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**COST-
EFFECTIVE
DEFENCE**

By Lewis Page

Edited by Dan Lewis

ERC COMPARATIVE ADVANTAGE SERIES – PAPER I

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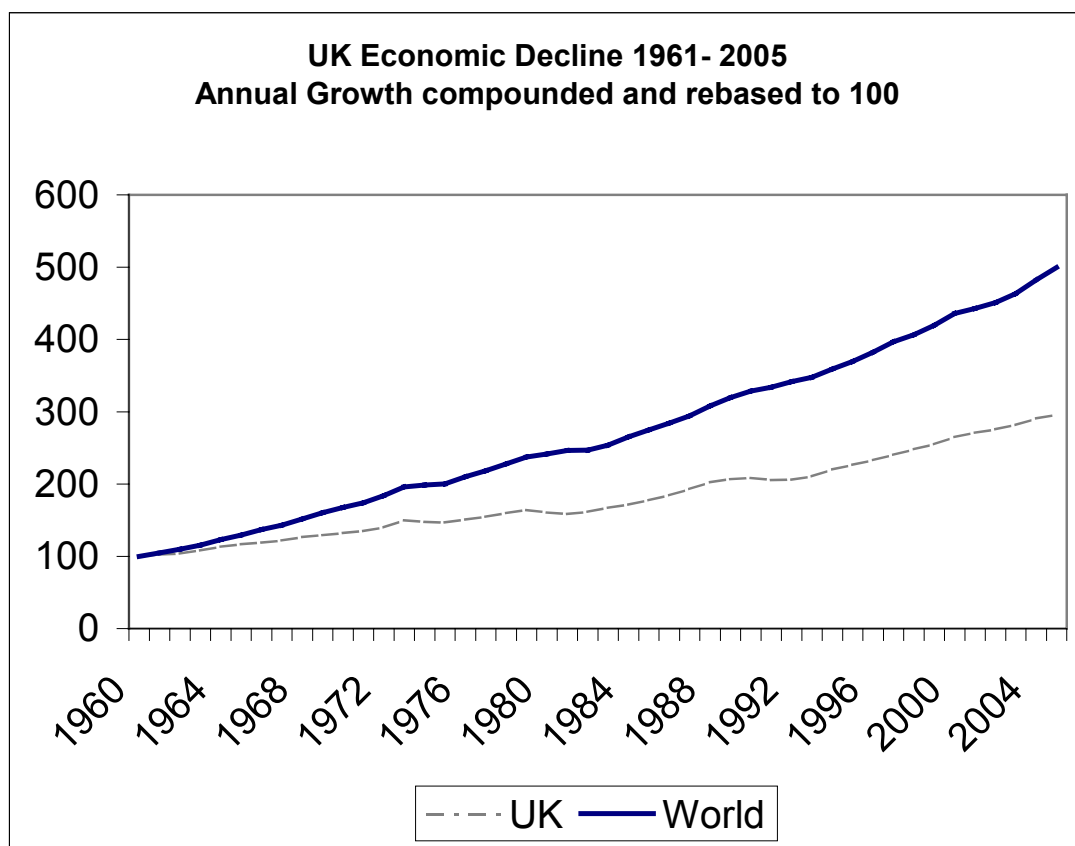
About the comparative advantage series

Comparative Advantage;

“The principle that under given technological conditions the increased product obtained from specialization and exchange rather than from a policy of self-sufficiency and economic isolation will be maximized where each country or region specializes in the production of those goods and services in which its relative advantage is largest.”

From *Everyman’s Dictionary of Economics* by Arthur Seldon and F.G. Pennance

Britain is in economic decline.



According to figures obtained from the World Bank, the UK economy has only exceeded world economic growth since 1961 just 10 times; in 1973, 1982, 1983, 1986, 1987, 1988, 1993, 1994, 1998 and 2001.

This consistent underperformance would have to be reversed if the UK is to maintain its position in the world. In the face of accelerating globalisation, Britain needs new comparative advantages in order to continue to compete and achieve a higher standard of living in the 21st Century. The ERC Comparative Advantage series will ask experts of all professions to look dispassionately at their respective industries in the UK to ask and explain what can be done better. We will also be taking a hard look at areas in the public sector and how to make them more efficient in the cold light of international comparison. There is absolutely no intention here to pick winners. The series merely aims to close the gap between expert knowledge and public policy in order to further

enhance economic performance and by analogy the UK's global standing.

The ERC is not committed to any of the views expressed in this paper.

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Foreword

As recent comments by the Chief of Defence Staff, General Sir Richard Dannatt underline, there is profound disquiet with the growing extent of the UK's military commitments and the wholly inadequate resources to meet them. Newspapers of all persuasions now routinely report on British troops in crisis; often intermittently supplied, poorly-equipped and utterly over-stretched. This is not acceptable and cannot be allowed to continue. Yet it is not prudent to throw pounds at the problem before asking and answering some hard questions about priorities regarding military capabilities and their financial costs. As must be now apparent, there is no better time for such a dispassionate analysis.

All of this and more, Lewis Page has done brilliantly.

He has ruthlessly exposed what is needed, what isn't and what it all costs. Above all, he pleads for a radical reorganisation that relates defence spending to a world far different from that of the Cold War.

As Page says, lamentably, a large proportion of the defence budget is expected to do two jobs at once: it is expected to achieve not only defence, but also the provision of comfortable civilian jobs in the UK or continental Europe. It is astonishing and disgraceful that the Infantry now close to exhaustion from back-to-back deployments are seemingly being cut back to pay for the absurdly expensive Eurofighter. In spite of the UK being involved in no less than 6 separate conflicts in 10 years, there has been alarmingly little progress in rethinking the UK's military capabilities.

Page believes that giving the MoD more cash would be unwise with the present management set-up. Extra defence funding would merely permit the current duplication of effort and overextension into foolish areas to persist. But a costs versus capabilities restructuring of defence would achieve a great deal *within the existing budget*.

Cost-Effective Defence provides a most lucid and accessible contribution to the overdue debate about Britain's Armed Forces. The ERC, policymakers and journalists should be grateful for such a high quality piece of work which richly deserves to be very widely read.

Dan Lewis

October 2006

**Research Director
Economic Research Council**

About the author

Lewis Page

Lewis Page served for eleven years in the Royal Navy, and before that was an RAF reservist in the Cambridge University Air Squadron. His time at sea was mostly north of the fiftieth parallel, generally in terrible weather. He was briefly allowed ashore twice, firstly to train as a mine-clearance diver and secondly for the All Arms Commando Course. As he was beginning to lose all hope of ever being decently warm he got in a couple of trips to hot climates at last. He then became boss of the Plymouth diving team. He attended over two hundred taskings as a bomb-disposal operator by land and sea, a number of which involved actual explosives. He also encountered genuine 'Weapons of Mass Destruction', but disappointingly this was in Wales.

On leaving the service he wrote an article for Prospect magazine explaining why he resigned and why other naval officers might consider resignation. It was the cover article in February 2004, and he has since written several other articles for Prospect on defence matters. His book "**Lions, Donkeys and Dinosaurs**" (ISBN 0-434-01389-7) was published by Heinemann in January 2006. It was hailed by the Guardian as "irritating" and by senior MoD insiders as "extremely irritating." Page feels that he must have got something right. It is nonetheless widely considered to be the most thought-provoking book in defence in decades and Sir Max Hastings in his review argued that he should be made a national defence correspondent immediately. Page has also written for the Naval Review, the Royal United Services Institute and the Sunday Express, and has appeared on BBC Radio's Today programme on several occasions.

Summary

- Military capabilities cannot be expressed in terms of numbers
- It is a relative quality – usefulness - which must be measured against ongoing tasks and arising ones in the future
- The UK armed forces will face 3 types of opposing forces; paramilitaries, armed forces of minor powers, armed forces of nuclear powers
- The last is extremely unlikely, the second happens every 10 years and the first continuously since 1945
- The UK's military capabilities reflect the reverse of these facts

- **Disproportionate resources in money and personnel are spent on;**
 - i) Anti-submarine warfare
 - ii) Superfighters
 - iii) Surface-based defence against enemy air attack
 - iv) Overcoming enemy armoured forces using ground units
 - v) Delivery of explosive strikes deep in enemy-held territory

- **Insufficient effort is being made in;**
 - i) Provision of deployable ground combat troops with a small logistical footprint
 - ii) Utility/transport helicopters
 - iii) Both heavy and light military air transports
 - iv) Sea-based aviation of every type
 - v) Recruitment and retention of suitable junior servicemen and women

- Giving the MoD more money would be unwise and merely continue present duplication of effort and overextension into foolish areas to persist
- A radical reorientation of existing resources is required first

- **Savings measures;**
 - i) Scrap maritime-patrol aircraft capability – annual saving £700m
 - ii) Cancel Eurofighter Tranche 3 – saving over EP07 £3 bn
 - iii) Scrap RAF “deep strike” capability – annual saving £1 bn
 - iv) Scrap several pre-Main Gate equipment programmes without replacement
 - v) Halt Type 45 destroyer programme after 6 ships
 - vi) Decommission Type 22 frigates and Type 42 destroyers without replacement in near term
 - vii) Reduce Type 23 frigate force to 8 hulls – reducing Royal Navy frigate/destroyer fleet to 14 ships with no consideration for replacement before 2021

- **Spending measures – to commence before savings measures**
 - i) Immediate order for £3 bn of big helicopters
 - ii) Expansion of the C-17 airlift fleet to 20
 - iii) Order for 25 new Hercules C-130J transport aircraft
 - iv) Firm orders for two large aircraft carriers with AWACs aircraft and preferred redesign to catapult/arrestor configuration
 - v) Confirm second batch of 3 Astute-class submarines to be delivered as slowly as possible to keep expertise alive until Trident replacement
 - vi) £5 bn to purchase 1000 Tactical Tomahawk cruise missiles from the USA
 - vii) £5 bn for a drone aircraft programme
 - viii) £2bn extra for the Military Afloat Reach and Sustainability programme (MARS)
 - ix) At least £2 bn to be earmarked for human intelligence and languages training to be focussed at the rifle company level rather than special forces
 - x) All remaining savings of £20 - £25 bn to be allocated to improve pay and conditions. Starting salary for privates/equivalent to be at least £22,000 especially for combat troops

- **Cost-Neutral Measures**
 - i) Existing navy and air-force heads to be downgraded one rank and subordinate to the army chief. The head of the army to become the senior office of the UK armed forces
 - ii) 3 of the 5 Recce cavalry regiments to re-role as Mechanised Infantry
 - iii) All tank regiments to re-role as Armoured Infantry
 - iv) RAF Regiment to shift into the Army infantry
 - v) Displaced Mechanised and Armoured Infantry to shift to the Light role to create an additional ten infantry units
 - vi) All future artillery projects cancelled except the M777 155mm towed howitzer
 - vii) Disposal of Rapier. Air-defence to re-role in the field element of new unmanned drone capability
 - viii) Brigades to be rebuilt as standing expeditionary air-land taskforces
 - ix) Permanent, deployable airspace-control groups to be formed
 - x) Existing Joint command arrangements streamlined
 - xi) Navy to operate principally as two carrier groups and several amphibious groups
 - xii) Police forces and fire brigades to be directed to establish large quotas for recruits with eight years or more of honourable military service as an additional recruitment incentive

Cost-Effective Defence

Some Suggestions For Resolving the Present Crisis of Aspiration versus Finance in the UK Ministry of Defence

The British Ministry of Defence is something of a centre of excellence in government. British soldiers, sailors and airmen are acknowledged worldwide as second to none and superior to most. This is not something which can always be said about other public servants.

And yet all is not well. Certain military units are working and fighting to exhaustion levels in real conflicts. Many others are overworked too, but this is merely so that their managers can claim that they are essential: nothing is being achieved. In many cases, equipment is missing, obsolete, defective, terrifyingly expensive or otherwise unfit for purpose. Huge amounts of resources, in people and money, are being channelled into efforts which are either pointless or outright destructive. A large proportion of the defence budget is expected to do two jobs at once: it is expected to achieve not only defence, but also the provision of comfortable civilian jobs in the UK or continental Europe.

