DEFENCE FIRST

A New Model for Britain's Defence Forces

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FOREWORD

David Murrin is the author of *Breaking the Code of History*, the culmination of decades of personal research across a wide range of disciplines. He argues that human behaviour is not random, but determined by specific, quantifiable and predictable patterns fuelled by our need to survive and prosper. He has called this cycle 'The Five Stages of Empire', which, due to its fractal nature, applies to empires, all the way down to the cycle of the individual. According to David, to resolve the issues confronting us today we cannot merely study the past. The human race will need to understand this precise algorithm of behaviour that has caused us to re-enact the same destructive cycles in ever-greater magnitudes, to change our future. Over the past decade, He has accurately predicted the rise of China, both economically and militarily. Additionally, David Murrin is a keen military historian who believes that wars are driven by the cycles of empires and nations and the overriding need for resources. He believes that the West including Britain faces the risk of a full-scale industrial war within the next decade and that Britain needs to change its policy on defence dramatically; from one that is currently used on an afterthought behind every other policy to one that is placed at the core of the national interest.

ACKNOWLEDGEMENT

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INTRODUCTION

There are times in history where threats remain latent and multiple scenario planning is applicable. However, today, based on the thesis outlined in 'Breaking the Code of History', there are three very clear and present threats to Britain's national interest that dwarf all others and require the nation's immediate attention. In ascending order, they are ISIL, Russia and by far the greatest of all, China. These threats have manifested not just because of their internal drivers, but because of the long-term decline in Western power that has created a vacuum of opportunity. Those in Europe, who question the threat of Chinese military expansion, should ask the questions: "Why is Australia modernising its defence capabilities, with a focus on China?" and "Why is the United States Navy (USN) reconfiguring itself to contain the Chinese expansion?"

There is no doubt that America is finding the role of global policeman exhausting with its debt burden. With limited resources, it will be forced to focus on the primary threat of China and withdraw forces from Europe which will give Putin greater leverage to threaten Europe. Meanwhile, under his presidency, Trump would no doubt demand quite rightly that Europe takes more responsibility for its own defence. Thus, the message to Britain is that it cannot rely on America to continue to defend our national interests by supporting our weakness.

Based on the cycle of empires in 'Breaking the Code of History', Britain has completed its new phase of regionalisation as marked by the vote to leave Europe. This manifestation of a new national energy and identity has been echoed in Britain's sporting success in the Olympics and other fields. However, atypical of the cycle is that Britain has not maintained and enhanced its defence capabilities commensurate with its new path back to a global maritime nation.

Many would argue that the world today is different from the past, as the levels of communication and connections are so much more advanced, and the world has never been so globalised. However, this was also a common argument prior to the outbreak of WW1, but on a more relative basis. What really matters is that the basic behavioural patterns of expansive nations have not changed, as explicitly demonstrated by China's behaviour over the last decade and by the regional civil war across the Middle East. These two evolutions have taken place despite the increased process of globalisation and unprecedented levels of communication.

To compound this unrecognised threat, there is a general impression in the West and Britain that large-scale conventional warfare is a thing of the past. However, only the foolish would believe that an aggressively expansive nation would not use all the means at its disposal to control the globe with the large scale application of force. While cyber warfare capabilities might add a new dimension to such a conflict; they will always be but one element in a multi-

strand warfighting capability. Most critically, cyber warfare is a vital component of intelligence gathering that has powerful applications against network-centric warfare.

Lastly, there is the question of what we can afford to spend on defence: To which the immediate counter question is can we afford not to with the current threats on the horizon. The reality is that Quantitative Easing, otherwise known as the 'printing of money' has failed to compensate for the weakness in the western economies. The only substitute will be a new version of direct investment similar to the USA's new deal during the 1930s. The natural place for this to start will be government investment in the UK defence industry that will build capacity and create jobs. It will also reduce the unit costs of defence items as great numbers are built, bringing cost benefits.

