Improving the Logistic Support to the United Kingdom's Amphibious Operations

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"*Since men live upon the land and not upon the sea, great issues between nations at war have always been decided – except in the rarest cases – either by what your army can do against your enemy's national life, or else by the fear of what the fleet makes it possible for your army to do*".[1]

"*Amphibious operations are a very specialised form of warfare . . . they have to fit together like a jewelled bracelet*".[2]

Introduction

The threat that was faced by Western Europe from the Soviet Union and Warsaw Pact during the Cold War forced the NATO Alliance to concentrate scarce resources on providing forces and equipment that provided the maximum deterrent value to the forces of the Eastern bloc. This unfortunately, was, in many cases, at the expense of proper logistic support, forcing the British Army for example, to rely on the secure lines of communication through allied countries and prepositioning of stocks both forward and in the rear areas.

The collapse of the Warsaw Pact and Soviet Union has caused Western armed forces to focus on force projection, expeditionary operations and manoeuvre warfare, given that there is no longer a direct threat to Western Europe. The interest in 'out-of-area' operations is not a new phenomenon. For many years after the Second World War, Britain retained quite a number of colonies and overseas territories, and had strategic interests around the globe. This was fuelled by the growth in the ideological conflict between the power blocs headed by the Soviet Union and United States. Between 1945 and 1968 for example, British forces were involved time and time again in such operations as humanitarian aid, peacekeeping, conflict prevention, counter-terrorism, counter-insurgency, amphibious and airborne operations and coalition warfare.

After 1966 however, there was a withdrawal from 'East of Suez' and a gradual concentration on Britain's role within NATO and the defence of Europe against the Warsaw Pact. Despite this, Britain managed to keep a fairly balanced Armed Forces, despite budgetary pressures and numerous defence reviews (particularly the Nott Review) and was thus able to retake the Falkland Islands in 1982[3] and send an Armoured Division to the Gulf in 1990 – 1. With the end of the Cold War, the main priority of meeting a major conventional attack has been removed, and is unlikely to appear for sometime. Thus the main threats to Britain's security have changed significantly, and are more likely to occur outside the boundaries of Europe, or on the periphery.

The Labour Government's Strategic Defence Review (SDR), aimed to "remodel Britain's defence policy and Armed Forces to meet the challenges of the next

century. The government's aim is strong, modern and cost-effective defence, now and for the longer term".[4] It is very likely that there will be a continuing, if not increased contribution to international peacekeeping and humanitarian intervention operations, some of which may be of considerable duration and logistically very challenging. The size and scope may also vary from a battalion-sized battlegroup to a full division (as per the Gulf War), although the review outlined the requirement that the Armed Forces should be able to carry out two medium-sized contingency operations at the same time. It also highlighted that the Armed Forces will need to go to the operation rather than have the operation come to them that would have occurred during a Warsaw Pact invasion of Germany. The areas that they may have to deploy to are unlikely to have the same levels of infrastructure as those of Western Europe and those forces may " have to sustain non-warfighting operations for indefinite periods whilst retaining the ability to respond to other contingencies. This calls for rather different force proj ection capabilities than we have needed in the past."[5] Sustainability, which can be defined as "the ability of a force to maintain the necessary level of combat power for the duration required to achieve its objectives"[6], has grown in importance and necessity now that the Cold War is over. The difficulties involved in achieving the right level of sustainability should not be underestimated, as "setting appropriate levels of logistic sustainability is a difficult task in an environment where there is no apparent adversary, and where the new risks are less clearly defined than before".[7]

This necessitates a move from a Just-in-Case (JIC) approach, with large-scale stockpiling at all levels of the logistic chain, to one that is nearer a Just-in-Time (JIT) approach. This will mean a greater emphasis on the ability of commanders to more

accurately predict their requirements and will be dependent on total asset visibility and guaranteed lines of communication. In working to reduce the risks still inherent in trying to provide such operational logistic support, the military should remain aware of the potential contribution that commercial organisations can provide. In the past, the military have traditionally had a less than enthusiastic attitude about the potential benefits to be gained from industry. Contracts were often characterised by a confrontational attitude but are now moving to a far more positive stance and a co-operative relationship where both risks and benefits can be shared.

With the 'peace dividend' bringing a reduction of the defence budget by some 23% in real terms and the British Armed Forces being cut back by a third, new operational imperatives have placed increasing strain on the Armed Forces, particularly in their ability to sustain overseas operations.[8] This paper will look at the implications for the logistic support given to 3 Commando Brigade, Royal Marines and will attempt to identify areas where, given the realities of the new defence environment, improvements can be made to their logistic support, with reference to commercial ideas and concepts.

Context

The sea-land interface has always proved to be problematic for military and defence planners and is considered the most difficult environment in which to conduct operations. Given that the United Kingdom is an island nation and that over two-thirds of the planet is covered with water, the end of the Cold War means that future military operations are going to involve the projection of military force to distant

theatres of operations either by airlift or sealift, and may well involve the Armed Forces in ‘forced entry’ operations at the start of the mission.