Over and above all this, the cost and complexity of existing equipment continues to soar. New classes of weaponry are often invented, but seldom will it be admitted that any existing organisations and kit have thereby been rendered obsolete. The preferred solution is always to have some of everything, just to be sure. The point is being reached where this will result in having very little of anything.

The time has come to make a serious, radical reorganisation. There have been many attempts to do this in late years, but in all honesty even the Strategic Defence Review of 1998 largely fizzled out. Other initiatives such as Options for Change, the Bett Report, or Front Line First achieved almost nothing. The anodyne waffle produced lately (*Delivering Security in a Changing World*, the Defence Industrial Strategy) has not even pretended to advocate change; rather there has been an attempt to preserve the existing unsustainable situation. Meanwhile the deadly interservice battle for budget goes on, and the Defence Procurement Agency continues to spiral down into a financial black hole of its own making.

In large part this situation has arisen from an almost total lack of political leadership at the MoD for some time. This is not really the fault of the politicians in question. There are not many Secretaries of State who must live with the knowledge that three levels down the management pyramid from them there are three separate bureaucrats (the heads of the armed services) all of whom have formalised direct access to the Prime Minister. A result of this structure is that everything is always split three ways, jam or pain. Effective management is thus very difficult.

Nevertheless it must be achieved. This document is intended to offer some specific suggestions which would enable the armed services to carry out the tasks demanded of them while living within their means. (Our means, one might say.) This is done by examining military capabilities versus costs.

MILITARY CAPABILITIES

Military capability is difficult to express in terms of numbers. The total manpower of an army, for instance, gives very little indication of how powerful that army will be in a high-intensity tank battle. On the other hand, an assessment of an army's ability to pour high explosives onto a designated spot at short notice and then run over the craters in tanks gives very little idea of that army's performance in urban counter-insurgency. This is even more the case with maritime and air forces. A count of regiments, ships and aircraft is more instructive, but can still be misleading. Certain kinds of unit are useful in nearly every military situation, others are almost never

worthwhile. Some equipment in service is obsolete, defective or simply worn out.

Furthermore, military capability is not absolute. It is a relative quality, which must be measured against ongoing tasks and those which might arise in the future. Before one can realistically assess one's own capability, it is necessary to have some idea of the abilities and intentions of potential enemies. This may be impossible to achieve with any accuracy, as recent events have shown.

Nonetheless, it is essential for policymakers to obtain some grasp of the capability – the usefulness – provided by each type of military unit. Compared to its costs, this will allow an assessment of value for money to be made and planning to be carried out. The first part of this process is the examination of the likely opposition.

OPPOSING FORCES

Paramilitaries

Far and away the most common and likely adversaries for the British armed services are lightly-equipped paramilitary forces. These may be insurgents acting against an established state, or they may be troops of the local regime. The situation may not be so clearly defined, as in regions where local warlords dispose of forces equal or superior to those of any central government.

Enemies of this type will normally be armed with a limited range of weapons, which can nonetheless be devastatingly effective. Personal automatic weapons, such as the ubiquitous ex-Soviet AK47 assault rifle, will be in widespread use. These weapons are almost the equal of those carried by Western troops. Indeed, they are superior in certain important respects, such as robustness when poorly maintained. At present, most opposing paramilitaries are unable to use them to anything like full effectiveness owing to lack of training; furthermore, the use of modern body armour and/or protected vehicles significantly reduces the number of fatal casualties sustained. This in turn minimises the media perception of damage done, which is critical to sustaining the deployment. Nonetheless, even AK47-type small arms have significant effects. Where they are present as a threat, every potential target – police, aid workers, press, military personnel – can move outside secure areas only under protection.

Almost equally common among paramilitary forces are light shoulder-fired armour-piercing rockets, usually of the ex-Soviet RPG¹ family. The only ground vehicles which can reliably resist these weapons are modern main battle tanks (MBT) and armoured infantry fighting vehicles (AIFV). MBTs cannot carry passengers, and are principally useful in high-intensity combat against opposing MBTs. AIFVs may be used as a safe means of transport where there is a risk of RPG attack, but they have many disadvantages. An AIFV will typically cause damage to the area it moves through; it requires large amounts of maintenance and logistic support; it finds many areas inaccessible. Personnel moving by AIFV have almost no ability to interact with the surrounding civilian population in a positive way. British forces typically use AIFVs in lower-intensity situations to provide a fairly unstoppable reaction capability. Otherwise, they will simply accept that the presence of RPG-equipped opposition inevitably means a risk of casualties on every occasion when ground troops leave a secure perimeter. Helicopters are the only safe form of transport in these situations, and will be much in demand.

The most devastating weapons commonly used by paramilitaries are improvised explosive devices, IEDs. These appear in almost infinite variation, and are quite capable of damaging or destroying even AIFVs by skilful design or sheer weight of explosive. If a paramilitary force is well trained or advised, it will be able to use IEDs to such effect that there is no safety to be found within the area of operations except – perhaps – in very heavily secured areas. It is worth noting that this will be particularly easy if the region has been subject to any heavy bombardment, as the

¹*Raketniy Protivotankoviy Granatomet* – Rocket Anti-Tank Grenade Launcher. Often termed a Rocket Propelled Grenade.

resulting profusion of unexploded ordnance will furnish an ample supply of explosives. If the paramilitary force has suicide bombers among its membership, attacks may be especially hard to resist; however a very similar capability can be achieved through the use of so-called 'proxy bombers.'

Automatic weapons, RPGs and IEDs will typically make up the bulk of a paramilitary arsenal. However, there may be an actual or perceived risk from other classes of weapon. The most common of these are short or medium ranged unguided explosive rockets or mortars, sometimes home-made. Examples include the ex-Soviet 'Katyusha' rocket, or the various improvised barrack-buster mortars built by the Provisional IRA. Such weapons are commonly used to mount harassing attacks on secure areas. They seldom produce much effect, especially where the target is a well-organised and fortified military base, but a small trickle of casualties may result. On occasion, however, serious damage may be inflicted: as when expensive aircraft are destroyed on the ground.²

Rarely, paramilitary forces may have access to shoulder-fired anti-aircraft missiles, often termed man-portable air-defence systems (MANPADS). Examples may include the American Stinger (issued in large numbers to Muslim extremists during the Cold War) or the ex-Soviet SA-7 and later variants. Despite the fact that these weapons have very seldom been encountered by Western forces, even the vaguest suggestion that they are present may have very severe effects on air operations. Air forces are typically not as willing to risk casualties as ground troops, and may refuse to operate within a possible MANPAD engagement envelope.³ A perceived MANPAD threat may also lead to flights being conducted at unnecessarily low level, within range of RPG or small-arms attack, resulting in losses which would not otherwise have occurred.⁴

British troops have been fighting against paramilitary opponents almost continuously since the end of the Second World War, typically facing multiple opponents in different places. There is no end in sight. It can reasonably be stated that this is the predominant type of modern military action, and that this will continue to be the case for the foreseeable future. However, only a small proportion of the UK's existing military resources are even partially useful for this kind of warfare.

Armed Forces of Minor Powers

Occasionally, British forces may be called upon to engage in combat against the organised armed services of less-powerful but reasonably cohesive states. Examples include the Suez conflict, the Falklands campaign and the wars with Iraq in 1991 and 2003. On other occasions, no fighting has taken place but the ability to act in this way has been required and demonstrated; for example the Kosovo intervention of 1999. This kind of operation is relatively rare, and usually brief when it does occur. Nonetheless it is clearly necessary for British forces to be prepared for it. Prospective opponents might include the forces of Iran, Syria, Indonesia, Burma, or (possibly) Saudi Arabia.

In this type of scenario, the enemy is likely to possess numerous ground forces. Typically these will be poorly trained and motivated by Western standards, but there may be elite units of a somewhat higher quality. Commanders will aspire to Western or former-Soviet levels of

²On 15 November 2005 one RAF Harrier was destroyed and another damaged in a Katyusha rocket attack at Kandahar, putting a third of of the RAF's strike capability in Afghanistan out of action.

³The RAF initially felt unable to deploy its C-17 heavy airlifters into Afghanistan because a MANPAD threat was deemed to exist and the C-17 then lacked a defensive aids suite. The solution used was the chartering of Antonov heavy lifters from Russia. (These aircraft did not have a defensive aids suite either, but the Russian charter firm did not consider this to be a problem.) *House of Commons Hansard Written Answers* 18 Jan 2002.

⁴On 30 January 2005 an RAF Hercules medium airlifter was destroyed by insurgent forces while flying at low level just outside Baghdad. A report into the circumstances was subsequently released by the MoD, but the type of weapon which shot the aircraft down was excised from the text. It is nonetheless clear that the aircraft was only reachable due to being at low altitude.

equipment, but will not have achieved this in either density or sophistication. There may be large numbers of obsolete armoured vehicles including MBT/AIFV and significant amounts of artillery, but serviceability rates will be low and logistics usually weak. A small but potentially dangerous force of ground-attack aircraft will usually be present. There may also be some inaccurate theatre-range ballistic missiles, useful only for the media battle but highly effective in that.

Some national opponents may have air defence capabilities. These could range from MANPADS and light anti-aircraft guns up through an integrated network of radars and heavy surface-to-air missiles (SAM). A few nations may possess a functional or even dangerous force of air-superiority fighters, but only in the rarest cases (as when fighting a former ally) will the fighters be backed by airborne radar or equipped with effective long-range missiles.

The most significant opposing naval force in this type of scenario – if applicable – will normally be an improvised minelaying flotilla. There may also be a small number of diesel-electric submarines, typically in poor condition. However, as in the case of MANPADS, submarines may have disproportionate morale effects on our own maritime forces. Any other enemy naval forces, if present, are unlikely to pose any great threat.

The possibility always exists of a hostile minor power moving on to acquire more capable forces. However, it might reasonably be suggested that when a nation reaches such a level of wealth and organisation it will either not be a threat, or it will have acquired nuclear weapons; or both.

Armed Forces of Nuclear Powers

It has occasionally been credibly suggested that British forces might be required to wage conventional warfare against a major nation or alliance which was also equipped with nuclear weapons. The most obvious example was the Cold War, where massed Soviet tank armies backed by colossal airpower threatened western Europe. There was a risk that if the Red Army were unopposed by any NATO conventional forces, the Soviets might be tempted to swiftly seize West Germany and perhaps other non-nuclear states along the Iron Curtain. Realistically France, Britain and the US might well have chosen not to respond with nuclear force in such a situation, fearing a Soviet counterstrike: and yet they sought to preserve their allies/buffer-zone from communist conquest. Thus it made sense for NATO – including Britain – to possess land and air forces capable of engaging the powerful Soviet military in conventional warfare. Given that reinforcement from the continental USA would be essential, the presence of a strong Soviet navy in the Atlantic called for suitable NATO naval forces as well, to retain use of the seas and the skies above them.

Nowadays the Red Army no longer menaces Europe, and the Red Banner Northern Fleet is no more. Russia still maintains a nuclear arsenal, but cannot threaten Europe with invasion. However, it is often suggested that Britain might at some future point engage in conventionally-armed warfare against another nuclear nation. China, India and Pakistan are cited as possible opponents.

It is very difficult to see why or how such fighting would take place. The circumstances which made conventionally-armed combat possible between the Warsaw Pact and NATO do not exist elsewhere. The only nuclear state which even comes close to appearing as a possible conqueror is China. The People's Liberation Army could muster invasion forces comparable to those of the Red Army in its day, but this is a threat only to certain of China's neighbours, not to the UK or NATO. China aspires to a powerful navy, and may achieve one in time. Conceivably in future she might seek to subdue Taiwan, possibly drawing in the US. This has to be assessed as unlikely, but still possible. However, it is not obvious how involvement would benefit the UK.

In summary, Britain has never undertaken conventional warfare against a major, nuclear-equipped power, and in only one specific and unusual case has the capability to do so been

required. Some eminent commentators doubt even that⁵. This is not to say that such a requirement will never arise in future, but it must be regarded as extremely unlikely. Any kind of conventional British military force or capability which is only or principally useful for fighting a major, probably nuclear-armed enemy must be assessed as being something of a luxury.

