

- Responding behaviours (a response is an endorsement that another person is willing to take the risk of interpreting the first person's message and if necessary, supplying the missing elements to make it understandable) are as critical as initiating behaviours (initiatives e.g., volunteering to complete tasks, appear to strengthen and unify the team) and members have to explicitly verbalize their commitment, excitement, and optimism.

Tucker and Panteli (2003)[17] pursued a study of eighteen global virtual teams within a global IT organisation. The study involved interviews with individuals who are employed at the specific organisation and who were part of culturally diverse, geographically dispersed and technology-enabled global virtual teams. Furthermore, the interviewees had worked within a global virtual team for more than 2 months - thus allowing some exploration of the changes within the team over time.

The table below details the common features and behaviours observed within the global virtual teams studied in Tucker and Panteli. The teams were categorised as High-Trust teams and Low-Trust teams and are distinguished in terms of the degree of shared goals that they experienced, as well as issues of power and communication.

Table 1 - Factors related to trust in Global Virtual Teams

High-Trust Global Virtual Teams	**Low-Trust Global Virtual Teams**
Factors related to Shared Goals:	**Factors related to Shared Goals:**
Awareness of shared goals	Lack of awareness of shared goals
Time given to build shared goals	Lack of shared goals
Early and open debate of goals	Opinions of others not considered
Primacy of team-based goals	Primacy of Individual goals
Factors related to Power:	**Factors related to Power:**
Availability of facilitators	Power battles
Facilitators' focus on win-win	Coercion
Recognition of knowledge as power	Misunderstandings and conflicts of interest
Recognition that power can shift between team members and across the distributed environment	Use of hierarchical power
Power differentials minimised	Perception of 'I have power'
Communication:	**Communication:**
Face-to-Face where possible	Asynchronous CMC (Computer-Mediated Communication)
Regular synchronous CMC	Adverse effects of time difference
Social interaction	Little or no social interest

Shared goals were evident in all of the 'high-trust' teams and, not surprisingly, these teams were also considered to be working well. Conversely in all of the scenarios where trust was described as low, shared goals were lacking. In the situations where team members were of the opinion that trust had been broken, the level of emotion was high.

Tucker and Panteli's (2003)[17] research served to identify and illustrate the significance of shared goals and power in influencing the development of trust. In particular, it was found that a focus on jointly agreed goals can help to provide limits or boundaries within which trust can be nurtured. However, the study has also clearly indicated that the construction of shared goals is not often a one-off activity and frequently requires the involvement of all parties involved. Though this could be a time-consuming, iterative and difficult process, this research concludes that it is far better to invest in building trust as early in the project as possible in preference to handling the destructive vicious circle generated by teams with conflicting goals and poor levels of trust.

4.7.3.1 Trust and MNE

The subject of trust features highly as a sub-factor of many other key issues within the scope of multi-national coalition operations. Collaborative working, language and leadership are key areas where trust plays a major part in the success of a team either distributed or co-located.

Many studies looking at these various areas across military and civilian or commercial environments include sections that explain the effects of trust on inter- and intra-team working. In particular the multinational experiments are cited as ideal opportunities to examine the effect and impact of trust in a distributed collaborative environment albeit with a highly contrived and driven scenario.

Investigation and experimentation carried out into trust by the Niteworks programme [5] attempted to understand its effect on participants ability to carry out their designated tasks. Niteworks present much the same themes regarding distributed virtual teams as many other research organisations. The need to build up trust, the ways in which this trust can be improved, degraded and lost altogether and the effect of technology all have detrimental and positive effects on leadership.

Niteworks used questionnaires, observation and interviews to gather data. Information gained from observation and questionnaires was used to provide structure to the follow-up series of interviews which were then required to expand and justify earlier responses.

It was clear that the ability to trust permeated all aspects of tasks carried out by the teams as contributors to the overarching aim of achieving Commanders Intent or the military objective, whichever was the more accurately disseminated. When interacting in a novel environment it is difficult to directly attribute causation for trust issues and for identifying why or why not participants performed their designated tasks. MNE 3 demonstrated a novel organisation with a novel process and a novel technology. A misunderstanding of any of the above will lead to a distrust and may also lead to confusion as to who is responsible for producing what in what way, Niteworks [5].