The formation most likely to be used in this sort of power projection mission is the United Kingdom Amphibious Force, the land component of which is 3 Commando Brigade, Royal Marines. It provides a specific strategic capability that can be used in such missions as defence diplomacy and ‘showing the flag’ visits to demonstrate resolve and support for an ally, be augmented with conventional land forces using high-capacity sealift assets, poise at sea and conduct operations against a coast at a time and place of political choice. Such a force represents “a world-wide, balanced and autonomous expeditionary capability, to be employed nationally or with allies according to well understood and practised doctrine, across the spectrum of conflict”.[9] The brigade consists of Royal Marine and Army components with integral combat support and combat service support elements including the Commando Logistics Regiment, Royal Marines (CLR). The brigade is part of the UK’s Specialist Reinforcement Forces (SRF) and is available for both NATO and national out-of-area contingencies. For NATO contingencies, the brigade can be assigned to the Supreme Allied Commander, Atlantic (SACLANT) in conjunction with the 1 Battalion Group of the Royal Netherlands Marine Corps (RNLMC) or if not required by SACLANT, can be assigned to support the Allied Rapid Reaction Corps as part of 3 UK Division under the Supreme Allied Commander, Europe (SACEUR). To fulfil these varying missions, six potential order-of-battles have been identified, from a rifle company to the fully augmented brigade with the requisite level of Operational Stocks (the new term for what used to be called War Maintenance Reserves) depending on the scenario.

Current Drivers

In some ways the Ministry of Defence (MoD) is facing the same challenges as many commercial companies did in the late 1980s and early 1990s with the recession, in their bid to reduce costs in order to maintain profitability. While SDR has generated new initiatives such as 'Smart Procurement', the new Defence Procurement Agency (DPA), the Defence Logistics Organisation (DLO) and 'Lean Logistics' in order (for some, at the behest of the Treasury) to reduce costs in the procurement and sustainment of the UK Armed Forces. This however, can be seen as important due to the fact that defence inflation has for many years exceeded normal economic inflation, leading to the spiralling cost of new weapon systems.

With logistics having become more important as the 20th Century has progressed, and particularly since the end of the Cold War, the need for more efficient and effective logistics is becoming paramount, as it is seen as both a 'competitive advantage' and a 'force enabler'. 'Focused Logistics' is the latest term to enter usage, and this paper will examine how different it is from what has gone before, and whether it is applicable to some of the operational challenges that the armed forces might face in the near future.

As the 21st Century dawns, the rate of change in technological progress is, compared to earlier times, astonishing. With this change, mankind is potentially facing a revolution in information technology, which will be equal to, if not greater than, those of the agrarian and industrial revolutions of previous centuries. With this

technological change, allied with the end of the Cold War and the seeming necessity to be able to intervene effectively far away from the home base, attitudes to war are changing along with the approach to business. In many ways, the two are converging, as the military try to take on board some of the 'best' practices of the business and commercial world, as both are faced with significant alterations in political and economic structures, the geopolitical balance, technological progress and perceptions of the 'threat'.

The US Department of Defense has recognised the importance of logistics in its Joint Vision 2010 (now being supplemented by Joint Vision 2020), which is designed as the operational template for the US Armed Forces in the new millennium. The logistics component of Joint Vision 2010 is known as 'Focused Logistics'. 'Focused Logistics' is defined as *"the fusion of information, logistics and transportation technologies to provide rapid crisis response, to track and shift assets even while en route, and to deliver tailored logistics packages and sustainment at the strategic, operational and tactical level of operations."*[10] The key elements here are the embracing of emerging technologies (particularly information technology), transportation techniques, business methods of asset control and the concept of 'tailoring'.[11]

'Focused Logistics' has emerged from the development of 'lean' and 'agile' logistics in the commercial world in the late-1980s and 1990s, which themselves originated in the 1970s with the development of Kanban (an inventory management system), Kaizen (continuous improvement in relation to product and process) and eventually JIT in Japan as a response to the oil crisis and recession. These concepts seek to

eliminate wasteful processes, and improve quality and performance so that companies are able to do 'more with less'. JIT is a 'pull' system where demand at the end of the logistic supply chain pulls in the direction of the market or user. The flow of components at each stage is therefore governed by the same demand. "Thus no product should be made, no components ordered, until there is a downstream requirement".[12] 'Lean thinking' was introduced by Womack, Jones and Roos in their five-year study of the automotive industry[13] and expanded later so that it could be applied to any form of business or incorporated into any organisational strategy.[14] The five principles of 'lean thinking' can be summarised as precisely specify value by specific product, identify the value stream for each product, make value flow without interruptions, let the customer pull value from the producer and pursue perfection.

Many in the UK Armed Forces relate leaner logistics with further downsizing and cutbacks, in the same vein as Options for Change and Frontline First. While these attitudes are slowly changing it is important to note that 'Focused Logistics' calls for improved support to the soldiers in the frontline through increased responsiveness, asset visibility and tracking as well as accessibility of logistic resources. The ultimate objective being full spectrum supportability – having a lean and agile support chain that can enhance the combat effectiveness of our forces whatever the size, scope and location of the operation – from 'factory to foxhole'. The concept of 'lean logistics' would suggest that keeping a high level of Operational Stocks[15] is in fact a wasteful inventory, which should be cut down to the minimum possible level. However, past campaigns[16] have shown the necessity of keeping a certain amount of JIC stocks to speed deployments, aid recoveries and reconstitution, cover battle losses and to exploit unforeseen circumstances. In looking at what improvements

can be made to the logistic support afforded UK amphibious operations and 3 Commando Brigade (3 Cdo Bde), it is important to remember that when investigating what commercial concepts could be applied to the support chain in order to improve flexibility, agility and speed of response, military operations are unpredictable. Streamlining the logistic structures to find the correct size of the 'logistics footprint' should be carried out with a balance between the two extremes of JIT and JIC – something that could be called 'Just Enough'. A streamlined logistics support chain should lead to faster response time, which could mean the difference between success and failure on the battlefield.