TYPES OF CAPABILITY ON OFFER

We can see that there are three broad categories of enemy: paramilitaries, medium-weight national armed services, and the forces of nuclear-weapon states. Most of the time we can expect to be engaged against lightly-equipped paramilitaries; on occasion, against the organised forces of minor nations. The ability to conduct conventionally-armed war against major powers would seem unlikely to be required. Against this background it is possible to assess the usefulness of the various types of conventional forces that we possess now or might aspire to possess in future.

Light Infantry Battalions

A British light-infantry unit consists of between 600 and 700 men at full manning, though many existing units are understrength. In its standard configuration, the unit can field up to 216 fighting foot soldiers armed with individual weapons: remaining personnel will be in supporting roles or heavy-weapons crews. However, the proportion of fighting troops can easily be boosted if required. The unit is normally equipped with soft-skinned road transport only, though various kinds of lightly-protected vehicles may be present in a combat theatre. A selection of heavy weapons is available, including anti-tank rockets, machine guns and mortars.

Variant types of light infantry unit exist, most notably Parachute battalions and Commando units. These are elite troops, physically tougher than ordinary light infantry, more expensively trained and more selectively recruited. A Parachute battalion may be dropped by parachute; a Commando unit is expert in amphibious landings, and possesses light armoured vehicles called Viking. These are still vulnerable to RPGs, however.

The light infantry battalion is useful against all classes of opponent. Units of this type have conducted the vast majority of Britain's fighting since 1945.

Armoured Infantry Battalions

An armoured infantry unit is similar in many respects to a Light one. However it is able to move its fighting troops in Warrior AIFVs, invulnerable to RPG fire. The rest of the battalion can move to a large degree in tracked vehicles, which have some off-road capability but are mostly not well armoured. Tracked vehicles, particularly heavy ones like Warrior, cannot easily move on roads. The preponderance of armoured and tracked vehicles also means that an armoured-infantry unit needs much more logistic support than a Light one, and that it cannot so easily provide large numbers of fighting soldiers.

A variant of armoured infantry exists, called Mechanised infantry. These units use Saxon vehicles instead of Warrior, for reasons of economy. Their off-road mobility is limited and their armour protection is weak.

Armoured and mechanised infantry lack the universal applicability of light infantry, but are useful against all classes of opponent if they can be practicably deployed and sustained.

Reconnaissance Regiments

⁵General Sir Rupert Smith, in his book *The Utility of Force*, states that NATO tank armies of the Cold War 'lacked utility,' and suggests that the West won that conflict at least in part due to the fact that it did not fully match the Soviet conventional buildup, and so was able to prosper economically.

Reconnaissance regiments are the successors to the armoured-car units of yesteryear. In the Cold War the intention was that they would act as a light screen ahead of a major armoured formation, normally a division. With the army's reduction in strength to less than two fighting divisions, only one of which is armoured, this role has almost disappeared. Nonetheless, five Recce regiments remain. Nowadays such a regiment will be attached to every mechanised or armoured brigade, and even light brigades will have a smaller amount of Recce cavalry attached.

The unit contains up to 600 cavalymen, still with the same vehicles supplied for armoured-warfare reconnaissance. These are lightly armoured, unable to resist RPGs. They are tracked, giving the same general mobility characteristics as an armoured-infantry unit. The vehicles were not intended to carry personnel into dismounted action, and so the unit will have difficulty in supplying fighting foot soldiers unless it largely dispenses with them. This is often done, and Recce cavalymen frequently make useful contributions to combat against paramilitary forces. Nonetheless Recce units are not an efficient use of resources in that type of fighting.

Recce cavalry are principally useful in higher-intensity combat against middle-rank nations or better, and even here they are threatened with obsolescence. Much of their training and equipment is of little use against paramilitary opposition.

Armoured/Challenger 2 Regiments

Tank regiments are similar in makeup and organisation to Recce regiments, but rather than light fighting vehicles they provide heavy Main Battle Tanks, currently the Challenger 2. These vehicles are invulnerable to RPGs, but can carry no passengers and have all the problems of tracked vehicles to a very high degree. They are principally useful for engaging enemy armour in open-country battles, an unusual occurrence even against nation-state opposition and set to become more so. The unit can supply ordinary fighting troops in the same fashion as a Recce regiment, but its greater logistic requirements and expense make it an even less efficient means of doing so.

MBT regiments are principally useful in higher-intensity combat against middle-ranking powers or better, and even here they are threatened with obsolescence. Almost all their training and equipment is of little use against paramilitary opposition.

Light Artillery Regiments

Light artillery units provide 18 to 24 towed 105mm artillery pieces, which are towed for road movement by wheeled vehicles or moved by helicopter. The combined Regiment is able to deliver explosives at a maximum rate of 2.2 tons per minute to locations within 17km of its gun positions. Sustained delivery rates have run as high as 145 tons per day.⁶ The regiment is nearly as road-mobile and deployable as a light infantry battalion, far more so than any kind of armoured unit. It is able to provide useful numbers of fighting foot soldiers when fire support is not necessary. Plans to replace the 105mm light gun with more capable equipment have recently been delayed for reasons of economy.

The light-gun regiment's combination of deployability, mobility, reliability, firepower and easy conversion to the infantry role makes it useful against all classes of opposition.

Heavy Artillery (AS90/Braveheart or MLRS) Regiments

⁶Each 105mm HE shell weighs 15.1 kg, and the gun's maximum rate fire is 6 rounds per minute. Rates over time in the Falklands – the most intense employment seen by these weapons – were as high as 400 shells per gun per day. *Charles Heyman, Armed Forces of the United Kingdom.*

AS90 regiments are equipped with 18 to 24 self-propelled AS90/Braveheart artillery pieces, which have the same mobility, deployability and logistic characteristics as Challenger tanks. The combined Regiment is able to deliver explosives at a maximum rate of 6.3 tons per minute to locations within 30km of its gun positions⁷. In future this might be increased beyond 50km by use of specialised ammunition.

MLRS regiments field 18 Multiple Launch Rocket Systems which can deliver 65 tons of munitions in a single salvo. Reloading takes 20 to 40 minutes.⁸ The Regiment could be described as being able to deliver ordnance at an average rate of 1 ton per minute, and can do so to locations within 30km of its firing positions. It is worth noting that MLRS is an area-effect weapon at present, lacking any precision characteristics. Efforts are in hand to improve this somewhat. Current versions also leave their (large) target areas full of particularly dangerous unexploded ordnance, in effect creating fields of landmines whenever they are used. Again, efforts to reduce this problem are under way. MLRS launchers are somewhat more mobile and deployable than Challengers or AS90, similar to Recce vehicles.

Heavy artillery regiments are able to supply useful numbers of fighting soldiers if fire support is not required. Nonetheless, AS90s are cumbersome, MLRS are frequently unusable due to their undesirable side-effects and both weapons are difficult to deploy overseas. Both are principally useful in combat against relatively well-equipped national armed forces, and even here they have strong rivals for their work. Neither are worthwhile when fighting against paramilitaries.

Air Defence Artillery

The British army has three complete regiments dedicated to ground-based air defence, with substantial and expensive equipment. This is a capability of no use whatsoever against paramilitary opponents, and it will be useful only on very rare (and probably disastrous) occasions when fighting national armed forces. An example was the Falklands conflict, where British fighter capability was weak owing to lack of maritime AWACS. Ground missile batteries did sterling work but ultimately were unable to prevent Argentine strike pilots from operating to deadly effect. Fortunately most of the bombs were aimed at escort warships, high-value targets but irrelevant to the amphibious campaign; also the British troops were mainly light infantry and well dispersed, a difficult target for air power to engage.

It is worth noting that Rapier, the most powerful British land-based air-defence missile, cannot hit an aircraft flying above 10,000 feet.⁹ Jets can easily fly at over 30,000 feet. Making accurate strikes from these higher altitudes requires the use of smart weapons, which for the past ten years have been available only to Western forces. However, basic smart bombs are not that hard to build. They are already being manufactured outside the US and Europe.¹⁰ Long-range inertial/TV-guided air-to-ground weapons have been widely exported from Russia for some time.¹¹

From an engineering and economics viewpoint, it is much easier and more efficient to dominate airspace from well above the surface. Given that such domination is a fairly uncommon task, less efficient surface-based methods would seem marginally worthwhile at best.

⁷Each 155mm projectile weighs 43.5kg and the gun's maximum sustained rate is six rounds per minute. *British Army.*

⁸Charles Heyman, *Armed Forces of the United Kingdom.*

⁹John R Pike, *globalsecurity.org.*

¹⁰Taiwan expects to field its "Wan Chien" stand-off smartbomb within the next four years. Iran has already manufactured its own "Qadr" and "Zoobin" precision stand-off weapons, getting a jump start from American equipment supplied to the Shah's air force.

¹¹Syria, for example, fields AS-14 and AS-18 weapons which would permit the Syrian air force to carry out precise strikes against British ground forces, either ignoring or even purposefully destroying their air defences.

Formations and Support Units

Infantry battalions are sometimes used independently, without many supporting troops: especially in warfare against paramilitary-level opposition. Cavalry and artillery units are not usually of any use alone, except when fully converted to the infantry role. Where fighting against better-equipped enemies is expected, combat units will be organised into brigades. A light brigade is based around three light infantry battalions; a mechanised brigade will have mechanised infantry battalions and a tank regiment; an armoured brigade will have armoured infantry and tanks. All brigades have a gun artillery regiment: light guns for a light brigade and AS90s for the other types. Mechanised and armoured brigades will have a full Recce regiment as well. One logistics regiment is required for each fighting brigade. An engineer unit should be assigned as well.

The British forces maintain eight permanent fighting brigade organisations: only three of them are light. The other five typically function as close approximations of light brigades in real-world operations, but are optimised for high-intensity armoured warfare. Britain maintains some ability to deploy its heavy brigades as an armoured division, but has not done so since 1991. If it were to occur again, the division might have an MLRS regiment attached.

Formation headquarters and support units are vital to any kind of serious operation. In the case of support units this includes humanitarian relief as well as fighting against every class of opponent. These units are normally heavily overworked as a result.

Reconnaissance Aircraft

Britain operates two main types of visual recce aircraft. The first is a modified Tornado strike jet, the second is the Phoenix unmanned drone. The jet has speed and range an order of magnitude greater than the drone, but its acquisition cost is *two* orders of magnitude greater and it requires an aircrew to run risks. Twenty-seven drones can be operated by a group of approximately 200 personnel; this would be a sufficient number to support perhaps six jets.

More capable drones are available, with greater range and endurance than manned aircraft. Some are able to carry out combat missions as well as reconnaissance. These machines are more expensive to buy than Phoenixes, but much cheaper than manned jets. They are at least as manpower-intensive as normal combat aircraft, but none of the manpower needs to run any risks and many personnel need not even go overseas.¹²

Britain is also seeking to acquire a radar-reconnaissance aircraft similar in nature to the American JSTARS (Joint Surveillance and Target Acquisition Radar System). The JSTARS can scan vast areas of country very quickly from afar, detecting or monitoring all moving vehicles and picking out those which are military from any civilian traffic. Its appearance sounds a death knell for opposing armoured formations: they will be detected as soon as they move, and then torn apart by strike air. The British project is called ASTOR (Airborne Stand Off Radar).

Reconnaissance aircraft are useful against all classes of opposition. It is reasonable to suggest that they are more effective than light-armour regiments at doing reconnaissance, and involve much less risk to personnel.

Transport Helicopters

The British transport helicopter fleet is badly disorganised and has suffered from decades of under-investment. Five types of aircraft are operated by all three services, with many sub types, creating a terrible maintenance and management problem. Total capacity is woefully low. Half

¹²Current American Predator drones operating in Iraq and Afghanistan are piloted from Nellis Air Force Base in the USA. The RAF has 44 personnel based there, gaining experience with the Predator. Technical and engineering staff frequently deploy to south-west Asia; pilots and operators remain in America.

the existing fleet is more than 25 years old, and in many cases these aged aircraft are almost useless. It should also be noted that costs per flying hour escalate as helicopters age, putting severe strain on operational budgets.

The only reasonably effective transport helicopters currently in service are the Chinook HC2 and the Merlin HC3. These cost a similar amount to acquire, but the Merlin is noticeably less capable. The Merlin also took five years from delivery to being judged ready for deployment to combat theatres.