With these key threat drivers and the additional impetus that Britain has left the EU, it is time for a change, as once did the Parliamentarians of England during the Civil War, by creating a new model of defence policy that will protect the nation in the challenging times ahead.

HOW DID WE END UP IN THIS MESS?

1. THE INADEQUACY OF BRITAIN'S DEFENCE PLANNING TODAY

Britain's defences have been in a terminal spiral of decline since the end of the Cold War in the act of collective political irresponsibility. This long period of neglect has placed our nation at risk to the rising threats across the globe. The successive Blair/Brown and Cameron/Osborne Government policies that have run down our military capability can endure for many years without apparent consequences, giving leaders the impression that they can justify these long-term systematic cuts in defence. However, there comes a time when the reductions drop below a critical level beyond which any remnant of sustainable and effective capability to project power and defend the nation's interest disappears. The 2010 review was just such a critical moment.

Since 2010, almost predictably in the long history of democracies that have miss-timed disarmament with the appearance of increasing threats, we now face multiple and significant challenges. The new threats on our radar range from the asymmetric challenge posed by ISILand the growing military aspirations of Putin with Russia on our doorstep, to the massive arms race initiated by China that will soon dwarf all other global threats. These three threats constitute the full spectrum of dangers to our nation which cannot be countered by reducing one element of our defence to increase another. Rather, they can only be met with a much

greater political will and defence expenditure that will enable all the changes for a new model for Britain's Defence Forces to be fully operational by 2022.

2. 2015 STRATEGIC DEFENCE REVIEW (SDR)

With such an obvious geopolitical shift since 2010, one would have hoped that the UK government would have adapted to these new circumstances and decided to reinvest in our defence. Especially, in the light of the lessons of the removal of our valuable Harriers back in 2011just a few weeks before they were desperately required in Libya for ground support operations. Additionally, in today fight against ISIL, Harriers would have been equally as capable and cost effective.

Today, Royal Navy (RN)hunter-killer submarines cannot put to sea to hunt Russian submarines hunting our nuclear deterrent in our waters, simply due to a shortage of skilled manpower. The result is that the RN had to repeatedly and humiliatingly call in French and Canadian sub hunting planes in the absence of our Nimrods to hunt for Russian submarines lurking inUK waters.

With such an operational reality, one would have thought that some hard, honest lessons might have been learned since 2010. In the light of these key lessons, one would have thought that Cameron and Osborne would have chosen to correct the deficiencies, both for expediency and their political legacy. From a political perspective, if they had taken drastic

action in 2015 on defence they could have distanced themselves from the 2010 review saying it was a product of the Coalition's politics, rather than Conservative policies.

Instead, the 2015 SDR was presented with typical political aplomb by David Cameron in a political attempt to make it look as if defence was important and understood by the leadership. Sadly, this is obviously not the case as they did not choose to increase dramatically defence expenditure, and we will now have to live with the consequences. To the key question as to whether we should have trusted Cameron with the defence of our nation and feel safe in a world of growing menace, full of diverse challenges, the simple answer is “no”. We should be very alarmed for our nation and future of our children.

Despite the obvious shift in risk against Britain’s national interests, the 2015 SDR failed to correct the disastrous decisions contained in the 2010 SDR. The latter showed recklessness and poor judgement, militarily and politically. This was especially the case with the Chief of Defence Staff Sir Jock Stirrup, who favoured fast jets above all other defence requirements and the RAF over other services - with crippling consequences for the national interest. The destruction of the vital fixed-wing maritime strike capability with the sale of all of our Harriers to the US Marine Corps was aided by the decision in 2000 to amalgamate the Fleet Air Arm Harriers with the RAF machines under RAF command. This short-sighted process gave the RAF control over the Fleet Air Arm Harriers, and allowed the RAF a decade later, to destroy Britain’s only significant long-range strike capability; it will not be replaced for over a decade. The RAF’s view was that the Harriers were its asset, rather than the Royal Navy’s, enabling them to trade them in for its much coveted fast jet capability. This is a clear demonstration of the destructive partisan politics between Britain’s armed forces and how, sadly, they do not always act for the benefit of the nation.