The United Kingdom Amphibious Force: Logistic Requirements

Following Operation Corporate (the campaign to retake the Falklands), the 3 Cdo Bde had its WMR split into five identical packs (called Assault Packs (AP)), that were allocated irrespective of where the brigade was being deployed. For example, when the brigade deployed to Northern Iraq on Operation Haven it deployed with two APs. On its return, it was found that only five percent of the embarked stocks had been utilised.[17] The APs basically consist of all stores that cover all eventualities so the brigade actually took arctic clothing and equipment (for no reason) when it deployed to Iraq. The APs were broken down by Major General G Ewer under the guise of the 'Ewer Plan' into 76 (54 ammunition and 22 general stores) more manageable sized schedules that can be selected depending on the scenario and environment. The 76 schedules were earmarked for 3 Cdo Bde's use only, preventing any stock rotation and so necessitated time consuming, manpower intensive and therefore expensive stock management. The resultant impact on the supply chain was duplication at best

and expensive Urgent Operational Requirements (UOR) purchases at worst. In March 2000, Headquarters Royal Marines lifted the ‘earmarks’ on these schedules, except for 4 Defence Stores schedules, and released them back to the defence supply chain. Although the ‘earmarks’ have been lifted, Headquarters Royal Marines retains the right to ‘cherry pick’ Operational Stocks that are required for any amphibious deployment.

3 Cdo Bde is designed as a specialist amphibious formation and has to be equipped for operations in the littoral as well as extremes of climate and terrain. Therefore, the brigade has to be more-or-less self-sufficient in terms of many of the functions that would be held at second (divisional) or third-line. The CLR provides integral second line support to 3 Cdo Bde. The third line does not translate well across to amphibious doctrine, as it is support that is held behind the divisional rear boundary at either Corps or Combat Service Support Group (CSSG) level. In amphibious operations, the Amphibious Task Group (ATG) effectively performs some of the second and much of the third line support functions depending on the operation and whether it is land or sea based, or a combination of the two. Amphibious doctrine therefore distinguishes between ‘afloat stocks’ and ‘ashore stocks’ rather than second or third line.

With the end of the Cold War and the changing nature of warfare resulting in a less linear battlefield with forces that are more agile, mobile and are likely to be joint and possibly multinational. There is therefore a greater emphasis on amphibious forces to operate ashore with a smaller logistics footprint so that they can become more

mobile and conduct a higher tempo of operations. There are effectively three ways to support the amphibious force ashore:

- Sea Based[18] – This is where all combat service support (CSS) is provided direct from the accompanying ships. This method does not require a large concentration of supplies ashore but does require a high degree of logistic transparency, efficient stores handling and management, good communications, dedicated landing craft and support helicopters, and of course, good weather.
- Partial Offload – All first line stocks and a number of brigade defaults[19] are held ashore while the remainder remains afloat. Logistic Support Detachments (LSDs) will go ashore under tactical control of the first-line logistic echelons to facilitate sustainment. These groups are the unit's link to the second line CSS and will be supplied by the Landing Force Support Party (LFSP).
- Shore Based – When the operation demands it, and there's sufficient logistic space, a full, shore-based CSS system can be established, for example, as was established at San Carlos during the Falklands Campaign. Initially, the landing area would be termed the Beach Support Area (BSA), and include a Stock Holding Area (SHA), Bulk Fuel Installation (BFI), Dressing Stations (DS) with surgical teams and a REME Workshop. If the area were to be expanded to include air and sea bridges from the UK, Allies and Host Nation Support (HNS) then it would be renamed a CSS Area (CSSA). This does not preclude leaving an element of CSS afloat to facilitate raids in other areas.

These types of CSS can be executed in a combination of push, pull or directed methods. Push methods can be used when consumption is reasonably predictable or there has been a conscious decision to resupply the units to a predetermined

level. This method follows the JIC philosophy, which minimises risk, but results in a large logistic footprint. Pull methods is where units demand supplies as and when they are required. This follows the JIT philosophy where risk needs to be judged, particularly with units that are in contact with or near to, enemy units. This is reliant on secure communications and a reliable transport and delivery system. Directed methods can be used to counter the inevitable peaks and troughs in demand that will occur during operations. All mission critical spares and stocks are supplied under this system. The commander can prioritise resupply in line with their concept of operations for the future and regulate the supply of scarce stocks. This system requires complete integration and transparency between operational and logistic planners, which is very difficult to set up.