Lift helicopters are extremely useful against all types of opposition and for humanitarian assistance. They are often the only safe form of transport in a combat theatre. The British capability in this area is pitifully weak, but very little funding is currently allocated to rectify matters. Indeed, future helicopter projects have been cut back in recent years. This more than any other single thing exemplifies how the procurement process is failing our combat troops: their most urgent requirement is being postponed yet again due to utter mismanagement.

Strike Aircraft

A Harrier jet can deliver 3 tons of ordnance 170 km from its operating base with an hour's loiter time in the target area¹³. Harriers move at 420 knots, and turnaround times between strike missions can average as low as 23 minutes¹⁴. Availability rates of 90% during combat operations have been reported.¹⁵ These figures equate to a delivery rate of over 500 tons per day for a detachment of six Harriers, comparable to the output of a regiment of heavy artillery.

A single Apache attack helicopter can deliver 1.8 tons of ordnance 170km from its base, with twenty minutes' loiter time in the target region¹⁶. It travels at 145 knots and turns round between missions as fast as a Harrier. An availability rate of 75% is a reasonable assumption¹⁷. A detachment of eight Apaches could deliver 130 tons of ordnance per day, comparable to the striking power of a light artillery regiment.

Artillery could sustain a high rate of bombardment for much longer and often has a shorter response time; but on the other hand aircraft possess conservatively ten times the range and therefore a hundred times the area coverage. Strike air can achieve even greater reach at the cost of less ordnance delivered and/or less loiter time. A detachment of six jets or eight Apaches will normally be accompanied by approximately 180 personnel, less than a third the numbers of an artillery regiment.

Neither Apaches nor Harriers require a runway to operate; both can work from improvised forward bases or ships at sea. An advantage for the Apache is its integration under the command of ground units. The Harrier is typically attached to a different chain of command, reducing its usefulness. On the other hand, the Apache is relatively slow, unreliable and lacks load-carrying ability. It must also be shipped into the theatre of war, whereas the Harrier can self-deploy.

For the purpose of delivering explosives it would appear that eight Apaches are better than a regiment of artillery, and that six Harriers are better than either.

Almost all current strike aircraft and those of the foreseeable future were originally intended to deliver ordnance against enemy ground targets in a hostile air environment, typically at low level. They are hugely over-engineered for their typical modern task, the delivery of precision ordnance from high altitudes in a relatively safe air environment. An interesting departure from this design

¹³Weapons load of 12 x 500lb bombs.

¹⁴During Operation Desert Storm 1991. *US Marine Corps*.

¹⁵During Operation Desert Storm in 1991 and the Falklands conflict 1982. *US Marine Corps, Royal Navy*.

¹⁶A weapons load of 76 2.75" HE rockets and 1200 rounds of 30mm.

¹⁷The US Army, the main operator of Apaches, has set 75% availability as its goal. *US Army*.

philosophy is the use of transport aircraft to deliver ordnance. A Hercules transport can be fitted with cannon or may simply drop precision-guided ordnance from its cargo ramp. Such use is quite frequent in the US special-operations forces, but no operational figures are available. However, it is plain that transports could deliver ordnance much more efficiently than normal strike aircraft; and they are also useful for other things.

Fighter and AWACS Aircraft

Only a few types of Western military unit can operate or even survive under hostile air attack. Surface-based air defences offer only the feeblest protection, and that only over small areas. Most small-nation adversaries possess at least some strike air capability, and thus it is essential for the British forces to have a credible, effective, deployable air-superiority force to win command of the skies.

Two main components are necessary to achieve air superiority. The first is a force of fighter aircraft; the second is a sufficiency of airborne-warning and command system (AWACS) planes, which can monitor a large stretch of sky and despatch fighters against hostile aircraft detected. A typical fighter/AWACS combination can dominate regions of airspace five hundred miles across, even against low-flying attackers; this represents area coverage at least a hundred times greater than the best surface-based anti-air systems.

Fighter aircraft fall into two main classes. The first might be termed superfighters; these are cutting edge air-to-air combat jets built almost without regard to cost and in some cases without regard to usability. They are extremely expensive, so much so that they dominate national procurement budgets, and initially they will be delivered with limited or no ability to conduct air-to-ground strike operations. Full strike capability will surely be added later, but colossally expensive superfighters can never be described as a cost-effective way to carry out air-to-ground missions.

Examples of this type include the new American F-22 and the Eurofighter, about to enter service with the USAF and RAF respectively. These planes were designed during the later Cold War to counter the final generation of high-end Soviet fighters, principally the MiG-29 and the Su-27. These two types are now widely exported from Russia, and it is reasonably suggested that British forces might need to engage them in future.¹⁸ Thus many air planners would contend that superfighter capability (Eurofighter or equivalent) is a necessity. Superfighter proponents would suggest that less capable aircraft cannot engage and defeat a MiG-29 or Su-27 equipped enemy force.

However, this is actually a very difficult argument to support. It is widely acknowledged that the ex-Soviet fighters could be overcome using ordinary Western jets armed with modern beyond-visual-range missiles which are already in service, such as AMRAAM¹⁹. Given the limited numbers of MiGs and Sukhois likely to be fielded by those nations we would actually fight and the poor condition the aircraft and crews would be in, it is hard to see a Third-World air force as the kind of opposition that would justify hundreds of expensive superfighters.

There is a second class of fighter available, designed with either cost or useability (or both) in mind. Examples include the F-16 and F-18 today, and some versions of the Joint Strike Fighter/Future Joint Combat Aircraft/F-35 in future. These aircraft, equipped with the right

¹⁸As an example, even such poor nations as Ethiopia and Eritrea have engaged in air-to-air battles using MiG-29s and Su-27s during 1999 and 2000. At least six aircraft were shot down, some of them apparently by local pilots rather than the Russian mercenaries who were active on both sides.

¹⁹The German Luftwaffe operates Mig-29s inherited from the former East German air force. A West German pilot who flew MiGs after unification assessed the aircraft as deadly in close-in combat, but vulnerable in modern long range engagements. He described exercises against current, mid-priced F-16 fighter-bombers. "The MiG-29 is a superb fighter for close-in combat . . . [However] we might seldom have got close in if they used their [long-range missiles]." Oberstleutnant Johann Koeck, quoted in *Jane's at the Controls: Mig-29, Jon Lake*.

missiles, could defeat even the most deadly aerial enemies. They are also relatively cost-effective for use in strike missions, and can often be operated from aircraft carriers at sea rather than needing a large, vulnerable, possibly unavailable airbase in the theatre of war. This second type of fighter would seem very much more suitable for the combat which British forces will actually undertake. Pilots in these more reasonably-priced aircraft, required to overcome unusually capable opponents with the best Russian export machines, might conceivably suffer some casualties: but not many compared to those routinely sustained by UK ground forces. It makes little sense to spend the bulk of our procurement budget keeping a numerically tiny number of our personnel entirely safe from a small, unlikely threat. Superfighters are not necessary for the UK in the current world picture.

For the future, there is one issue of concern in this area. British industry, with the active encouragement of the British government, is about to sell Eurofighter to the Saudi regime. It is not all that difficult to see the nation now called Saudi Arabia becoming an adversary in future. Thus, it is possible that the Eurofighter could one day actually face a worthy opponent: itself. The Eurofighter might then be said to be a worthwhile purchase for UK, but only if we also supply it to tyrannical extremist regimes at a reduced price²⁰, as we are about to do. Indeed, one could speculate that the Western aerospace industry may seek to build yet a further generation of absurdly expensive aerial weaponry to overcome the threat they are creating today.

Apart from fighters, there is also a need for AWACS planes. These are already in service, in conventional runway-launched airframes. The main issue for the future is the need to have this capability in carrier-borne aircraft. The British future carrier project has comprehensively failed to tackle this, and the likelihood is that the Royal Navy will have to continue with the present improvised helicopter-borne solution. This is far from ideal as helicopters cannot achieve anything like the altitudes and detection ranges that aeroplanes can, and also lack endurance.

Fighters and AWACS aircraft are typically essential against minor-power opposition, particularly if they can be based at sea. They are of no use against paramilitaries except in rare cases, for example airliners hijacked by suicide pilots.

Transport and Tanker Aircraft

Transport and tanker planes are of two main types. The first are large, long-range turbofan-powered aircraft. These can carry big cargoes at high speed over long distances but normally require a long concrete runway. The American C-17, of this type, has largely overcome the runway limitation by the use of new technology. Such aircraft are manufactured only in Russia and America, and therefore the British forces are not normally permitted to purchase them. This means that they are routinely chartered from the former Soviet nations for most long-range operations and even exercises. However, the RAF has managed to obtain five C-17s following interminable delays to the collaborative European transport-aircraft programme.

The second type are smaller, shorter-ranged turboprops. These have no difficulty with short, rough airstrips but carry only small loads, slowly, over quite short distances. Aircraft of this type are not really suitable for conducting intercontinental deployments, but are very useful for ferrying

²⁰The Saudis are to purchase 72 Eurofighters. The price is being kept secret, but has been estimated in the press as £6bn; giving a price per Saudi Eurofighter of £83m. The UK MoD has estimated the eventual total cost to the British taxpayer of the Eurofighter programme of £20bn, on the basis of the RAF receiving 232 aircraft. It is possible that this number will be cut to 144, reducing the programme total to approximately £18bn and so giving a cost per British Eurofighter of £125m. If the order is not cut, one might note that the RAF plans to form only seven Eurofighter squadrons, which would translate to a maximum of 150 airframes in service. The remaining 80-plus jets would presumably be permanently mothballed – effectively, discarded – as was done with excess Tornado F3s and Nimrod patrol planes in the past. In that case the taxpayer cost per RAF Eurofighter would be £135m, 60% more than the likely Saudi price. (The MoD has quoted figures as low as £40m per RAF Eurofighter: these numbers can be produced only by the most creative accounting.)

loads within a theatre of war. This is especially true where a paramilitary threat has made all ground travel dangerous, as in Iraq or Afghanistan at present. Modern turboprop transports are at present built only in Russia and America, but an immensely expensive and long-drawn-out effort is underway to achieve such a manufacturing base in Europe. Part of this effort was British until very lately²¹, and as a result almost all future British airlift funding has been directed into it.

Transport and tanker aircraft of both types are vital to almost every military operation, from humanitarian assistance to high-intensity combat. British capacity in this area is totally insufficient. Aircraft are routinely chartered from the former-Soviet nations, and even with such stopgaps combat troops are being badly let down.²²

Tanker planes use the same types of airframe as transports, but are intended to supply fuel to combat aircraft in mid-air (in some cases the same aircraft can be used for both missions). They are vital when deploying a force of aircraft into a combat theatre, and they also permit many operations to take place which would not otherwise be feasible. Tankers are nearly as useful as air transports. British capacity here is similarly woeful, and yet funding to address the problem has been cut back.

Aircraft Carriers

A Nimitz-class aircraft carrier of the United States Navy has an acquisition cost of US\$4bn²³, approximately £2.1bn sterling. It carries 85 aircraft, including highly effective fighter, strike and AWACS. It would be capable on its own of defeating most minor-power air forces, establishing air superiority above the MANPAD ceiling and conducting strike missions at will without any local basing or support.

The British MoD is at present seeking to acquire two aircraft carriers from British and French industrial concerns. Older estimates suggest these will have an acquisition cost of £1.5bn each²⁴; it will be surprising if this figure does not rise to surpass the cost of a Nimitz-class vessel. However, the British carriers will carry only 40 aircraft, and their AWACS capability in particular will be badly limited by the fact that they will – at least initially – not be able to support ordinary jet aircraft, only STOVL jump-jets and helicopters. It is hard to describe the current British carrier programme as good value for money. This is due to the insistence on placing most of the work in the UK, which is necessitating a rebuild of the dying British shipbuilding industry. This would appear foolish, as the industry will simply collapse again in ten years or so; it will never be able to win business from other customers than the British government.

Aircraft carriers are useful in fighting against all classes of opponent, even paramilitaries, as they provide almost-Invulnerable, independent, mobile bases for many kinds of air support. They are most valuable against nation-state opposition, however.

Amphibious Ships

²¹BAE is currently in the process of selling its interest in Airbus. This will render Airbus Military, the European collaborative turboprop-transport manufacturer, wholly offshore owned. In the current European manufacturing environment it seems likely that by the time the planes are delivered (2011 at the soonest) their procurement by the RAF will no longer be safeguarding any great number of British jobs.