The Niteworks investigation was subject to the following limitations which also illustrate the dangers of considering MNEs as robust and rigorous experimental environments:

- Communications systems and their capability is directly related to trust in equipment, leadership and inter-team working.

- The participants observed and interviewed as part of this investigation were unfamiliar and inexperienced in terms of the MNE environment, the EBP process and the supporting communications media, somewhat confounding the purpose of the investigation.

- The EBP process was not operationally represented through the operating procedures established for the experiment, therefore confounding the notion that these results might be transferable to the real world.

4.7.4 Future Research

Trust is not considered as an independent element in this study. It cannot be isolated from cause or effect from any of the other key element discussed here. Trust can be

investigated, examined and measured as is evidenced in this section, but, it is defined by the impact of other factors such as language and leadership amongst all the others.

There may be opportunities to further examine trust as part of study work into other areas, however, given current understanding of the impact and effect that trust has on individuals or groups in coalition based distributed environments, it is clear that there is little benefit to be gained from further investigating trust in an isolated manner.

4.8 Culture

4.8.1 Definition:

The Columbia University Press Encyclopaedia[7] defines culture as the integrated system of socially acquired values, beliefs, and rules of conduct which delimit the range of accepted behaviours in any given society. Cultural differences distinguish societies from one another.

Culture is based on the uniquely human capacity to classify experiences, encode such classifications symbolically, and teach such abstractions to others. It is usually acquired through "enculturation", the process through which an older generation induces and compels a younger generation to reproduce the established lifestyle; consequently, culture is embedded in a person's way of life. Culture is difficult to quantify, because it frequently exists at an unconscious level, or at least tends to be so pervasive that it escapes everyday thought. This is one reason that anthropologists tend to be sceptical of theorists who attempt to study their own culture. Anthropologists employ fieldwork and comparative, or cross-cultural, methods to study various cultures.

4.8.1.1 Classification of cultural differences

Stewart et al (2001)[21] Culture relates to the way in which definable groups of people interact with their social and physical environment. Culture, whether relating to nations or organisations, is learned through experience. A range of factors relating to differences between national cultures can be identified. Perhaps the best known study into differences between national cultures was conducted by Hofstede in the 1970s (Hofstede, 1980).

On the basis of an examination of survey responses given by 117,000 IBM employees in 40 countries, Hofstede derived a cross-cultural classification scheme of work-related values based on four dimensions. These were:

1. 'Power distance', which relates to the amount of respect and deference between those in superior and subordinate positions;

2. 'Uncertainty avoidance', which relates to planning and the creation of stability as a means for dealing with uncertainty;

7 http://www.answers.com/topic/culture

3. ‘Individualism – Collectivism’ which relates to whether one’s identity is defined by personal goals and achievements or by the character of the collective groups to which one belongs; and

4. ‘Masculinity – Femininity’ a dimension which, Hofstede argued refers to the relative emphasis on achievement or on interpersonal harmony.

This classification scheme has provided a useful starting point for researchers for examining and categorising the apparent broad differences between national cultures. It is essential to stress that the implications of Hofstede’s work are not that there are good and bad cultures. Rather, this work can be used as a starting point to recognise that there are differences, to suggest how those differences might manifest themselves in an organisational setting, and to attempt to apply this knowledge in an attempt to optimise cross-cultural performance.

Elron, Shamir, and Ben-Ari (1999) have demonstrated that by drawing on the Hofstede classification, it is possible to point to cultural differences between the nations forces in a number of recent multinational operations. They further speculate that the dimensions proposed by Hofstede are particularly relevant to the operation of military forces ‘…..in hierarchical organisations such as armies, power distance (the respect and deference given by subordinates to superiors) may influence many aspects of relationships’….such as….’the interpretations of superiors’ commands and the legitimacy of challenging them’.

4.8.2 Impact

Many papers were identified where culture majored as the key reason for analysis or was treated as one of many parts of an overall research question. There is an abundance of analysis on the role culture plays in today’s coalition based forces, their success or otherwise. Most, if not all analyses suggest ways to educate and prepare personnel in the skills that will be required in the multi-cultural environments.