Amphibious operations are usually categorised by a rapid build up of combat capability ashore, where the follow-on forces must be landed at the right time, in the right place and in the right order to allow the assault force to maintain momentum. The Task Force must be able to provide the assault units with continued and co-ordinated CSS at a time when many of the supplies, equipment and materiel will still be based at sea. The logistic support units to the amphibious force must be capable of rapidly transferring to the shore to establish a base for further operations when required. They must therefore have unity of command, continuity, flexibility, simplicity, economy and security. As the United States Marine Corps (USMC) has found out, a single unit, task organised and drawn from both the amphibious force and the Task Force best meets these requirements. It is known as a Landing Force Support Party (LFSP), will usually land after the assault forces have achieved their initial objectives and operates within the BSA. It consists of a headquarters, a shore

party of one or more groups and a beach party of one of more Amphibious or Logistic Beach Units (ABU / LBU) and any special attachments as required. Put simply, responsibility for tasks inland from the beach comes under the purview of the shore party, while tasks seaward of the beach are down to the beach party. There is also a Tactical Logistics Group (TACLOG), which enables the Landing Force to liase with the LFSP. It's primary tasks are to monitor scheduled waves going ashore, advising the Commander, Amphibious Task Force (CATF) of the tactical land situation and recommending changes to the landing plan, advising the Commander, Landing Force (CLF) on any changes to the landing plan, co-ordinating the flow and build up of supplies on the BSA, maintaining records on ship dispositions and unloading status and advising on most appropriate delivery means for requested items and its location. 3 Cdo Bde shares this organisation to enable it to both fulfil its operational requirements and to be interoperable with the USMC in coalition operations.

Up until recently, the LFSP would operate an insecure voice circuit (LFSP Comd) covered by KIPLING or KL43C nets for secure data transfer. Once the main headquarters for the CLR is ashore, it becomes Log Sp Ops but is still insecure. The Shore Party Group would operate both secure and insecure voice as well as secure data transfer facilities provided via KIPLING, to the CLF and all other major formations. At the moment, these communications are inadequate to be able to direct the logistic support with the precision necessary by both the pull and directed methods of logistic support. There is also a lack of real-time communications (via satellite for example), which will hinder any attempt to make UK amphibious operations more manoeuvrist. The distances at which these operations are likely to

be conducted in the future, will amplify the complexity of these arrangements (Operation Corporate was carried out at a range of some 8,000 miles, Operation Granby at some 4,000 miles and over 2,000 miles for Operations Palliser and Silkman), as will the probable lack of local infrastructure.

The LFSP exists to provide a uniform flow of supplies, consumables, spares and stores to the amphibious force, as it requires them. It must fulfil a number of functions to do this including:

- To assist with the unloading and recording of all personnel and material that is coming ashore
- To establish a Distribution Point (DP)
- Provide limited transport for troop movement
- Provide a Helicopter Handling Team (HHT) to facilitate the delivery of under-slung loads

During the initial stages of the operation, units requiring resupply should demand from the LFSP and collect from the DP. Once the CLR has established itself ashore, units can collect from a DP close to the beach or one forward of the beachhead. At this point, three Days of Supply (DOS) are held in reserve and one has been sent forward with the Brigade Support Group (BSG). In operations where the logistic support is conducted as a partial offload or is fully shore-based, logistic support is very similar to conventional land operations. There is however, enormous scope for the introduction of Asset Tracking and the enhancement of In-Transit Visibility (ITV). Assets are currently tracked electronically within the Base Depots in the UK, via the VITAL network and then manually on their arrival to the units. While there is a

generic loading plan, these can often be rushed, while supplies and equipment can be loaded in an illogical way due to the political pressure to act or changes in plan while en route mean that the equipment and supplies have to be reconfigured to support the commander's plan. Asset tracking, even in its crudest form, would significantly help with logistic response time and simplify reconfiguring the load. Once embarked, it is very difficult for an Assault Supply Party (ASP) to communicate its exact holdings to TACLOG and for TACLOG to consolidate and communicate these to the LFSP without dedicated communications. The LFSP must maintain a number of records for reporting purposes, including:

- BSA Overlay (showing the disposition of units, installations and communications facilities)
- Ships Position Chart (showing the disposition of ships containing personnel, supplies and equipment)
- Ships Unloading Status Chart (the status of each ship regarding the amount it has unloaded and estimated completion time and departure from the docking area)
- Serials Landed Status Report (showing the status of personnel, equipment and supplies that have reached the BSA, and when they have moved forward to join their units)
- Vehicles and Equipment Status Chart (showing the disposition and status of vehicles and equipment that belong to the LFSP)
- DP Status (showing supplies received, issued and still on hand at any given time)

Asset tracking and ITV on a dedicated net would enable these processes to become real-time and help the commanders make informed decisions based on facts to hand and help logisticians answer the perennial question of 'where is it and when will it

arrive?' It would enable the CATF to provide continued and co-ordinated CSS to the amphibious force with the capability to rapidly transfer ashore and establish a shore base, while enabling the LFSP to be disbanded a lot sooner than is currently the case, with obvious implications for manpower and resources.