Critically, until the Fleet Air Arm is given back control of their own fixed-wing F35s, the RAF will always denude the carriers of the 36 planes per ship that they were designed to carry and which would allow them to conduct round-the-clock operations and maintain air superiority over a task force. The idea that American planes would take their place and operate from British carriers is a national disgrace, and could, at critical moments of national policy like a second Falklands war, strip the nation of its choice of independent action.

Another core failure of the 2015 SDR is that it has continued the 2010 SDR's destruction of manpower across the services by failing to take emergency action to remedy the situation. It takes years to train and build a combat hierarchy that is effective, without which the best weapons in the world are useless. The minuscule size of our army is now barely capable of projecting a full division overseas. The critical reduction of pilots in the RAF to reduced levels for most operational squadrons and the reduced manpower of the Royal Navy means that ships and submarines cannot be put to sea for lack of crews, an unforgivable operational shortcoming. Where will the crews for the new carriers come from, one has to ask? With such an obvious manpower shortage it seems inevitable that some of the few ships that we have

currently in service will be laid up and out of commission, effectively cannibalised for the crew. The current situation of having to beg for skilled service personnel from other nations to man our ships is politically irresponsible.

Most importantly, our servicemen and -women are not drones, but human beings. As such after persistent neglect, the morale of our Armed Forces must be at an all-time low. Both Cameron and Osborne have been once more quick to launch the very same forces into a war with ISIL, with less than the resources required to produce a decisive result and with only a squadron of Tornadoes focused on the task.

Whatever protestations the Conservatives might make, the clarification that defence was a forgotten priority came the day after the 2015 Defence Review when Osborne announced a £200bn tax bonanza. If Britain's defence was considered important by the Conservatives, why could some of this funding not have been spent on defence instead of being channelled into Osborne's popularity campaign?

Western leaders should remember that when (heaven forbid) in the future, an enemy decides to attack, he does not consider what new weapons and capabilities will come into service against them in the future, but rather what is operational today. The 2015 SDR has many promises for the future, but still not enough to give our forces real teeth. However, most importantly, our nation is currently weak and vulnerable. Britain has always played a strong leading role in the defence of Europe, and if we do not maintain a strong defence capability, we cannot lead by example, in turn leaving Europe in a weakened state.

3. THE BREAKING THE CODE OF HISTORY (BTCH) DEFENCE REVIEW

This document was written as a result of my concern of the weakening of our national defences over time and the simultaneous increase in external risk factors. The purpose of this BTCH Defence Review is to combine an estimate of potential risks that we face with an independent and objective assessment of what capabilities we have and how and where we urgently need to enhance our capabilities. I would like to go further to propose that Britain creates a new model defence force for the coming decades to ensure its security.

This document has been prepared from open-source materials.

SECTION 1: PRIORITISING THE GEOPOLITICAL RISKS TO THE NATION

1.1. PREDICTING FUTURE GEOPOLITICAL RISKS TO BRITAIN

The Trojans failed to asset the risk correctly and were destroyed.

Human affairs are all about balance in our relationships, both on a personal level and geopolitically between nations. Changes to the equilibrium always have consequences for a relationship, some benign, and some far-reaching with at times dramatic and destructive results. In this ever dynamic process the key to maintaining harmony is to recognise and evaluate the nature of such shifts and to strive constantly to find ways to redress and maintain that crucial balance. To fail to recognise such threats risks the extinction of whole cultures.

The premise described in BTCH that the West (led by America) is in decline under President Obama's governance, has become an alarming reality. In such circumstances, it is vital that sound strategic reasoning is applied to evaluate and understand the current and future geopolitical threats faced by Britain and the Western world. Additionally, it is critical that we ensure that our limited resources are deployed wisely and proportionally to the various threats.