Some suggestions refer to tools designed to facilitate achievement of the unity of command. More fundamentally for our own force, the adoption of change at the grass-roots i.e. through the lines of development defines a core national need that addresses these cultural issues.

4.8.3 Relevant Studies and findings

Niteworks attempted to answer the following ‘Culture’ based questions at MNE 3 [5] – *What are the critical cultural obstacles, particularly within and between coalition partners, which cause different understandings of the nature of command relationships?*

The issues arising from using the multinational experiments as valid, robust and rigorous sources of data have been both described and alluded to throughout this document. Similarly, therefore, investigations into cultural aspects of coalition operations produced results that were fraught with confounding factors.

The investigation into cultural obstacles found that UK personnel felt that they were not aligned with other nations ways of working, especially the US. Despite the culture of alliance and co-working built up over many years between the UK and US, it was felt impractical and un-diplomatic to suggest that other nations should change to suit the UK.

A more practical approach is to achieve common understanding and empathy. Although cultural diversity can slow the process, it can also produce a richer debate and more robust answer, particularly if the coalition has taken care to finesse its members' difficulties and obtain agreement on a difficult issue.

Training UK staff on the differences between nations' style and methods of working should improve understanding and empathy. Where possible, work experience in coalition nations would provide a richer understanding. In addition video conferencing facilities to improve the face-to-face interaction, with improved levels of communication and therefore trust, may be of benefit. Further work is recommended to ensure the coalition partners develop the EBP concept as a multinational team, rather than one individual nation Lead.

Niteworks made the following recommendations;

- Cultural obstacles to effective coalition operations require further assessment, but this assessment should include the points of view of every other Nation to ensure the most diplomatic and practical solutions are found;

- JFHQ might consider increasing staff awareness of, and empathy with different ways of working. To facilitate this, consider enabling UK staff to undertake work experience with other likely coalition partners;

- JFHQ might consider the addition of video conferencing facilities to IWS;

- JDCC should lead for the UK in the development of a common lexicon of EBP terminology (particularly "Command-led process"), processes and organisational structure.

The recommendations made by Niteworks indicate clearly that our international differences borne out of geography, language, climate and privilege (all the individual characteristics that define culture) are hopelessly embedded into every aspect of international team-working despite how familiar or friendly these nations may be. This suggests that looking at culture and excluding all other factors such as leadership or communication will lead to a non-conclusion or perhaps only a further clarification to the definition of culture.

QinetiQ have carried out a great deal of work into factors affecting multinational forces. Culture has featured richly in selected reports which cover Organisational and Sociological Factors, Cremin et al (2004)[4] & Stewart et al (2004)[17] and Rehearsals for the Multicultural Theatre, Purdy et al (2004)[22], which aimed to identify the nature of cultural differences that could influence close team working with other nations personnel in multinational operations and to provide guidance on training strategies.

The focus of the work was originally on rapid pre-deployment training. However, as the work progressed, the study identified the need for different types of multicultural training and drew a distinction between educational awareness throughout individuals' careers and specific pre-deployment training with respect to the local infrastructure and populace in the operational theatre. The expectation was that by providing cultural education throughout career lifecycles, that UK Armed Forces personnel will come to any multinational setting more prepared, more alert to potential problems and more competent to achieve effective team working with partners in a reduced time-frame. Pre-

deployment training can then be provided as required dependent on the country, situation and nations involved.

4.8.4 Future Research

The key elements of culture need no further investigation with respect to the scope of this document. However, the issue of training, its impact on personnel and the acceptance of different cultures particularly where a future deployment is likely is highly applicable.

Conduct a study designed to facilitate achievement of the unity of command or more fundamentally to our own force, the adoption of change at the grass-roots level. Through the lines of development define a core doctrinal change that addresses these cultural issues.