²²“During our visit to Iraq, we heard that airbridge reliability remained a key concern . . . The difficulties stem from problems . . . with the C-130 Hercules in theatre and the availability of RAF airbridge Tristar, VC10 and C-17. Troops travelling home on leave are frequently delayed and this reduces their time on leave. **It is unacceptable that Servicemen and women, serving greatly in excess of Harmony Guidelines, should have their leave disrupted by the MoD's inability to provide a reliable airbridge.**” *Commons Defence Committee 13th report, July 2006.*

²³Source: Government Accountability Office, US Congress.

²⁴BAE Systems press release dated June 26 2002. Authoritative figures later than this are hard to find, suggesting that the cost has indeed escalated significantly.

Specialised shipping is necessary whenever one wishes to disembark troops or equipment without the use of a modern harbour. Such shipping is cheap as defence projects go, and can be run cheaply as well. (Only a small proportion of current British amphibious ships are operated by the Royal Navy. Most are crewed by civilians, some not even MoD employees.) Nonetheless, current British provision is inadequate even to deploy the specialist Marine Commando amphibious brigade.

Amphibious ships are most useful against nation-state opposition, allowing British forces to force entry to a theatre of war from the sea even if no friendly governments are present. However, amphibious ships have also proven to be of use for humanitarian assistance and evacuation of British or friendly nationals from trouble spots. They have also supported operations against paramilitary opponents, as in Sierra Leone.

Anti-submarine Helicopters and Aircraft

Capable enemy submarine forces are extremely rare. Where they do exist, however, the first-choice method of engaging them is the use of aircraft. The Royal Navy now possesses a large fleet of Merlin anti-submarine helicopters, which can be based easily on almost any kind of warship or fleet-auxiliary vessel (or ashore, or on many chartered platforms). The Merlin's performance is said to be such that two aircraft could monitor the entire English Channel for submarine activity.²⁵ Thus it may reasonably be said that the Merlin force is more than adequate to take on any likely future submarine threat, and no other capability is required in this area. Nonetheless, a £3-4 bn programme is underway to provide 12 upgraded Nimrod long-range anti-submarine patrol planes in addition.

Anti-submarine forces are useful only against nation state actors, and only occasionally even then.

Destroyers

Destroyers are highly specialised warships built around extremely expensive anti-air missile systems. They are intended to protect fleets of ships from air attack. The Royal Navy is about to receive the largely French Principal Anti-Air Missile System (PAAMS), carried in Type 45 ships. If this works, it will confer the ability to shoot down low-flying attackers up to 17 nautical miles from the ship and higher-flying enemies as far off as 55 nautical miles. The cost of each ship is approaching £1bn²⁶, almost as much as the projected price of an aircraft carrier (see above). This could reasonably be described as a marginally useful capability compared to that provided by a fighter/AWACS combination able to suppress enemy air activity across hundreds of miles.

Destroyers have utility only in the total absence of friendly air-superiority forces, and then only rarely. Despite this they are extremely expensive, and so cannot possibly be described as a cost-effective way to spend money at any time.

Frigates

Frigates are similar to destroyers, but lack the heavy air-defence missiles. They commonly mount some air defences, but these are short-ranged and principally useful for defending the ship itself. Frigates also have a sharply limited ability to bombard the shore with artillery shells, achieving approximately one-fifth the delivery rate of a light artillery regiment²⁷. This can be

²⁵Royal Navy.

²⁶The National Audit Office produces an annual report on major defence projects. The total cost of the six Type 45 destroyers currently on order was £5.2 billion in 2001, rising steadily to £5.9bn in 2005. *National Audit Office*.

²⁷The 114mm guns mounted in British frigates are roughly equivalent to Army 105mm pieces. The naval weapon has a maximum rate of fire of thirty rounds per minute: a regiment of twenty-four 105mm guns

sustained for only ten minutes before the ship's magazines are empty. Almost all active combat employment for British frigates post-1945 has consisted of such bombardment.

The principal role of frigates is usually seen as being anti-submarine warfare. In fact, however, useful involvement by the frigate will typically be limited to acting as a base for an anti-submarine helicopter. This will be even more the case following the introduction of the highly capable Merlin helicopter (see above). As a way of buying seagoing helicopter spots, the frigate is astonishingly uneconomic.²⁸ In future a few frigates may be fitted with a new sonar, possibly giving them some other utility in anti-submarine fighting.

Similarly, frigates carry Harpoon missiles for use against other surface ships; but such engagements are very rare and such missiles better delivered by aircraft or submarines.

Frigates are almost never useful in proportion to their cost, no matter the type of opposition one may be facing.

Naval Minewarfare Forces

Generally speaking, most of the materiel for any substantial British military deployment will travel to its destination by sea. Most minor-power naval forces and even some paramilitary organisations will be able to achieve some kind of sea going minelaying capability, potentially hamstringing any such deployment. The Iraqi navy of 1991 knocked out two major US warships by such means²⁹. In an earlier war, a US admiral had been moved to write that "we have lost control of the seas to a nation without a navy, using pre-World War I weapons, laid by vessels that were utilized at the time of the birth of Christ."³⁰

Naval mine countermeasures (MCM) forces can clear enemy mines, potentially regaining the use of the seas. The Royal Navy retains appropriate capabilities in this area, though somewhat threatened.

Naval minewarfare forces are useful to any deployment whose supply lines run through waters to which the enemy has access. As such they are occasionally useful against paramilitary level opposition and frequently against national adversaries.

Submarines

Submarines are of two main types: those powered by nuclear reactors, and those using a diesel-electric system. The Royal Navy operates only nuclear-powered vessels. Diesel electric boats are frequently held up as a terrible threat by anti-submarine specialists seeking to justify budgets and careers, but in fact they are of little use in most situations. This is owing to the fact that they have very little submerged speed or endurance. Diesel-electric craft are more accurately described as submersible torpedo/missile boats rather than as true submarines. Their effectiveness in WWI and the early stages of WWII was due to the absence of enemy radar and aircraft in the areas where they operated.

can fire at 144 shells/min.

²⁸Example: The Royal Fleet Auxiliary vessel *Argus*, an aviation support ship (a civilian-manned helicopter carrier) cost £63million in 1988 – equivalent to £105m in today's money. She can support at least four helicopters, for a price of £26m each. The cost of buying a Type 23 frigate – for one helicopter spot achieved – has been reported to Parliament as being as high as £195m and as low as £95m; the Royal Navy website currently lists the frigate HMS Iron Duke as having cost £140m, but experience suggests that this figure will be removed as soon as it is referenced. It is clear that helicopter spaces in frigates cost anywhere from three to eight times the going rate.

²⁹USS *Princeton*, an Aegis missile cruiser, and USS *Tripoli*, a helicopter carrier.

³⁰Rear Admiral Allan Smith, commanding the American advance force at Wonsan, Korea, in 1950. *US Naval Historical Center*.

By contrast, a nuclear powered submarine can remain submerged for months, travelling fast the entire time. It is invulnerable to enemy air and surface forces other than specialist, expensive anti-submarine units (possessed only by major powers) and it carries a wide range of weapons. These may include cruise missiles which can attack shore targets hundreds of miles inland, as well as relatively ordinary torpedoes and anti-shipping missiles. Submarines can also act as an extremely stealthy means of deploying special forces, though the British capability in this area has recently been badly cut back.³¹

The nuclear submarine's worst weakness is its lack of sensor range. When fully submerged it is limited to the use of sonar, which can detect only ships and submarines; and those, only when close by. If the sub puts up masts to use radar it will be vulnerable to detection itself. Communications with a submerged submarine are also severely restricted, making it difficult to integrate such vessels into fleet manoeuvres.

Nuclear powered submarines are principally useful against minor-power opposition or stronger, but might conceivably have certain uses against paramilitaries (usually this would involve intelligence-gathering, cruise-missile strikes or special-forces operations).

Tabulating this information is useful, allowing an easy comparison of the value for money provided by the various types of friendly forces and a recommendation as to whether each type should be increased, maintained, decreased or dispensed with.

³¹HMS *Spartan*, the UK's only submarine fitted with a 'dry hangar' for deployment of special forces swimmer-delivery mini-subs, has recently been decommissioned. No such capability will exist until at least 2009. *Telegraph*, 16 Jan 2006.

Table 1
Relative Qualities of Friendly Forces and Recommendations for the Future

Type of Unit	People in Theatre	Deployability	Major Equipment Cost	Cost-Effectiveness versus		Notes	More or Less?
				Para-militaries	Minor Powers		
Light Infantry Btn	600-700	Good	<£50m	Good	Good	Many fighting troops	More
Armoured Inf Btn	700-750	Poor	£200-300m	OK	Good	Some troops Warrior	Same
Recce Regt	500-600	Medium	£100-200m	Poor	OK	Some troops Light armour	Reduce
Tank Regt	450-550	Poor	£300-400m	Poor	OK	Some troops Heavy tanks	None
Light Artillery Regt	550-650	Good	<£50m	OK	Good	Useful troops 140 tons/day to 17km	More ³²
Heavy Artillery Regt	700-800	Poor	£100m	Poor	OK	Some troops 400 tons/day to 30+ km	None
Air Defence Regt	550-650	Medium	Up to £1bn	Poor	Poor	Some troops + very limited air defence	None ³³
Recce Drone ³⁴	20 ³⁵	Good	<£5m	Good	Good	Totally safe	More
Radar Recce Aircraft	30	Good ³⁶	Up to £160m	OK	Good	Safe, covers vast areas	More ³⁷
8 x Attack Helicopter	180-200	Medium ³⁸	At least £350m	OK	OK	130 tons/day to 170km	Same

³²All brigade artillery should convert to towed guns with a strong emphasis on the infantry role. It is hard to see any real need for divisional artillery if adequate air assets are present.

³³As an insurance policy it would make sense to retain substantial stocks of MANPADs and trained users distributed across the land forces.

³⁴Based on Predator aircraft in service with the US and jointly operated by UK forces. Some of these are now armed for combat missions.

³⁵These aircraft need further support personnel back in the home country in order to operate.

³⁶Deployability is good for land-based aircraft if there are friendly bases in theatre and a sufficiency of tanker aircraft, otherwise Poor. Carrier aircraft always have Good deployability.

³⁷Various drone options look much more promising than the present ASTOR programme. However it is too advanced to be usefully cancelled.

³⁸It is undesirable to self-deploy helicopters over long distances: if not sea-based, they must be shipped as cargo.

Type of Unit	People in Theatre	Deployability	Major Equipment Cost	Cost-Effectiveness versus		Notes	More or Less?
				Para-militaries	Minor Powers		
6 x Super fighter ³⁹	180-200	Good ³⁴	At least £510m	Poor	Poor	Air defence & 400 tons/day to 170+ km	Less
6 x Multi-role Jet ⁴⁰	180-200	Good	£300-400m	OK	Good	Air defence & 400 tons/day to 170+ km	More
AWACS aircraft	40-50	Good ³⁴	Around £200m	Poor	Good	Vital for air superiority	
Transport Helicopter	20-30	Medium ³⁶	£30-60m	Good	Good	Fast, safe transport	More!
Transport Turboprop	10 ³³	Good	£100m	Good	OK	Possible strike & tanker use	More
Heavy Air Transport	10 ³³	Good ³⁴	Approx £153m ⁴¹	Good	OK	Essential for airbridge	More
Tanker aircraft	10 ³³	Good ³³	Unknown	OK	OK		More
Aircraft Carrier	1000 ⁴² + air group	Good	£1.5bn +	OK	Good	Own AWACS essential	More
Amphibious Ship	60-200 ⁴⁰ + cargo	Good	As little as £75m ⁴³	OK	Good		More
Destroyer	200-300	Good	£1bn	Nil	Poor	Limited air defence	None
Frigate	200-250	Good	£100-250m	Nil	Poor	Limited anti-submarine	None
Naval MCM ⁴⁴ Group	300-350	Medium	£300m	OK	Good	Necessary for sealift or amphibious	Same

³⁹Based on Eurofighter Typhoon, assuming a later model with useful strike capability.

⁴⁰Based on F-35B STOVL, assuming that it achieves a strike capability at least equal to current Harriers.