Future Operations

The Royal Navy has in fact been looking at the future utilisation of naval assets in combined and joint operations for some time. SDR highlighted the unique characteristics of naval forces and how they were suited to undertaking the sort of expeditionary operations envisaged for the UK Armed forces in the future.[20] This concept has been adopted as the Maritime Contribution to Joint Operations (MCJO) and its main thrust centres around force projection and its four enabling tenets (force protection, force packaging, C4ISTAR (Command and Control, Communications, Computers, Intelligence, Surveillance, Target Acquisition and Reconnaissance) and Sea-Based Logistics). Such a concept is very similar to that outlined in the US DoD's Joint Vision 2010 (discussed earlier). The MCJO concept entails:

- Force Projection – This is at the heart of the MCJO concept and will be conducted by Command and Control Warfare (C2W), Maritime Fires (naval gunfire and air support) and Air / Ground Manoeuvre Forces and is similar to the USMC concept of Operational Manoeuvre From The Sea (OMFTS). Amphibious manoeuvre from the sea has traditionally entailed manoeuvre at sea, followed by the transition ashore, followed by manoeuvre ashore. While manoeuvre at sea allows the attacker to choose the place and time of the operation, the transition process that allows sufficient combat power and logistic support to be built up so

that the amphibious force can conduct manoeuvre ashore has often allowed the defender to overcome the initial surprise and prepare defensive positions or to counter attack. Both MCJO and OMFTS seek to eliminate the transition process through Force Projection or Ship to Objective Manoeuvre (STOM – the aim of which is to apply the tactics of modern land manoeuvre to the amphibious battlefield, that of conducting a joint force penetration and exploitation from over the horizon to directly accomplish objectives ashore).

- Force Protection – as the focus of logistic support moves from shore-based to sea-based the responsibilities of force protection will increase for the Task Force as amphibious and logistic shipping are neither, agile, stealthy or heavily armed. The Falklands conflict showed the consequences of neglecting force protection through the loss of a number of RN warships, as well as the Landing Ship Logistic (LSL) Sir Galahad and the Ship Taken Up From Trade (STUFT) Atlantic Conveyor, which were sunk with some dated technology ranging from Super Etendard with Exocet missiles to Skyhawks with iron bombs. Force protection requires instant and seamless data transfer to achieve a common battle picture.
- Force Packaging – This is where the various force elements are combined into a coherent whole, and relies on integrated training, a streamlined and efficient force generation system, familiarisation with Standard Operating Procedures and efficient communications.
- C4ISTAR – This is the fundamental enabler of MCJO for the RN. Data sharing is the foundation for operational success in today's defence environment and involves the successful integration of different databases to achieve one picture, a formidable task indeed. The ability of the UK, indeed, any country, to project forces abroad, depends upon their access to quality information, speed of

decision and the ability to rapidly deploy forces that have the requisite mobility and firepower to attain their objectives.[21] This relies on an integrated and responsive C4ISTAR structure, which must be capable of being integrated fully with other Services and Allies.

- Sea-Based Logistics – As outlined previously, sea basing seeks to eliminate the amphibious forces' vulnerable shore-based logistics footprint during the early stages of an operation and provide a 'platform' from which combat forces can be projected, sustained and tailored to the mission objectives. Amphibious forces that use sea basing are not dependant on Host Nation Support (HNS), and suitable configuration of the Royal Fleet Auxiliary (RFA) support ships would allow the Task Force to loiter for a time in international waters and then rapidly respond as the situation evolves. The concept is however dependant upon improved communications and dedicated logistic lift assets, i.e. landing craft and support helicopters. The USMC is in the process of moving to Maritime Prepositioning Force 2010 where a number of ships are located across the globe. Packed with combat-ready equipment and supplies that the Marines can fly to and marry up with, in-theatre. It envisages a Mobile Operating Base (MOB) that is modular in construction and assembled into a size that is tailored for the mission, and can present the operational commander with a greater array of choices than is at present possible. It should be large enough to act as a Forward Operating Base (FOB).[22]

What are the main logistic implications of MCJO? In a sea-based operation, the resupply of forces ashore will become essential to force projection. If the reliance on WMR is to be reduced then the support chain must be capable of sustaining the

force ashore as well as the forces out to sea. It is not only however, the ability to track assets that is important, but the ability to move those assets around and deliver them to the correct place, at the correct time, in the correct order and in the correct amount. The two concepts are inextricably linked. In the commercial world, such an agile distribution system combined with real-time information systems has led to the concept of Quick Response Logistics. There is a link between the "the information systems and the JIT logistics systems that combine to provide 'the right product in the right place at the right time' . . . made possible . . . in particular [through] the rise [in] electronic data interchange (EDI), bar coding and laser scanners".[23] Quick response Logistics is based on the idea of substituting information for inventory and has implications for the amount of Operational Stocks that need to be held and carried in the future and therefore for the amount of STUFT vessels that will be needed. Vital to the implementation of such a logistics strategy is information fusion. The integration and use of both information and technology is vital to concepts such as 'Focused Logistics'. The US DoD's goal is the creation of a Global Combat Support System (GCSS) that has six essential attributes:

- Any Box – The advantage of having a Common Operating Environment (COE) is that it doesn't matter how many systems are currently in service or about to enter service, the important point being that they can communicate with one another within the COE.
- Any User – The use of common screens on all workstations to reduce the training requirement.
- One Net – The accessibility of all combat, combat support (CS) and CSS functions from a single workstation.
- One Picture – The capacity to integrate information across functional areas.

- Common Services – These include basic computing requirements such as access to a printer, having sound and communications facilities within the COE. Such commonality can reduce overall system costs by eliminating duplication of such basic requirements.
- Robust Communications Infrastructure – a robust communications infrastructure is required to facilitate the services above and provide near real-time access to the information via a secure global net.