There are three obvious candidates for consideration:

1. Islamic Fundamentalism (ISIL).
2. Russia.
3. China.

We will review each threat and propose strategies that might enable just such a degree of balance to be reached, sufficient (hopefully) to deter future aggression. However, any student of conflict should appreciate the importance of intelligence-led strategies, which become even more critical when defending against multiple threats simultaneously with expensive, precious and limited resources.

In this regard, the West has developed a significant intelligence capability against the Islamic threat but has lost its once powerful Cold War capability against Russia. The latter, we anticipate, is currently being revitalised as a consequence of the Ukraine crisis. However, the real challenge is developing a successful intelligence capability against China, which has not historically been thought of as an enemy of the West and whose heritage and culture is so vastly different. Without a comprehensive intelligence apparatus focussed on China and its multi-layered overseas activities, the West will constantly be on the back foot in the years ahead. The damage caused by the Chinese to Western intelligence agencies by their manipulation and control over the activities of Edward Snowden is a prime example.

1.2. THE THREAT FROM THE RISE OF AN ISLAMIC IDENTITY

The rising Islamic world's first impulse was to lash out and resist interference from its historic Christian enemy in the West by exporting terrorism into its homelands. Since 9/11 and two wars later, America's appetite for intervention has abated, and to some degree, the Islamic fundamentalists' objective has been partly achieved. The next step is the establishment of a Pan-Islamic State, often compared with the First Caliphate.

Using the model of the Five Stages of Empire described in BTCH (and expanded in Appendix 1) to understand more completely the trauma that the Middle East is beginning to go through, the new Islamic empire cycle is in the late phase of regionalisation, enduring a regional civil war. This brutal Darwinian-type process of selection and self-determination will decide whose and what values will unite and consolidate the region into a single powerbase over the next

half decade. During this period, it is critical that the West minimises its involvement in the process as far as practically possible to avoid further inflaming Islamic/Christian relations. However, when needs must, it should with great commitment apply surgical strikes to limit extremist elements like ISIL.

On the positive side, this internal struggle has reduced the energy resources and rationale for attacks on the West, which coupled with well-developed security measures, should contain the threat to Western communities. Overall, we would assess that the current and foreseeable threat to the West is relatively limited while the oil continues to flow out of the Middle East and sustains our economies. Observation and containment of this process with a combination of diplomacy and alliance construction combined with military force in the air and on the ground to remove ISIL as a state operator is a wise approach.

In Africa, this Islamic energy of expansion will continue to push southwards impacting on Christian tribal nations south of the Sahara Desert and war should be expected to erupt east to west across Africa. During this phase, there may well be a requirement for support to the Christian tribal nations from the West facing this onslaught on its former colonies and current allies in which it has invested so heavily (Kenya would be one example). Additionally, as Chinese influence in Africa becomes greater, the risk of a proxy war that could ultimately involve China must be monitored both continuously and closely.

The India-Pakistan border is the other area that represents a high-risk zone as an emerging Hindu nationalism clashes with the Islamic zeal of Pakistan and an expansionist China. Without constant Western political mediation, the risk of conflict will sadly only increase with time. Strategically, it is vital for the West that India is not involved in a nuclear exchange with Pakistan, as this would catastrophically disadvantage the Western alliance against China, by eliminating the only other country with a similar demographic mass.

Overall, the Islamic threat does not represent a fundamental challenge to the Western way of life over the next decade despite potential physical invasion of our homelands with overwhelming military force. However, it will force changes in our foreign policy and security architecture which as a consequence will reduce our personal freedom. Most of all, it will require a different approach to the integration of the Muslim minorities. The comparatively limited threat (compared to a total war) should be

manageable by a policy of constant vigilance applied to a strategy of political and military containment, which is to a large extent the policy operating today.

See Appendix 2 for expanded explanations of the social architecture of the Regional Civil War of the Middle East.