⁴¹Based on the UK's Short-Term Strategic Airlift programme. Four C-17s were originally leased. An extra aircraft has since been obtained and the leases bought out, with total costs estimated at £769m in Mar 2004 by the Defence Procurement Agency. The deal angered the British aerospace industry and its many allies.

⁴²Crews of such ships are in the theatre of war, but are typically very safe. They could potentially be civilianised, saving large sums; some already have been.

⁴³Four Swan Hunter built Landing Ship Dock (Auxiliary) vessels are projected to cost £309m as of Dec 2005.

⁴⁴Mine Countermeasures Group of five minehunters with forward-support unit, clearance diving unit and HQ.

<i>Type of Unit</i>	<i>People in Theatre</i>	<i>Deployability</i>	<i>Major Equipment Cost</i>	<i>Cost-Effectiveness versus</i>		<i>Notes</i>	<i>More or Less?</i>
				<i>Para-militaries</i>	<i>Minor Powers</i>		
Submarine	100	Good	£1.1bn ⁴⁵	Poor/Nil	OK	Good for anti-sub and other tasks	Same
8 x Anti-Submarine Helicopter ⁴⁶	200-250	Good	£850m	Poor/Nil	OK	Only anti-submarine force needed	Same
Anti-sub Patrol Plane ⁴⁷	40-50	Good ³³	£200m+	Poor/Nil	Poor	Not required given helis & own subs	None

⁴⁵Based on current projections for the Astute class submarines.

⁴⁶Based on existing Merlin aircraft.

⁴⁷Based on current projections for Nimrod MRA4.

EQUIPMENT PROCUREMENT SITUATION

Having covered the usefulness of military capabilities, it now time to examine costs.

An almost total curtain of secrecy has descended during late years over the finances and future plans of the Ministry of Defence. In particular the Defence Procurement Agency releases only the most vague and general hints as to how it might spend the large sums of public money it has at its disposal. Important projects appear and disappear without public announcements; such figures as are released (usually by other agencies, for instance the National Audit Office) are often suppressed on the grounds that they are “commercially sensitive.” So far from moving towards open government, the Ministry of Defence is now significantly less transparent than in the past, and this trend is intensifying.

Despite the present opacity, certain figures are available.

Departmental Expenditure Limits (£m)	2003/04	2004/05	2005/06
	Outturn	Provisional Outturn	Plans
Intangible Assets ⁴⁸	1662	1579	1943
Assets Under Construction ⁴⁹	3594	4334	4344
Total Future Equipment Spending	5256	5913	6287

Source: MoD Directorate of Performance and Analysis

It is of little use to compare figures prior to 2003/04 as the introduction of Resource Account Budgeting completed at that point, skewing all trends within the MoD. Nonetheless it is clear that equipment spending has risen by almost 20% over the last three financial years.

During the same period, a number of other announcements have been made:

- Four infantry battalions have been cut.
- A squadron of Tornado F3 fighters and two squadrons of Jaguar strike jets were closed down.
- The active force of Nimrod MR2 anti-submarine planes was reduced from 21 to 16 aircraft
- Three destroyers and three frigates were decommissioned.
- Three Sandown class minehunters and three patrol vessels were decommissioned.
- RAF Coltishall was closed.
- Some 20,000 military and civilian posts were cut from the MoD.
- It was announced that the procurement of Type 45 destroyers would reduce from twelve to eight (and this may fall to six).
- The entire fleet of Sea Harrier jump-jet fighters was discarded

One might have thought that a sharp rise in procurement spending and these painful economies in running costs would be accompanied by ambitious plans for new, modern equipment in future. In fact, however, during the same period:

- A proposed Aviation Support Ship plan was cancelled.
- Cuts of over £1bn to planned funding for future helicopter projects was announced, leading to

⁴⁸“Intangible Assets comprise the development costs of major equipment projects.”

⁴⁹“Assets Under Construction largely consist of major weapons platforms under construction in the Defence Procurement Agency.”

many existing programmes being merged into a “Future Rotorcraft Capability.” This remains effectively in limbo, despite the critical need for new helicopters.

- The Nimrod MRA4 replacement programme was reduced from 18 to 12 aircraft.
- The Future Offensive Air System project team was disbanded within the Aircraft Cluster of the DPA, and largely reassigned to look into cheaper drone options
- The Future Surface Combatant project team was broken up. Aspirations for the next decade were limited to a relatively affordable off-the-shelf replacement of a few of the oldest current ships
- Artillery Projects were cut back or delayed (notably replacement light artillery)

Despite all this, it is an open secret that remaining procurement plans for the period 2011-21 (“Equipment Plan [EP] 07”) currently being assembled within the MoD, still cannot be made to fit within the likely available funding. Leaks in the specialist press suggest that the total shortfall over this period is approximately £12bn.⁵⁰ Looking at current trends, with the equipment budget running at approximately £6bn, it would appear that there might be £60bn or a little more in today's money to spend over the 2011-21 decade – assuming that defence spending keeps pace with inflation.

The following is a list of known projects with very rough estimates of costs that might arise during the EP07 period. These are of necessity inexact owing to the MoD's refusal to divulge its own figures. Those shown in bold are beyond Main Gate stage, meaning that contracts are inked and cancellation would produce little in the way of savings.

Future Rapid Effects System £14bn – new generation of Army combat vehicles
 Future Carriers £3-4bn – the proposed new Aircraft Carriers
 F-35 £10bn – the replacement for the Harrier and Sea Harrier; the future carrier plane
 Eurofighter Tranche 3 £2-4bn – the final 88 superfighters for the RAF (unlikely to actually be used)
 Medium Sized Vessel Derivative £3-4bn – replacement of ageing naval frigates
 Future Rotorcraft £3bn – some minimal, too-late effort to replace the antique British helicopter fleet
BVRAAM £1bn – the new very-long-range European air-to-air missile
Astute £1-2bn – introduction of the first three new submarines
Nimrod MRA4 £2bn – arrival of the replacement anti-submarine patrol planes
 Ground Based Air Defence £3-4bn – replacement of the entire British SAM network
A400M £1bn – the new European turboprop air transport will arrive
 SPEAR £2-3bn – a new smart bomb/missile in addition to Storm Shadow and Paveway
Watchkeeper £1bn – the first serious British reconnaissance drone
 FASGW £2bn – a new air-launched anti-shipping missile
Skynet £2bn – much of the new PFI satcomms network will be paid for next decade
Type 45 Destroyers £2-3bn – remaining vessels of the class will arrive (assumes only six bought)
 FIST £2bn – the new close-combat miracle suits
 Strategic Tanker £5-10bn – the new PFI effort to provide Airbus tanker/airbridge aircraft
 UKMFTS £5-10bn – the new consolidated military flying training system
 Artillery £1bn – various artillery projects
 MARS £1-3bn – Military Afloat Reach and Sustainability; replacement of most fleet-auxiliary ships
FLynx <£1bn – small naval attack and army light-duties helicopters

Total £66-86 bn

This is broadly in line with the leaked figures on probable EP07 budget shortfall. However, all this is to ignore the fact that the nuclear deterrent will need renewal from 2025 onwards. Money may well have to be spent on that before 2021, and there is no guarantee of extra funds being provided by the Treasury.

⁵⁰Aviation Week & Space Technology, 16 Jul 2006.

Thus it is clear that the MoD simply cannot afford its current aspirations. The traditional expedients of delaying or shrinking projects have now been used to the limit and beyond. It is no longer even marginally possible to have all the different things that the various services consider to be essential. This is not, in fact, the crisis which many in the defence community would make out. Many current capabilities are duplications of effort, or not useful at all. We have far too many ways of dealing with unlikely threats (submarines, powerful air forces, opposing armoured formations) and insufficient forces to deal with the adversaries which actually exist (mostly paramilitaries).

To give just one example, Iran possesses three Kilo-class diesel-electric submarines. These probably constitute the entirety of the submarine threat faced by British forces in the foreseeable future. They have cost the Iranians something on the order of £400m⁵¹ and require 150 sailors to man them. Against this rather slender threat, the Royal Navy and RAF propose to deploy the following forces:

Equipment	Cost	Personnel
5 squadrons of Merlin Mk1 helicopters	£4.5bn	800+
12 Nimrod MRA4 patrol planes	£3.6bn	1000+
Around 15 frigates	£2-4bn	3000+
At least 3 attack submarines	£3bn+	300+
Total British anti-submarine forces	£14bn+	5100+
Total Iranian submarine forces	£0.4bn	150
British/Iranian ratio	3500%	3400%

This cannot possibly be described as a proportionate response to the threat, but it is typical MoD behaviour. It is no surprise that spending does not match aspirations: the UK cannot afford to buy multiple sledgehammers for every nut. It is time to start choosing just one method of dealing with each unlikely enemy and focus more on the likely, everyday enemies we are fighting now.

Another reason that the budget is under such strain is the political constraint to buy British or European whenever possible – or even when it is not possible, and a whole new manufacturing base must be created first. Purchasing existing equipment from America is always seen as the least favourable option. This virtually guarantees that the MoD must buy products which will only be made in small quantities, causing unit costs to skyrocket and enhancing the difference in budgets. As a rough rule of thumb, the British expenditure in any given area will be a tenth of America's; and the items purchased often have unit costs ten times higher owing to a lack of competition and economies of scale. Furthermore, British and European investment in science and technology research is much lower than in America, so the resulting equipment is typically less capable despite having cost far more. It is not unusual to find that the British forces have capabilities two or even three orders of magnitude worse than the US.

Even with the current efforts to focus most British spending in Europe, the unwillingness of European governments to spend significant percentages of GDP on defence mean that the UK/European defence industry is hugely less capable than that of the USA. It cannot make large military aeroplanes or helicopters; it struggles to make small ones. Stealth technology is effectively unknown. The list goes on.

Some would like to believe that Europe could become a military-industrial power base to rival the US. This would not be true even if it were a single, cohesive state with strong military ambitions. The current loose, quarrelsome alliance of nations who mostly prefer to spend their money on welfare will never achieve conventional capability even close to that of the US. It is highly questionable whether the world needs another superpower in any case. Extra money spent on

⁵¹Details of the price paid by Iran to the Russian submarine exporters are not known. However, prices of US\$230m per sub were quoted during negotiations by Pakistan to buy similar vessels from France.

expensive European weaponry is mostly wasted. The only real yield is well-paid jobs, but even these are short-lived and quite few compared to the funds required. Weapons procurements are not a sensible way of pursuing social benefit.⁵²

PERSONNEL SITUATION

The other main factor in military force and expenditure apart from equipment is personnel. It would appear at first glance that the Ministry of Defence recognises this, with spending per service person rising slightly over the last few years:

	2003/04	2004/05	2005/06
Expenditure on Armed Forces Personnel (£m)	7974	8274	8134
Total number of Armed Forces Personnel ⁵³ (thousands)	321	322.4	315.3
Average expenditure per Serviceman or woman (£thousands)	24	25.7	25.8

Sources: MoD Directorate of Performance and Analysis, Defence Analytical Services Agency

Nonetheless, this is not an impressive amount of money to spend per head when one reflects that the average British employee pay stood at £28,200 pa as of 2005⁵⁴. In general terms, armed-forces personnel are less well rewarded than the UK civilian population. At the same time they surrender many of their rights as British subjects (no right to personal safety or happiness, no right to strike or join a union, no control over hours worked, a different and harsher legal and disciplinary code etc). Typically, servicemen and women are doing jobs *at least* as dangerous and responsible as that of a member of the emergency services, under much worse conditions, for much less money. In the case of junior combat-arms soldiers, the difference becomes outrageous. Consider this comparison:

⁵²Britain recently bought American Apache attack helicopters, but insisted that final assembly be carried out in the UK. This was said by the MoD to have provided 34,000 man-years of work to the British economy. However, the extra cost of these man-years compared to buying the Apaches direct from Boeing was in the order of £2bn. Given that 34,000 man-years only equates to a few hundred jobs for life, this cannot be seen as a sensible way of spending the money. (One could have handed out the same number of million-pound lump sums and still saved a billion.) The firm in question has now been sold overseas despite the huge subsidies it received.

⁵³Number of UK regulars, reservists on full-time service and Gurkhas at the start of each period.