Information fusion incorporates the use of Automated Information Technology (AIT), such as the use of barcodes, optical memory cards, radio frequency tags, smart cards and satellite tracking to enable in-transit visibility through the Joint Total Asset Visibility (JTAV) programme, run via the US Transportation Command (USTRANSCOM) Global Transportation Network (GTN). JTAV can provide commanders with access to a wide-range of logistics data through the use of state-of-the-art client server technology. It provides its users with timely and accurate information on the location, movement, status and identity of personnel, equipment, units and supplies, giving visibility throughout the process of preparation, transport, storage and distribution. It will also provide the capability for the Armed Forces to act on this information to improve the performance of the DoD's logistic practices. The JTAV programme has been running since the mid-1990s and has achieved over 70 percent visibility out of a target of 100 percent. It is hoped to achieve 95 percent visibility by the year 2005.

The UK Amphibious Force and 3 Cdo Bde have the following systems (or have to communicate with the following systems) that provide a limited asset tracking visibility:

- Stores System 3 (SS3) – This is in-service with the Royal Logistic Corps (RLC) and is a third generation computer based inventory management system. It is somewhat dated and has had numerous changes but it interfaces with many of the other information systems that are used by the UK Armed Forces.
- GLOBAL – This is a stock control and accounting system for use in second line and Field Army (including the Royal Marines) stock holding units. It gives users access to both VITAL and OLIVER from a single terminal and can manage both lifed and batch numbered items bar combat supplies. Each GLOBAL installation holds the stock account and inventory for that particular unit within a relational database on a local server and runs on standard hardware and is menu driven. If provided with a dedicated communications network it could provide visibility across the formation and back to base. GLOBAL allows for better management of resources and incorporates such facilities as inventory control, depot management, stocktaking, and reconciliation, returned stores and disposals activity, accommodation stores, stationary items, local procurement and management activity. All GLOBAL units transfer data to SS3 at the end of each day. SS3 then consolidates the information and sends it back to each GLOBAL unit at the end of the processing cycle.
- VITAL – This is a consignment tracking system used to track items issued from the two Base Ordnance Depots at Bicester and Donnington to the second line stores holding units. The primary data is drawn from SS3 and GLOBAL with other data being input from manual barcode scanners. SS3 provides issue data to

VITAL on a half-hourly basis and VITAL return dispatch information once a day. GLOBAL provides VITAL with details of receipts into supply squadrons or the Logistic Support Squadron, CLR in the case of 3 Cdo Bde. Currently, VITAL is the only dedicated asset tracking system available within 3 Cdo Bde with a single terminal in both the Logistic Support Squadron and Devonport Dockyard (distribution point for the brigade). They have not been activated on the VITAL network and remain expensive stores ledgers. There are two reasons for this, firstly, the units are so over committed that they are unable to detach personnel away to be trained on the system and secondly, the communications links required by VITAL on board ship (satellite communications) have never been dedicated to CLR use. This in fact creates a downward spiral as the lack of visibility and communication require an increase in the number of personnel to account and track the stock, increasing the number of personnel committed to operations thereby reducing the number available for training etc. VITAL records all the details of freight in the supply chain and each item is given a unique tri-service reference number. The programme can be accessed via GLOBAL and can be interrogated to find out where in the supply chain a demand has reached. This is useful as it avoids duplication of essential items that are already in transit. VITAL identifies freight by reading a barcode printed on the issue voucher and once a consignment is complete, automatically prints the relevant documentation such as the loading checklist or air waybill. Unfortunately, GLOBAL has reached the limit of its potential and ICL have stated that they will not produce any more servers. Support will become ever more difficult after this year. The GLOBAL 2 project is underway however, and will involve a new set of hardware and will have the software that can be ported into a Windows NT system. VITAL has now

been interfaced with WTMS and RIDELS, the RAF and RN systems. All these systems will be superseded with the introduction of DSMS (Defence Stores Management Solution) and DRUMM (Delivering the Requirement for Unit Material Management)

- OLIVER – OLIVER can be used to pass high priority demands direct to the stores system if necessary. The terminal provides a 'window' via authorised dumb terminals, into the SS3 at Bicester, allowing the user to query the database for information, including database enquiries, initiation of batch transactions and urgent issues. The only organic OLIVER terminal however, is located at the Headquarters, Royal Marines in Portsmouth forcing the brigade's logistic staff to seek authority for any high priority demands from the higher headquarters with inevitable time delays.
- SEESUPS – This is a PC based system, providing support for accounting and reporting on combat supplies within deployed formations. The major weakness in this system is that there is a lack of visibility due to the lack of an interface with other systems. There is an effort underway to provide mobile phone compatible modems to enable the user units to transfer the data to the LFSP / BSA who can then update TACLOG. This is reliant on network coverage.
- UNICOM – This is an Army-wide system with two functions, an administration function (personnel records etc.) and a stores accounting function. It provides units with a first line accounting capability (UNICOM Q). As GLOBAL only goes down to second line, UNICOM could provide the final link in providing total visibility down to the end user. A project is underway (UNIGSS) to link UNICOM Q to GLOBAL or directly to SS3. Unfortunately, the Royal Marines did not buy into the project, so it is only the Army units within the brigade that have it and

then only the admin capability. This is because the Royal Marines receive their funding through the RN, but operate predominantly in an Army environment and so require systems that have interoperability with both. A complex undertaking as the RN is currently in the process of moving from the OASIS / UPKEEP system to one called PHOENIX. Again this will be superseded by DSMS.