1.3. PUTIN'S RUSSIA

Until recently the West has underestimated Putin and his rule. It has been guilty of appalling slackness in not adapting its foreign policy as Russian strength has returned. The once bankrupt empire of the USSR, which by the 1990s was weakened by negative demographics, has now once again become stronger and wealthier. Until 2011, this was driven by its commodity production. This cycle has now taken a deflationary countertrend move, and commodity prices are expected to continue until a price low is reached in 2018. Thereafter the uptrend in commodity prices is expected to resume and intensify as the new twenty-five-year positive commodity cycle enters its strongest rallying phase over the next decade. This V-commodity price bottom will, in the next four years, place immense pressure on Putin to distract his people from the internal economic decline. This economic focus will make Putin increasingly unpredictable and dangerous. His move into Syria was very shrewd, just at the time when America had withdrawn from the Middle East becauseAmerica believed that its new found oil production gave it immunity against Middle East politics. However, with low oil prices, America will have to return to the Middle Eastern chessboard, probably led by its new president to be elected in November 2016.Meanwhile, Russia now sits in the centre of the chess board from where it will, without a doubt, seek to leverage its position to advantage further.

In the past few years, Russia has been hit threefold: with economic mismanagement, Western sanctions and lower oil prices, which have placed it in a very precarious economic situation. On the one hand, there are the forces of an economic implosion that might lead to civil unrest against Putin, but on the other hand, there is the argument that the West caused the problem via sanctions. Putin could use any external event to trigger a war to unite his people in common cause to save himself. This situation needs to be monitored and managed and is a very high-risk scenario. Then, if he survives through to 2018 which is the anticipated commodity low point, Russia will once more become stronger economically into 2025 with increasing commodity prices. With such an improvement in economic conditions, Russia's national energy could significantly increase, and the key issue will be: will Russia side with the West or with China?

Putin has proven himself to be a very capable, if not entirely dictatorial, leader, but the good news is that Russia does not have expansive primary energy because its demographics are

some of the worst in the old Western world. This single primary social driver, or lack of it, will limit Putin's future ambitions, especially if he faces a more resolute and prepared West as a consequence of the almost inevitable annexation of Eastern Ukraine.

On the negative side of the balance is that at the heart of the European/Russian relationship is Europe's dependence on Russian energy supplies, historically used by Russia to strong-arm those to whom it supplies. Only when Europe has ended its reliance on Russian energy, can the West face Putin on an equal footing. In this light, Rapid development of the shale oil and gas exploitation processes across Europe is of considerable strategic importance to be able to resist the strong arm tactics of Putin

The good news is that the West has the ideal mechanism to defend its interests through the NATO structure (rather than any future EU construct) which integrates America into European concerns. However, it should be noted that the expansion of the number of NATO members since 1990 has changed its concentrated structure into one of a diverse, sprawling alliance of different military capabilities. This has introduced new risks that have yet to be mitigated especially the issue of overextension.

In the wake of a disastrous policy in Ukraine, Western politicians should consider that the biggest long-term threat it faces would be if Russia, seeking new alliances, turns to China.Strategically, this would be the greatest disaster to befall the West since the raising of the Iron Curtain. The only realistic strategy for the West is to coordinate its military and political actions to show realistic resolution in protecting its sphere of influence, and to understand that baiting the bear in his territory will only result in humiliation and a weaker position when facing future threats. Difficult as it may seem, the West will have to come to some accommodation through political engagement, employing a degree of humility demonstrating that it appreciates its post-Cold War relations with Russia have not given Russia the respect accorded a major power - the recent revolution in Ukraine being a prime example. However, such a strategy would only succeed from a position of military strength

Overall, we do not consider there is an inevitability of a risk of a new extended Cold War as both sides are in very different stages of empire now, as opposed to then. With this consideration, Russia does not represent a threat that could change the Western way of life, but rather one that will, if not resolved, be a running sore and distraction from pressing primary threats. However, the period running up to the impending commodity trough in 2018 should be viewed as a period of considerable danger. The risk is that Putin manufactures a conflict with the West to distract his people from an economic collapse.