⁵⁴Office for National Statistics: Mean Annual Gross Pay for full-time employee jobs 2005 was £28,210.

	Combat-arms Soldier	Police Officer	Firefighter
Starting pay	c. £14,000	c. £22,000	c. £25,000+
Training Length	c. 7 months	3-4 months	3-4 months
Training Difficulty (subjective)	Hard	Easy	Medium
Lifestyle	Unpleasant dormitory barracks or field conditions. Visits home fortnightly or less.	Live at home, return every 24 hours	Live at home, return every 24 hours
Overseas deployments	Frequent, months in duration	Nil	Nil
Deaths from hazards of service	In excess of 100 among approximately 30,000 such soldiers over past three years	Total of 36 among 100,000 police officers over past <i>twenty</i> years ⁵⁵ (less than 2% of the risk level faced by combat troops)	Total of 29 among 30,000 firefighters between 1990 and 2000 ⁵⁶ (less than 9% of combat troops' risk)
Working patterns	Open-ended; frequently extremely arduous	Forty-hour week including active night shifts	Forty-hour week; night shifts usually spent asleep
Prospects	Compulsory redundancy at age 40	Job for life, potential for excellent pension	Job for life, potential for excellent pension
Applicants per post	Less than 1	5	At least 12

It is not difficult to see why the infantry in particular struggles to recruit up to strength. It was suggested during the recent infantry cuts that in fact 36 infantry battalions was the maximum amount that the UK could recruit, so it made sense to reduce to this level. Other parts of the armed forces offer a similar employment package, though without the same levels of danger, discomfort and physical stress; they too have lesser difficulties with manning. If emergency-services personnel deserve the pay and treatment they receive – as most would agree, indeed many would suggest they deserve better – then we are treating our junior servicemen and women absolutely shamefully. As a practical matter, there are all kinds of negative consequences to this: high turnover, high training demand, loss of experience, gapped billets. One might even suggest that abuses by British troops overseas – where they have genuinely occurred – result at least partly from the fact that many parts of the forces cannot be very choosy about the recruits they accept.

It is clear that we must offer better treatment to our young service personnel. Single living accommodation is being improved, which will slightly ameliorate the situation; but to be honest this smacks of investing in plant rather than people. There is not much to be done about long deployments, risk of death, working hours and visits home, and there is only so much to be gained by offering free gyms, adventure holidays or time off for sport. Overseas recruitment is all

55BBC

56Fire Brigades Union

very well, but historically the fate of nations which depend entirely on foreign mercenaries for defence has been unenviable. It is time to make a substantial increase in pay, focused on lower ranks and combat troops as much as possible. There is not much need for over-40s in uniform, and the services are probably right to dispense with most of them: that being the case, it would be only just to do more for former servicemen as well.

Conclusions

Disproportionate amounts of resources, in both money and personnel, are focused on the following areas:

- Anti-submarine warfare
- Superfighters
- Defence against enemy air attack using surface-based weapons
- Overcoming enemy armoured forces using ground units
- Delivery of explosive strikes (or 'fires' in military staff jargon): particularly deep in foreign/enemy-held territory

Insufficient effort is being made in these other areas:

- Provision of deployable ground combat troops with a small logistic footprint
- Utility/transport helicopters
- Both heavy and light military air transports
- Sea-based aviation of every type
- Recruitment and retention of suitable junior servicemen and women

It is very reasonable to suggest that the UK does not spend as much on defence as it should. The defence budget at £30bn is small compared to health and social-security expenditure (soaring through £200bn with no ceiling in sight and few perceived positive results). Nonetheless, simply giving the MoD more money would be unwise in the present management climate. Extra defence funding would merely permit the present duplication of effort and overextension into foolish areas to persist. No more funding should be allocated to defence until a radical reorientation of existing resources is complete: and by that time there will be a need for a new nuclear deterrent, which is likely to absorb any extra money that might be obtainable.

Recommendations

Savings Measures

1. Maritime-patrol aircraft capability to be dispensed with. This would permit the mothballing of RAF Kinloss and the disbandment of the Nimrod air wing, with a reduction of at least 1700 uniformed and 200 civilian posts. Annual savings would be in the order of £700m⁵⁷. Current Nimrod MRA4 project to be shut down, with whatever savings could be achieved (probably slim, as the project is now relatively advanced).
2. Eurofighter Tranche 3 to be cancelled. This would require the agreement of European partner nations (Spain, Germany, Italy) but this could probably be obtained without great difficulty.⁵⁸ Savings to the UK during the EP07 period would be in the order of £3bn.
3. "Deep strike" capability to be mostly dispensed with. Three squadrons of RAF Tornado GR4 bombers and one of Tornado GR4A recce jets to disband as soon as possible. Antique 39 Squadron photographic Canberras to be disbanded. Consideration given to mothballing RAF Lossiemouth and moving the Tornado training squadron to Marham in the near term. Remaining Tornados to disappear without replacement as soon as either Eurofighter or F-35 strike capability enters service. Annual savings would be in the order of £1bn immediately and £2bn from the turn of the decade.⁵⁹ Some ability to conduct meaningless, destructive showpiece bombings would be temporarily lost.
4. The following pre Main Gate equipment programmes to be shut down *without replacement*. Sadly this would not free any money for spending elsewhere, but these measures together would bring the EP07 equipment plan into line with the funds likely to be available, or come close to it. Projects to be dispensed with:
 - Selective Precision Effects at Range (SPEAR)
 - Future Anti-Surface Guided Weapon (FASGW)
 - Medium Sized Vessel Derivative (MVD)
 - Versatile Surface Combatant (VSC)
 All the various successor projects to Ground Based Air Defence (GBAD)
5. Type 45 destroyer programme to be halted after the six ships presently on order.
6. Remaining Type 22 frigates and Type 42 destroyers to be decommissioned without replacement in the near term. Any useful equipment (eg Outboard, close-in air defence weapons) examined for refitting in remaining Type 45s and 23s, or possibly RFA vessels.
7. Type 23 frigate force to be swiftly reduced to 8 hulls, equipped with the 8 sets of Sonar 2087 now on order. The total frigate/destroyer fleet thus to stabilise at 14 ships, with no replacement even considered before 2021. (All these ships could easily last until 2035.) This would result in annual savings of more than £1bn⁶⁰. Smaller savings would be possible in the Royal Fleet Auxiliary. It would still be possible to assign capable escort groups to carrier or amphibious deployments, especially given that such escort groups would often be unnecessary. The only loss would be the present largely pointless single-ship taskings.

Taken together these measures would remove the current EP07 budget nightmare and produce further savings of at least £40bn before 2021. Absolutely no money to be reallocated

⁵⁷Provision of maritime-patrol aircraft has cost a total of £1985m over the last three years. *MoD Annual Report and Accounts*.

⁵⁸Even BAE Systems Chief Executive Mike Turner is uncertain about the fate of Tranche 3. Whether the partner nations "have the money will be based on two things," he says. "One is the commitment of European governments to defense. . . . Secondly, there are already strong demands on the defense procurement budgets in European nations, including the U.K." *Aviation Week & Space Technology*.

⁵⁹Ninety strike jets have cost an average of £3bn pa to provide over the last three years. Dispensing with sixty of them and one base should give pro rata savings. *MoD Annual Report and Accounts*.

⁶⁰The existing flotilla of 25 frigates and destroyers has cost an average of £2.2bn pa to run since the introduction of Resource Account Budgeting, and associated fleet-support vessels at least £200m more. *MoD Annual Report and Accounts*.

outside the MoD.

Spending Measures (to commence before savings measures)

8. Immediate award of firm orders for £3bn-worth of big helicopters: Chinook CH-47F from Boeing for land-based lift and an alternative type for ship-based operations. The latter could be Boeing V-22 Tiltrotors if this programme is genuinely ready to go at last. Other solutions such as the Sikorsky CH-53K might be preferable. American types in current production are to be preferred over European solutions as unit prices will be lower and delivery quicker. This will provide a fleet of heavy lift helicopters in addition to the light ones now on order (FLynx). The need for medium lift aircraft in addition appears questionable. Existing Puma and Sea King 4 aircraft to be phased out as the new aircraft arrive. This additional money should suffice to obtain at least 30 new Chinooks and perhaps a similar number of maritime aircraft. Existing EP07 funding to be retained for purchasing further rotorcraft during the next decade.
9. Expansion of the C-17 airlift fleet to twenty aircraft. Based on prices paid for the present five, this would not cost more than £2.5bn.
10. An order to be placed for 25 new Hercules C-130J turboprop transports. This would cost in the region of £1bn. Existing order for 25 Airbus A400M European turboprops left in place, but no further A400Ms to be bought. (Particularly in light of BAE's sale of its stake in Airbus). Funding of £1bn allocated for use of Hercules/A400M as strike platforms instead of expensive, over-engineered fast jets. AC-130 gunship conversions to be considered, as well as ramp-delivered precision ordnance.
11. Firm orders to be placed for two aircraft carriers with AWACS aircraft. Preferred option would be changing the ship designs to a catapult/arrestor configuration able to operate conventional aircraft rather than jumpjets and helicopters only. This could not cost more than £1bn on top of existing plans, as the ships are already intended to accept such a change in future. It would then be possible to buy Northrop Grumman E-2D Advanced Hawkeye AWACS aircraft for no more than £30m each⁶¹. Not only is the E-2 far more capable than any possible rotary-wing AWACS design, it is existing, proven technology and would be much cheaper as well. At least some of the British order for F-35/Future Joint Combat Aircraft should be switched from the F-35B STOVL jumpjet version to the F-35C arrestor-hook carrier type ordered by the US Navy. This last measure would be cost-neutral or save money, and would significantly add to capability. (The F-35C will not have the vertical-lift fan of the F-35B and so will carry greater payloads.) Overall this package would massively enhance the future carriers' abilities, and not cost more than £1.5bn in addition to existing plans.
12. Second batch of three Astute-class submarines confirmed for approximately £3bn. To be delivered as slowly as possible for the price, keeping indigenous nuclear-submarine expertise alive until Trident replacement/refurbishment grows near.
13. The sum of £5bn allocated for purchase of Tactical Tomahawk cruise missiles from the USA, vertical launchers being fitted to the six type 45 destroyers (space was allowed in their design) and the second batch of Astute submarines. This money would obtain at least 1000 missiles, more than enough for any genuine "deep strike" needs. It would also render the Royal Navy invulnerable to surface ships, and confer useful abilities in suppressing enemy SAM networks.
14. The sum of £5bn to be allocated for setting up a drone aircraft programme similar to that already operated by the USA (with UK involvement). Predator-A (unarmed), Predator-B (armed) and Global Hawk radar-recce aircraft to be purchased initially. Existing Watchkeeper and Phoenix programmes run in parallel as a backup. Ship-based operation to be an early priority.
15. Existing MARS (Military Afloat Reach and Sustainability) programme bolstered with £2bn additional funds. Given that there will also be a much smaller frigate and destroyer fleet to support, this will allow the procurement of a wide range of amphibious and logistic ships, to include helicopter/STOVL carriers using the current aviation support ship model. All vessels civilian-crewed to reduce running costs.
16. At least £2bn earmarked for human intelligence and languages training. It is suggested that this not be focused in ultra-secretive special forces formations, rigorously selected for physical

⁶¹Taiwan took delivery of two E-2s in April 2006 for a price of US\$104.6m. *US Department of Defense*.

toughness and close-combat skills. Rather, immediate aims might be to have Arabic, Farsi, Pashto and Urdu speakers in every rifle company (incentive pay might be useful here). Every battalion intelligence section to be equipped, budgeted and trained to run agents. Undercover surveillance units to be formed for attachment at brigade level.⁶²

17. All remaining savings (in the order of £20-25bn) allocated to improving pay and conditions, specifically those of more junior service personnel. As a guideline, the pay of officers at the rank of Lieutenant-Colonel and above should not rise at all (there are no difficulties whatsoever retaining these senior officers, indeed we have a vast surplus of them). Nor should there be any increases in civilian pay. If it is not possible to bring starting salary for Privates/equivalent up to at least £22,000pa equivalent within this framework, consideration should be given to focusing money specifically on combat troops. This might be done by the introduction of special service pay for those whose duties specifically involve dismounted close combat, along the lines of existing special-forces, flying or parachute pay. (Such a classification of close-combat and non-close-combat troops will have to be made during the introduction of FIST in any event. The money could be termed FIST pay, if desired.)