- LOGTRAKS – This was introduced for use in Operation Grapple and has the capability to track both the prime mover and its load via the GPS system and send and receive messages via INMARSAT to a base station. Airtime on INMARSAT must be purchased however, and such airtime is available to potential enemies. It was designed for use by DROPS vehicles, using a programmed radio frequency tag and although is not in use within 3 Cdo Bde, it is a capability within the MoD.

Means of Delivery

Ensuring the technology available to the amphibious forces of the UK interfaces properly to produce a reasonable degree of asset visibility is only part of the problem. An enhancement and upgrading of the means of delivery for those supplies and material is also required. Current logistic distribution is quite an ad hoc affair at the moment with distribution and transport assets currently being focused on combat and combat support forces. The build up of CSS assets is literally accommodated as and when space is available on either the limited helicopter or landing craft assets during the initial phase of the operation.

There is an assortment of ship types that are available to the UK Armed Forces for the formation of an amphibious task force that can also be supplemented by the inclusion of STUFT shipping. The limitations of the RN and RFA is apparent when one considers that to deploy 3 Cdo Bde, eighty-four percent of the lift would be provided by STUFT shipping, with the attendant time and security implications. The brigade is always held at Readiness Level 2, i.e. seven days notice to move, while STUFT shipping contracted through the Baltic Exchange in London usually operates on a twenty-eight day advance notification system. To get around this system relies heavily on the goodwill of the shipping lines or the contracting of vessels from less orthodox sources. For example, when the Army shipped the Challenger 2 across to Canada for last minute field-testing, the ship that was contracted was a Lithuanian one, with a Russian crew! If deployed, STUFT shipping is usually deployed with the necessary equipment and personnel to ensure integration into the task force. There are a number of limitations in using STUFT shipping however, such as the inherent lack of agility and shallow water manoeuvrability, slow offload time and limited survivability. The MCJO concept will help in some respects, as much of this shipping can remain over-the-horizon, thus easing the force protection responsibilities of the escorts. The current sixteen percent lift provided by the RN consists of the following ships:

- Landing Platform Dock (LPD) – The RN currently has two LPDs, HMS Fearless and HMS Intrepid. They contain the necessary command and control equipment to enable the task force commander to command a force with maritime, land and air elements. They provide the only means for transporting heavy equipment that can put that ashore using four Landing Craft Utility (LCU) or helicopter assets. These ships provide, at the moment, the only means of rapidly putting combat

power ashore according to current doctrine as no equivalent capability exists in the naval and merchant fleets.[24] The two ships are due to be replaced by two new vessels, HMS Albion and HMS Bulwark which are due to enter service in the next two years.[25]

- Landing Platform Helicopter (LPH) – The RN has one LPH, HMS Ocean, which provides dedicated helicopter support for amphibious operations. The primary task of the LPH is to embark, support and operate a task organised aviation group, which is selected from medium support, attack and utility helicopters. It can also support surface offload as it carries 4 Landing Craft Vehicle and Personnel (LCVP) and is equipped with facilities to command a Commando Group. The RN was originally going to receive two LPH, but the second was cancelled under Long Term Costing 1993 and one of the Invincible Class aircraft carriers (HMS Illustrious, Ark Royal and Invincible) would provide the balance of the support helicopter assets.
- Landing Ship Logistics (LSL) – The five LSLs are operated by the RFA and provide much of the organic troop, vehicle and freight capacity. They also provide the key facilities of mexeflote (a raft capable of carrying large quantities of stores and heavy equipment) carriage, support helicopter operating spots and rear door ramps allowing vehicle access to the mexeflotes if the sea allows. The existing five are being replaced with four far more capable ships over the next decade.

The final delivery to the frontline units is carried out by a combination of Sea King Mk 4, the Chinook CH-47, LCUs and LCVPs. These delivery means could be supplemented by the MV-22 Osprey which is a tilt rotor design that allows the aircraft to land and take off like a helicopter, but to transform itself into a turbo-prop aircraft

for normal flight. It is undergoing final evaluation tests in the USA and will hopefully be in service by 2003. It has a range of over 500 nautical miles that can be extended through in-flight refuelling and can transport twenty-four fully equipped marines, an internal payload of 10,000lbs or an external payload of 10,000lbs (single hook) or 15,000lbs (twin hook). Alternatively, there is the Landing Craft Air Cushion (LCAC) that is essentially a hovercraft, and is capable of high speed, over the beach ship-to-shore runs carrying up to sixty tonnes. It is designed primarily to carry tracked or wheeled vehicles and heavy equipment and has a range of some 300Nm at thirty-five knots. Both the USMC and the Russian Naval Infantry have used vehicles such as these in recent years. There is also the Guided Parafoil Air delivery System (GPADS) which can deliver a 700 to 2,500lbs load, is launched between 5,000 and 25,000 feet from a C-130 Hercules and is guided by its own GPS system to a ground based beacon. It has been in service with the USMC since 1997. All these systems are, or will be soon, available to the UK Amphibious Force. Whichever systems they choose will be dependant on the degree to which the logistic support strategy is refocused from shore based to sea based. If some measure of shore basing is retained (as is likely) then the amphibious force must retain a measure of tactical surface mobility to ensure logistic delivery. If MCJO is to become a reality, the RN and Royal Marines must enhance their operational reach and their capacity to sustain operations by either upgrading the assets available to the CSS system or increasing the number of assets available.