Potential areas for investigation include:

1. Tools;

2. Multinational Commander education about different nations and cultures;

3. Provision of guidance to Multinational Commanders;

4. Career management for British officers to ensure exploitation of training and exchange postings;

5. Promotion of attitudes and behaviours to underpin effective multinational working by military organisations;

6. Development of a “community of practice” database the purpose of which would be to provide an up to date source of information, advice and experience to personnel preparing to deploy into a coalition/multinational based environment.

Using the very high levels of experience of successful coalition operations involving just such diverse cultural coalitions, create the requirements that will update and enable an improved military capability through improved and revised doctrine underpinned by a programme of training that entrenches these skills early in a soldiers career, not just before deployment but at initial officer training or very soon thereafter.

5 Conclusions

5.1 The Multicultural Theatre

The UK armed forces are to a greater extent responding to the requirement to deploy troops in support of coalition operations. These operations not only include the established hotspots in Afghanistan and Iraq, but also many other, non news-worthy flashpoints around the world.

There is, therefore a need for the UK forces to be able to integrate themselves into a new or current operational environment as quickly as possible; integrating not only equipment but also achieving the cross-cultural and international boundaries inherent in these circumstances. The ability to be operationally effective as a force in such environments relies on flexibility, training and adaptive leadership:

- Flexibility: On a non-technical level, the ability to adapt and overcome problems and barriers is a key part of the success of such operations;

- Training: With training comes familiarity and confidence. The ability to assess a situation and to be able to rely on experiences either personal or anecdotal and then to be capable of adapting styles of leadership, communication and psychological approaches in order to achieve the goal will engender trust and respect;

- Leadership: If force contingents at the operational and tactical level are operating very closely together the command function will need to adapt to the cultural and national differences of the contingent commanders. The requirement will be to ensure common intent, an overarching, achievable goal and respect for international and cultural attitudes towards the force and the goal.

5.2 Military Experience

Understanding the key factors affecting leadership in multicultural coalition operations required that experienced personnel and those who recently worked in these environments were questioned about their experiences, views and opinions. The results based the analysis on the experiences of approximately 200 military officers with experience of the multinational, multicultural environment from Afghanistan, Iraq and many other deployments such as peace-keeping operations elsewhere in the world Stewart et al (2001)[21].

In general, several aspects were evident across the board as issues that required particular focus:

- Quantity and quality of training for deployment or multinational postings was varied and inconsistent;

- Training focussed mainly on the relevant conflict and/or location of deployment.

The training and preparation centred on the location and environment to be experienced; there was no awareness training that informed the ability to meet the challenges of

command and leadership in these areas particularly if the host or other coalition forces are involved or under command.

The surveys conducted support these findings. It was found that in the absence of formal techniques and preparation, personnel reverted to type and training, falling back on traditional, tried and tested techniques or on informal advice and techniques passed on by previous incumbents.

Initial conclusions drawn suggest that:

- The previous experience of personnel had a positive effect in that they felt better prepared for deployment. This was independent of the deployment location and of the location where the experience had been gained. Positive previous experience always builds confidence especially if an individuals characteristics and traits include adaptability and initiative as is usually the case with leadership qualities.

- Training should cover a number of areas including leadership within the context of the cultural taxonomy.

5.2.1 Post Operations Report & Post Exercise Reports (PORs and PXRs)

The sources of information researched for this report were vast and disparate. Unfortunately, due to time constraints it was not possible to investigate a valuable source of real operational experience as is detailed in PORs and PXRs.

Conduct further study into the area of multicultural coalition based operations and create a further issue of this report having embodied the findings of analysis into relevant Post Operation and Post Exercise Reports generated by experienced personnel in theatre.

5.3 Non-technical elements must drive the technical needs

Through this study it is plainly obvious that, in the world of collaborative team working, force interoperability, coalition operations and distributed planning HF issues such as language, culture, communication and trust are finely entwined in a causal network of push and pull factors that can be difficult to unravel if any of these elements becomes an operational barrier.

For example, participants lack trust because they cannot see one another. They cannot see one another because they are separated geographically although they can converse real-time through voice-net and text chat capabilities. Their distrust is borne out of lack of history “I don’t know this guy, never met him before”. Also, is the information being passed of sufficient quality “I’ve never received information from this source before, what is it’s QI (Quality Index)?”. The level of mistrust is inherent and human. Swift trust implies at least some knowledge of the other participants background culture and working practices amongst many other factors. Where is the trust when the person you are working with is new to the system, from a country where culture, language and way of life are completely different and unknown?