Cost-Neutral Measures (Optional)

18. The posts of Chief of Defence Staff and Vice Chief of Defence Staff to be abolished. Chief of General Staff (head of the army) to become the senior officer of the UK armed forces, remaining at his present rank. All existing privileges of direct access to the Prime Minister removed. Existing navy and air-force heads to be downgraded by one rank and subordinate to the army chief, amalgamating their jobs into the positions of their existing personnel directors. Existing single-service operational staffs (C-in-C Fleet, Strike Command, UK Land Forces) dismantled and largely transferred into the Permanent Joint Headquarters. Suitable reductions in grade and civilianisation or abolishment of posts throughout the upper MoD. All civil servants, while retaining current pay and privileges, moved down two places in the table of equivalency with military ranks. Permanent Under-Secretary's annual report to be drafted and signed by the professional head of the Armed Forces. Without measures such as these, nothing noteworthy will ever be achieved by any new Secretary of State.
19. Three of the existing five Recce cavalry regiments to re-role as Mechanised Infantry (rename the role "Mechanised Cavalry" or similar if this helps to sugar the pill). Most of their existing equipment to be mothballed. Two regiments of four sabre squadrons to remain, the intention being to supply a single Recce squadron to each combat brigade. If the ceremonial Mounted Regiment were to be retained for non-defence reasons, it should become a separate career track, lower paid, as in the King's Troop of the Royal Horse Artillery or the Royal Marine Bands. This would avoid deleterious effects on the competence of serious combat units.
20. All tank regiments to re-role as Armoured Infantry. (Or "Armoured Cavalry" if they prefer, as long as they switch from Challenger to Warrior.)
21. RAF Regiment Field Squadrons to shift into the Army infantry and become a one or two battalion Light infantry regiment, presumably called "the RAF Regiment." Operations involving airfields to be carried out by any available infantry units in future. RAF paratroop unit moved into the Parachute Regiment – subject to acceptance by the Paras.
22. Displaced Mechanised and Armoured Infantry to shift to the Light role. As many as ten additional infantry units would be available, easing the current crushing strain these troops are under. Ceremonial duties as performed by Guards infantry to become a separate career track, lower paid and ideally funded by the Department of Trade and Industry.
23. All future artillery projects cancelled except the M777 155mm towed howitzer and a wide selection of sophisticated rounds for it. All brigade artillery batteries to convert to this equipment, with a heavy emphasis on the infantry role.

⁶²Undercover surveillance in hostile areas tends to be seen in the army as special-forces work. However it might reasonably be described as safer than ordinary patrolling, which is done by regular soldiers. The necessary equipment is not expensive by military standards, nor need the the training be overly severe or difficult. (MI5 are now hiring covert surveillance operatives as minor technical specialists, straight from the general population.)

24. Rapier to be disposed of. Starstreak HVM to be the only ground anti-air missile retained, without any consideration given to a replacement until at least 2021. Consideration given to using only the shoulder-launched version, issued on limited scales to all units, with operators locally trained (similar to the former arrangements for snipers). Air-defence batteries to re-role as the field element of the new unmanned drone capability, with the aim of providing a battery to every brigade. Ample former RAF personnel would be available to bolster technical expertise.
25. Brigades to be rebuilt as standing expeditionary air-land taskforces. As an outline, a brigade might have the following units:
- Four infantry battalions mounted in Warrior/Saxon/FRES as required
 - Artillery regiment with 155mm towed pieces and modern ammunition
 - Recce squadron, perhaps including elite quasi-special-forces sub-unit⁶³
 - Human-intelligence unit of linguists, agent runners, undercover surveillance teams
 - Drone unit, initially of Battery size in the field with pilots etc in UK as required
 - Logistics and Engineer regiments
 - Strike aviation regiment of 18 Apache or 12 STOVL F-35B/FJCA plus FLynx
 - Lift regiment with Chinook and Hercules/A400M
- There would be an air-group commander (RAF Group-Captain or equivalent⁶⁴) permanently working for the brigadier, who similarly had permanent report-writing command of the aviation regiments. One or more of these air-land brigade taskforces would be configured to operate amphibiously from suitable MARS vessels, using Viking vehicles, V-22 tiltrotors and STOVL F-35B/FJCA.
26. Permanent, deployable airspace-control groups to be formed, primarily focusing on air superiority and SAM-suppression missions. These would normally report to the deployed land-forces commander in theatre. There could also be Divisional strike aviation regiments. Air groups to deploy by carrier if equipped with F-35C or self-deploy with tanker support if Eurofighter. Carrier or landbased AWACS aircraft as suitable.
27. Existing Joint command arrangements streamlined. A deployment will normally be driven by the need to deliver a land force; the land-force commander (brigadier or divisional general) will have air and maritime units under his command as suitable. The existing, superfluous Joint, Air and Maritime commanders typically to be dispensed with.
28. Navy to operate principally as two carrier groups and several amphibious groups. Merlin anti-submarine helis not required aboard frigates would normally operate in squadrons from suitable MARS decks. Single-escort deployments would become unusual. (For sanctions-enforcement, for example, a more usual platform would be a MARS ship with helicopters and embarked troops.)
29. As a concrete measure to help the service leaver and improve retention in the first few years, police forces and fire brigades would be directed to establish large quotas for recruits with eight years or more of honourable military service (perhaps 50% of new intake places to be offered first to applicants so qualified). A solid chance at one of these pleasant, coveted jobs-for-life would be an immensely strong incentive to join the forces and serve for a useful period of time.

Swingeing reforms of this nature would be very difficult to achieve; but simply abdicating responsibility on the grounds that a task is too difficult is not an acceptable starting point. The existing management at the Ministry of Defence are collectively failing in their tasks, even as their subordinates courageously shoulder immense burdens.

It is time for someone to take charge.

⁶³Already established in the existing Air Assault and Commando brigades

⁶⁴Such a job would be much more suitable employment for airmen of this rank than notional 'command' of a UK airbase. Base manager posts to be civilianised, in all three services.

Glossary of Terms

A400M	The ongoing programme by Airbus to produce a collaborative European turboprop transport aircraft similar to the existing Hercules. It will be somewhat more capable than a Hercules but much more expensive. BAE having sold its interest in Airbus, purchases of A400M may not guarantee British jobs for much longer.
AIFV	Armoured Infantry Fighting Vehicle. British portmanteau term for the latest generation of infantry combat vehicles. Americans would say MICV, Mechanised Infantry Combat Vehicle. The UK version is Warrior, a 25-ton tracked armoured vehicle armed with a 30mm cannon and able to carry an 8-man infantry section.
AK47	<i>Avtomat Kalashnikova 1947</i> . Term used to refer to the original Soviet assault rifle or any of its numerous derivatives. Weapons of this family are carried by a majority of the world's troops and paramilitaries.
AMRAAM	Advanced Medium Range Air to Air Missile. The current cutting-edge long range fighter weapon, which gives ordinary jets the ability to take out superfighters lacking an equivalent fairly safely. Not as rinky-dink as the BVRAAM/Meteor, but available now, proven and much cheaper. It will be fitted to F-35s, and to Eurofighter.
Apache AS90	Refers to the Apache attack helicopter now entering British Army service. Artillery System of the 1990s, the current British self-propelled heavy artillery piece.
AWACS	Airborne Warning And Command System. Here refers to an airborne radar aircraft. By virtue of being high in the sky it can monitor huge areas and detect even low-flying enemies. Essential for the effective use of fighters to achieve air superiority.
BAE	BAE Systems, a company with 40,000 UK employees and nearly 60,000 overseas. It owns the majority of UK defence manufacturing: the remainder have been bought by more foreign companies.
BVRAAM	Beyond Visual Range Air to Air Missile. A very long range rocket-ramjet super-missile being built in Europe. It will be fitted to Eurofighter. Aka Meteor.
Eurofighter	The enormous twenty-one-year effort by Britain, Germany, Spain and Italy to produce a superfighter which could take on large numbers of advanced Soviet jets. Cost to the British taxpayer is estimated at £20bn for 232 aircraft, putting each jet at £86m. So far 144 have been ordered, which realistically is all that the RAF can use. Dispensing with the remaining 88 might save £3bn but would push up the per-jet cost to £120m. Such a course would also require the consent of the partner nations. However, buying all 232 and then permanently mothballing eighty-plus (as occurred with the Tornado fighters in the early 1990s) would put the cost per plane actually used at £130m or more. In RAF service the Eurofighter will be called Typhoon. Initially it will have no useful air-to-ground capability, but this is to be added as soon as possible.
EP07	Equipment Plan 07, the MoD plan for spending on new equipment programmes from 2011 to 2021.
F-35/FJCA	The Future Joint Combat Aircraft or F-35. A combat jet under development which will be capable of supersonic flight and of acting as either an air-to-air fighter or a strike platform. The A version requires a normal runway. The B version is of STOVL configuration. The C version is intended for catapult launch and arrested landings aboard a fully-equipped carrier. So far the UK intends to order only the B model.
FASGW	Future Anti Surface Guided Weapon. A navy programme to replace the existing Sea Skua anti-shipping missile fired from current naval Lynx helicopters.
FIST	Future Integrated Soldier Technology. An amazing set of man-portable electronics for the close-combat soldiers of the future. Under existing plans these men will be wearing around £100,000-worth of equipment but still paid less than £15,000 pa.

FLynx	Future Lynx. A project to provide 100 new Lynx helicopters, 30 for the Royal Navy (these are primarily intended carry out missile attack against small surface craft) and 70 for the Army (these will mainly be used to move small loads or groups of troops).
FRES	Future Rapid Effects Systems. A £14bn programme to replace many ageing Army vehicles. Particularly intended to equip new “Medium” forces, better protected than light infantry but without the many disadvantages of existing heavy armoured vehicles.
HVM	Refers to the Starstreak High Velocity Missile, the most modern of the Army's anti-aircraft missiles.
IED	Improvised Explosive Device. A hand-assembled bomb made by terrorists. Better designed or more capable examples can defeat the armour of even the heaviest vehicles. An everyday threat in low-intensity conflict.
MANPAD	Man Portable Air Defence System. A shoulder-launched SAM. A rare but plausible threat when fighting paramilitaries or insurgents.
MARS	Military Afloat Reach and Sustainability. A procurement programme looking to purchase a replacement fleet for the RFA.
MBT	Main Battle Tank. Eg the 60-ton Challenger 2 now in British service.
MCM	Mine Counter Measures. A naval term for methods used to deal with sea mines.
MoD	Ministry of Defence.
MRA4	Maritime Reconnaissance and Attack 4. Designator for the new Nimrod anti-submarine patrol planes being built by BAE for the RAF.
MVD	Medium-sized Vessel Derivative. A programme to replace ageing Type 22 frigates in the near term.
Recce	British abbreviation for Reconnaissance.
RFA	Royal Fleet Auxiliary. A fleet of specialist civilian manned shipping which provides support vessels for the armed forces. It includes amphibious assault vessels and a helicopter carrier largely indistinguishable from those of the Royal Navy (apart from being much cheaper).
RPG	<i>Raketniy Protivotankoviy Granatomet</i> (Rocket Anti-tank Grenade Launcher). A cheap, very common ex-Soviet shoulder-launched armour-piercing rocket. An everyday threat when fighting terrorists or insurgents. Capable of bringing down helicopters or even aeroplanes in some situations.
SAM	Surface to Air Missile.
SPEAR	Selected Precision Effects At Range. An RAF requirement for a weapon between the existing Storm Shadow airdropped cruise missile and Paveway smartbombs in cost and reach.
STOVL	Short Take Off and Vertical Landing. A type of combat jet which takes off from a short, rough strip or a ramp on an aircraft carrier. Having burnt fuel and expended weapons, it becomes light enough to set down vertically supported by jet thrust. Also known as a jump jet. The only current example is the Harrier. In future, harriers will be replaced by the B variant of the F-35/FJCA, the F-35B.
Typhoon	The RAF name for Eurofighter.
VSC	Versatile Surface Combatant. A programme to replace fairly new Type 23 naval frigates in the longer term.

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