Conclusion

This paper has outlined that the new defence environment has forced the MoD into adopting a more commercial outlook and to adopt commercial practices in the procurement of new equipment and services for the Armed Forces and the logistic support provided to the operations that are now likely to take place. Such operations are likely to be expeditionary in nature, and the changing nature of the modern battlefield is going to demand that our forces need to operate in a joint manner and to have greater agility on a manoeurvist battlefield. Their logistics will need to be more agile, be leaner and have a smaller footprint to support the combat forces adequately. For the Royal Marines to do "what it has always done best – conducting, or preparing for, operations world-wide"[26], the amphibious forces of the UK need to adapt as well, in terms of their logistic support practices and the technology that is required to implement the new concepts. It is obvious that while investment in a completely new AIT system to replace the myriad of systems already in place and emerging is impractical (given budgetary constraints), the basic systems to facilitate an asset tracking capability already exist. At the very least, the logistic support offered to the brigade could be developed with the VITAL terminals being brought online, and the first line units within the brigade being issued with UNICOM and subsequently DSMS and DRUMM. An effort could be made to ensure that all stocks are bar-coded at source and a dedicated satellite communications link being provided on-board and ashore. This however is not the complete story, and the actual delivery means need to be updated through the introduction of new technology such as the MV-22 Osprey, or a higher prioritisation on the logistical use of existing helicopter assets, and the possible introduction of an MOB concept. These measures would not only allow a degree of visibility and tracking, but could facilitate a quick response logistics system, enabling greater logistical reach and a

smaller footprint ashore. It would also allow the commander to retain a greater degree of flexibility and agility on the modern manoeuvrist battlefield.

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[1] Corbett in Headquarters Royal Marines and Maritime Warfare Centre. *The United Kingdom Approach to Amphibious Operations*, HMSO, London, 1997, p. 7.

[2] Ismay in Headquarters Royal Marines and Maritime Warfare Centre. *The United Kingdom Approach to Amphibious Operations*, HMSO, London, 1997, p. 45.

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[4] Ministry of Defence. *The Strategic Defence Review*, The Stationary Office, London, July 1998, p. 53.

[5] *Op Cit. The Strategic Defence Review*, Supporting Essay 6, p. 4.

[6] White, M S. "How Can We Meet the Logistic Requirements of Forces Deployed at Some Distance from the UK?", *RUSI Journal*, October 1996, p. 32.

[7] Saunders, D J. "UK Logistics Planning – The Way Ahead", *RUSI Journal*, December 1992, p. 24.

[8] *Op Cit. The Strategic Defence Review*, p. 6.

[9] *Op Cit*. Corbett, p. 9.

[10] Department of Defense, Army Vision 2010 and related documents, US Army Home Page http://www.army.mil/2010/focused_logistics.htm.

[11] Gansler, J S. US UnderSecretary of Defense (Acquisition and Technology) in FY 98 DoD Strategic Plan.

[12] Christopher, Prof M. *Logistics and Supply Chain Management. Strategies for Reducing Cost and Improving Service*, 2nd Edition, Financial Times / Pitman Publishing, London, 1998, p. 179.

[13] Womack, J. Jones, D. & Roos, D. *The Machine That Changed the World*, Rawson Associates / Macmillan Publishing, New York, 1990.

[14] Womack, J. and Jones, D. *Lean Thinking – Banish Waste and Create Wealth in your Corporation*, Touchstone, London, 1997.

[15] Operational Stocks (formerly WMR) are defined as stocks of material amassed in peacetime to meet the increase in military requirements consequent upon an outbreak of war. Such reserves are intended to provide the interim support to sustain operations until re-supply can be affected. AAP-6. NATO Glossary of Terms and Definitions.

[16] See for example, Moore, D. Bradford, J. and Antill, P. *Learning from past defence logistics experience : is what is past prologue?*, RUSI, Whitehall Paper No. 52, London, 2000; Thompson, J. *The Lifeblood of War : Logistics in Armed Conflict*, Brassey's, London, 1991; and Van Creveld, M. *Supplying War: Logistics from Wallenstein to Patton*, Cambridge University Press, Cambridge, 1977.

[17] Fagg, Major L (retd). War Reserves Group. Interview with author. 1 July 1999.

[18] Moore, D. Antill, P. and MacLennan, W R. 'Is Sea-Basing a Viable Method of Providing Logistic Support to the UK Amphibious Landing Force?' in *Naval Review*, October 2000, Vol. 88, No. 4, pp. 312 – 317.

[19] A default is defined as the amount of combat supplies distributed to each unit as a standard daily load, based on what the individual units can hold on personnel and vehicles.

[20] *Op Cit. The Strategic Defence Review*, Supporting Essay 6, Paragraph 12.

[21] See US DoD Logistics and Readiness, Office of the Deputy Under Secretary of Defense Website at http://www.acq.osd.mil/log/briefs/briefs.html.

[22] Stokes, G W. *Sea-Based Logistics: A Concept Just Over the Horizon*, US Naval Post-Graduate School Dissertation, February 1997.

[23] Christopher, Prof M. *Logistics and Supply Chain Management*, 2nd Edition, Pitman Publishing, 1998.

[24] *Op Cit*. Headquarters Royal Marines and Maritime Warfare Centre. *The United Kingdom Approach to Amphibious Operations*, p. 94.

[25] Heyman, C. *The Naval Forces of the United Kingdom 1999 – 2000*, Pen & Sword Books, Barnsley, 1998.

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