The overriding conclusion seems to be that if you can communicate effectively then these issues are lessened. If you can communicate ideally then currently we do not really understand to what extent the underlying issues remain. What we do know is that a

utopian view of interoperability in terms of HF vastly eases the inherent problems associated with inter-group working and distributed collaboration. The question that needs answering is what is considered to be the Utopian system and view?

5.4 Requirements

In order to fully scope a problem area and to subsequently track changes and modifications to the supporting designs and specifications it is necessary to document systems in terms of their requirements.

Create a HF Interoperability Requirements Specification that supports military capability improvements in this domain across all the relevant lines of development.

This will serve to collect all future concepts and capability improvements in a single manageable location. Under configuration management capable of continual update, amendment and improvement; the aim will be to maintain an HFI DTC Requirements Definition for future Military Capability in non-technical military applications.

6 Recommendations

6.1 Follow-up

Due to the vast amount of source material available on the elements affecting multinational, multicultural coalition based operations, this report would benefit from a follow-up issue incorporating findings and conclusions from sources that could not be researched due to time constraints:

- NATO Groups – NATO HF Medicine Panel (HFM) – RTG/120, RTG/138;
- Further document sources – Permanent Joint Headquarters (PJHQ), JFHQ, Defence Leadership Centre (DLC), Defence Academy (Shrivenham);
- PXR and POR information held at Dstl Farnborough and at some of sources listed above;
- Incorporation of Non-Governmental Organisations (NGO) and Non-Military Organisations (NMO) into the multicultural equation (although addition of these entities widens the scope of this report considerably).

6.2 Actions

Opportunities for multinational experimentation are rare and do not explore the full range of alliances and unexpected coalitions likely to be found in real life. In any case, controlled experimentation on this scale is nigh impossible and may not be the most appropriate means of exploring this area.

It would be more prudent to find good ways to share lessons already learnt and wisdom gained as organisational structures and processes are developed alongside, or even ahead of, the technology providing linkage to the networks of people.

This recommendations section will act more as a summary action of findings and actions generated in each key element in Section 4.

A summary table details each action and identifies the section where it was generated:

Table 2 – Action Summary Table

No #	Action	Section No.
1.	Carry out a design and requirements specification exercise into a properly defined EBP collaborative planning system involving virtual and displaced interworking teams.	**4.2**

No #	Action	Section No.
2.	Carry out an investigation into the means to ensure that the full meaning of Commander's Intent is disseminated to and understood by Subordinate Commanders. This might include recommendations such as format definition and/or template specification and investigation of different potential types and methods of articulating command intent.	**4.2**
3.	Investigate the outcome of Cremin's report [4] and identify the progress made against the recommendations.	**4.3**
4.	Investigate current training policy with respect to multinational coalition operations and the training provided pre-deployment. Additionally, an investigation is needed into the type, quantity and quality of information available to individuals prior to deployment.	**4.3**
5.	Generate a set of requirements that describe the changes and additions to military culture itself in order to fully implement the doctrinal inclusion of all aspects of multinational, coalition operations into general military life.	**4.3**
6.	Conduct a study into collaborative distributed team-working tools such that a requirements definition is produced that can form the basis of a proposed future collaborative distributed teamwork system. The study should carry out detailed consultation with military personnel who will be able to properly advise on the issues and requirements of systems that must be provided in order that the EBP process can be conducted effectively and successfully.	**4.4**
7.	Devise an experiment or trial through which it is proposed real quality data can be gathered that answers questions relevant to HF interoperability issues in coalition based operations and across virtual teams. In addition, this could be supported through other sources of data such as real life experiences from serving personnel.	**4.4**
8.	Establish what follow-on work has been conducted following recommendations proposed by Wheatley and propose subsequent research and implementations in the communications domain.	**4.5**