To counter this risk, the West's strategy towards Russia should be one of containment through strength, and political rapprochement - much as France and Britain did at the beginning of the twentieth century. This rapprochement would have to include a Western

acceptance of a degree of Russian expansion into the old USSR's sphere of influence.The West's goal in this process is to avoid forcing Russia into the arms of China. This would be a geopolitical disaster of monumental proportions, minimising the effect of the American Pivot to the East, has the goal of containing Chinese expansion. In seeking rapprochement with Russia, Europe should be at great pains to emphasise its common European heritage, and not forget the sympathy and support that Russia offered America after 9/11.

1.4. CHINA

1.4.1. The rapid rise of China

In our assessment, China's power will continue to grow at a rate that will astound even those who anticipated this great Chinese expansion. Such is the potential of China that this process represents a fundamental challenge, not only to the Western way of life, but to the whole world.

America's pivot eastwards demonstrates that the world's one declining superpower is finally taking China seriously, and is actively constructing alliances designed to contain this expansion. At present, this new construct is more political than military. However, as the Chinese-driven arms race gathers speed, political rhetoric will have to be matched with economic power translated into military muscle. When a nation's security and perhaps even

its very survival is related to its economic means to pay for its defence, the importance of economics takes on a new meaning.

1.4.2. The inherent Risk of America's debt

Within this context, America's current financial condition, perilously maintained by the printing press, must be revitalised with structural economic reforms. The only possible way to see how this might occur and to say the least dramatic one is through voluntary debt restriction and a managed return to economic reality. Possibly, at some stage when the American-Chinese tension reaches a critical level, America pre-emptively and selectively could choose to default on the Chinese portion of its debt, cutting some 20% of the total. These two options are the only chance for America to regain an economy that can fund the arms race that China has now commenced. The sooner such a restructuring takes place, the sooner America can start rebuilding and once more competing with China. The other option, if America continues to sleepwalk in denial, is that at a time of China's choice during a period of international tension, it will trigger a debt default. This approach would be a replication of America's strategy against Britain during the Suez Crisis, with catastrophic consequences disabling America and giving China a major relative economic advantage.

1.4.3. Responding to the Chinese arms race

Western defence spending is now required to invest in primary combat power i.e. naval and air units. There will also be a need for sharing weapons technology with less developed allies such as India. Henceforth, the West must be accurately tuned to the signs of transformation in military affairs in China that could significantly and relatively quickly change the balance of power away from the West.

We should be very clear in our understanding of the magnitude of the Chinese challenge we face. Indeed, China is no like other threat that the West has ever seen since its rise five hundred years ago. First, China aspires to be the world's third great sea power after Britain and the US. Unlike Britain and then America which became demographically constrained as effective land powers (Britain in Europe and the US in Asia, during Korea and Vietnam), China's demographics make it potentially the greatest land power in history. This combination of potential land and sea power is unique in human history. The lessons from our past of German and Japanese aggressive expansions suggest that it could take an alliance of the whole world including Africa, the Middle East and Latin America to contain Chinese military build-up. Additionally, China's expansion and determination to use such new found power will over the next few years become obvious to everyone.

Viewed in this context, China is by far the greatest of all the threats currently faced by the West, with potential to change the western way of life drastically. Consequently, China

demands the full attention of not only America but all its allies, including a rather comatose Europe and especially Britain. The first vital step is for politicians in the West to wake up quickly to the Chinese threat and develop the ability to protect Western society from cyber espionage and attacks. This will also send the message to Russia of Britain's intent to defend its national interests.