No #	Action	Section No.
9.	Conduct studies addressing problems of communications in carrying out the actions suggested above and by Wheatley; other factors such as trust, language and information dissemination must be examined. This study research makes it clear that face-to-face communication either co-located or across a VTC system improves dramatically the ability to understand, trust one-another and exchange verbal and non verbal meaning. If it were possible to link via VTC all members of all teams across a distributed dynamic collaborative environment, how would issues of language, trust etc. affect the planning process with this type of capability? Indeed, is it a sensible proposal to put such a capability in place on a small scale and extrapolate the results to try to gain some idea of the large scale improvements?	**4.5**
10.	Investigate the language capabilities of personnel in the three services and conduct a gap analysis to inform potential proposals for language competency for personnel within a suitable timeframe.	**4.6**
11.	Investigate the progress being made in the area of language translation. This investigation should report on the technology and also be able to suggest likely avenues of functional improvement and how such tools could be integrated into current multinational coalition operations where needed.	**4.6**
12.	Conduct a study designed to facilitate achievement of the unity of command or more fundamentally to our own force, the adoption of change at the grass-roots level. Through the lines of development define a core doctrinal change that addresses these cultural issues. Potential areas for investigation include: 1. Tools; 2. Multinational Commander education about different nations and cultures; 3. Provision of guidance to Multinational Commanders; 4. Career management for British officers to ensure exploitation of training and exchange postings; 5. Promotion of attitudes and behaviours to underpin effective multinational working by military organisations 6. Development of a “community of practice” database the purpose of which would be to provide an up to date source of information, advice and experience to personnel preparing to deploy into a coalition/multinational based environment.	**4.8**

No #	Action	Section No.
13.	Using the very high levels of experience of successful coalition operations involving just such diverse cultural coalitions, create the requirements that will update and enable an improved military capability through improved and revised doctrine underpinned by a programme of training that entrenches these skills early in a soldiers career, not just before deployment but at initial officer training or very soon thereafter.	**4.8**
14.	Conduct further study into the area of multicultural coalition based operations and create a further issue of this report having embodied the findings of analysis into relevant Post Operation and Post Exercise Reports generated by experienced personnel in theatre.	**5**
15.	Create a HF Interoperability Requirements Specification that supports military capability improvements in this domain across all the relevant lines of development. This will serve to collect all future concepts and capability improvements in a single manageable location. Under configuration management capable of continual update, amendment and improvement; the aim will be to maintain an HFI DTC Requirements Definition for future Military Capability in non-technical military applications.	**5**

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7.1.4 Acronyms & Abbreviations

ACE	Allied Command Europe
ADatP3	Allied Data Publication 3
ARM	ATCCIS Replication Mechanism
ARRC	ACE Rapid Reaction Corps
ATCCIS	Army Tactical Command and Control Information System
BISA	BOWMAN Information System Application
C2	Command & Control

C2IEDM	C2 Information Exchange Data Model
C2IS	Command & Control Information System
C4I	Command, Control, Communications, Computers and Intelligence
CCHQ	Component Command Headquarters
CJTF	Coalition Joint Task Force
CMC	Computer Mediated Communications
COA	Common Operational Analysis
ComBAT	Common Battlefield Toolset
COInS	Common Operational Information Subsystem
CONOPS	Concept of Operations
CRP	Corporate Research Programme
CTF	Commander Task Force
DIME	Diplomatic, Information, Military, and Economic
DLC	Defence Leadership Centre
Dstl	Defence Science & Technology Laboratory
DTC	Defence Technology centre
EBO	Effects Based Operations
EBP	Effects Based Planning
EU	European Union
GDSS	Group Decision Support Systems
GPS	Global Positioning System
HF	Human Factors
HFM	Human Factors Medicine Panel
HQ	Headquarters
HFI	Human Factors Integration
ID	Identification
IP	Internet Protocol
IT	Information Technology
IWS	Information Workspace
JDCC	Joint Defence Command Centre
JDCC	Joint Doctrine & Concepts Centre
JFCOM	Joint Force Command
JFHQ	Joint Forces Headquarters
JOCS	Joint Operational Command System
JOP	Joint Operational Picture
LO	Liaison Officer
MC	Military Capability
MCI	Multilateral Command Intent
MIP	Multilateral Interoperability Programme
MNE	Multinational Experiment
MN-LOE	Multinational Limited Objective Experiment
MoD	Ministry of Defence
MOOTW	Military Operations Other Than War
MS	Microsoft
NATO	North Atlantic Treaty Organisation
NEC	Network Enabled Connectivity

NGO	Non-Government Organisation
NMO	Non-Military Organisation
NRF	NATO Response Force
NT	New Technology
OA	Operational Analysis
ONA	Operational Net Assessment
Ops	Operations
PC	Personal Computer
PJHQ	Permanent Joint Headquarters
POR	Post Operation Report
PXR	Post Exercise Report
QI	Quality Index
RAF	Royal Air Force
RAFCCIS	Royal Air Force Command and Control Information System
RAO	Research Acquisition Organisation
RMP	Recognised Maritime Picture
RN	Royal Navy
RNCSS	Royal Naval Command Support System
ROE	Rules of Engagement
SA	Situational Awareness
SMS	Small Message Service
SSA	Shared SA
SOP	Standard Operating Procedure
STANAG	Standardisation Agreement
TDL	Tactical Data Link
UK	United Kingdom
UN	United Nations
US	United States
USC	University Southern California
USJFCOM	United States Joint Force Command
VTC	Video Teleconference

7.1.5 Glossary

ADatP3 – Allied Data Publications

Military Formatted Messaging Systems. The Defence Forces of many nations use formatted messaging systems for transmitting Command and Control information. Current examples of such systems include the ADatP3 NATO Standard.

Commander's Intent

The stated purpose or desired end state of a commander in the accomplishment of the assigned mission.

Course of Action (COA)

1. Any sequence of activities that an individual or unit may follow.

2. A possible plan open to an individual or commander that would accomplish, or is related to the accomplishment of the mission.

3. The scheme adopted to accomplish a job or mission.

4. A line of conduct in an engagement.

5. A product of the Joint Operation Planning and Execution System concept development phase.

Diplomatic, Information, Military and Economic (DIME)

Areas of national power that are leveraged in "effects-based" operations against an adversary's vulnerabilities identified by Operational Net Assessment, and targeted against his will and capability to conduct war.

Effects Based Operations (EBO)

Effects Based Operations (EBO) – as opposed to Threat Based Operations during the Cold War – is a transformational concept where the intent is not to match the adversary's tactical capability one for one, but to ensure that national and international will and desired effects are achieved and maintained. Multi-national Forces must work together using Diplomatic, Information, Military, and Economic (DIME) instruments of power to achieve the desired effects.

Effects Based Planning (EBP)

Effects Based Planning is a concept being explored by Joint Forces where planning starts with strategic objectives and ends with multiple plans of action dependant on scenario, resource and environmental factors. The Commander decides which plan whose desired and secondary effects will best suit his own intent.

GP3

GP3 was developed by BAE Systems on behalf of the UK MoD. The application represented the UK Land contribution to the digitization initiative and was one of only a few information systems to make it into service.

Information Workspace (IWS)

A virtual collaborative tool engineered for groups that work in multiple locations. It is based on a virtual environment. Each virtual building can represent an actual location or group of users. Within each building are floors which contain several rooms. These rooms can be organized as required to facilitate access to information and people. Part of the Collaborative Information Environment (CIE).

Lines of Development (LoD)

The eight constituent elements of a Military Capability (MC). They are defined in the Smart Acquisition Handbook Edition 5 as (TEPIDOIL) -

- Training, Equipment, Personnel, Information, Doctrine and Concepts, Organisation, Infrastructure & Logistics.

Operational Net Assessment (ONA)

A continuously updated operational support tool that provides a JTF commander visibility of effects-to-task linkages based on a "system-of-systems" analysis of a potential adversary's political, military, economic, social, infrastructure, and information (PMESII) war-making capabilities. The ONA informs decision-makers from strategic to tactical levels regarding the complementary effects and supporting missions and tasks that can be considered when applying the full range of diplomatic, information, military and economic (DIME) actions to achieve specific effects on an adversary's will and capability in support of national objectives.

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