1.4.4. The return to a bipolar world

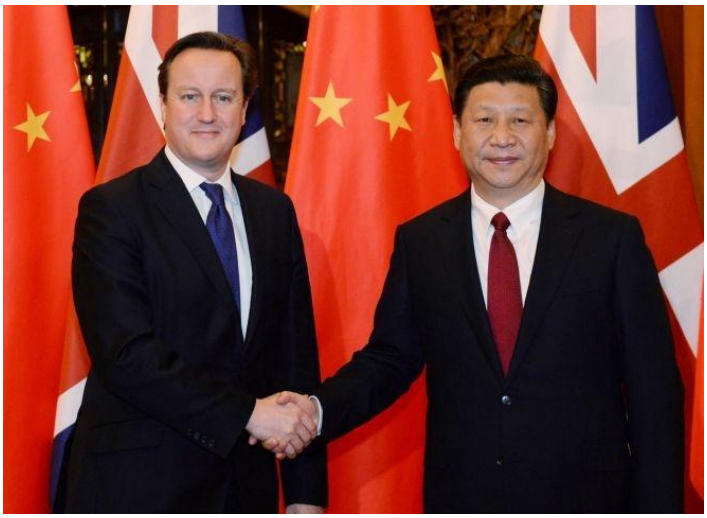
The only solution to the Chinese challenge over the next decade is, so far as possible, to employ a similar strategy as used in the Cold War to reduce the risk of conflict by matching China's expansion with the creation of a global political and military alliance, led by America. If the strength and integrity of such an alliance were to match China's growing power, then the risks of war can be expected to decrease into the 2025 peak after which the commodity cycle begins to cool as it enters a twenty-five-year decline.

The harsh reality and inevitability are, as explained in BTCH, that the West is in terminal decline as a world power, with America as the last of the Western Christian Empires. Through Britain is in a phase of ascension again. However, it is not of a magnitude that will shift this balance of power. The Asian super empire led by China is clearly in the ascendancy. Management of this great power shift is the responsibility of current politicians and those of the next decade. If America continues its current economic path, its collapse will be precipitous and will consequently create a power vacuum that China's current youthful incarnation will quickly and aggressively step into with potentially destructive consequences for all humanity.

To compound the threat to the West, China is now well and truly in the ascension to the empire phase of its development after having completed its copy and assimilation phase. Consequently, it is now innovating and creating new ways of owning world-beating technology, foremost of which have been in cyberspace.

China, with its massive armament programme and expansive policies in the South China Sea,will inevitably be even more involved in cyber espionage against British interests and at the same time continues to challenge America, our closest ally, for superpower status. No one with a balanced mind could believe that its rise will be a peaceful one.

1.4.5. Britain's policy towards China



So, why in the current geopolitical environment did Britain welcome President Xi so openly when its closest military ally America is facing off against China and building new military alliances with India, Japan and Australia? Well, it's easy to criticise HM Treasury as they seem to be leading the charge on this investment. But in truth, it has been allowed to happen as our current generation of politicians lacks an understanding of today's geopolitical map and the dangerous forces that are being built all around us. Critically, the majority of Britons remember nothing of the 19th century's Opium Wars which, to our everlasting shame, resulted in 14 million Chinese opium addicts to benefit the British tea trade. In contrast, the memory of this national humiliation is still present in Chinese memories as is the Rape of Nanking in its relation with Japan, and when the time suits China, it will no doubt inflame these potentially polarising memories to justify its future expansionary actions.

Notably, during President Xi's visit to London, public sentiment in China echoed the underlying cultural memory in which China has not forgotten or forgiven the humiliation of the Opium Wars at the hands of Britain.

There are some critical requirements for the peaceful management of this'once in a five hundred year' power transition. Most importantly, the West has to ensure a strong defensive capability coupled with the construction of strong alliances.

In addition, it has to develop an understanding of Chinese history and culture and the cycle of the rise and fall of empires that can provide an appreciation of the other side's perspective.

Contrary to the polarisation process that will inevitably take place as competition increases, the Chinese are not in any way inherently bad. We would describe their history as one of the most admirable and remarkable on human record. However, they are currently in their sixth empire cycle, and this current reincarnation is best understood by comparison with the dynamics of a boisterous youthful teenager. A youngster who in time will grow to become wise and more respectful to those around him. The transition needs to include recognition by the West of its mortality combined with an understanding of China's current expansionary intentions. This geopolitical reality will require Britain to manifest the strength to resist the

poorly judged impulses of youth by standing firm with once key national principles and values, alongside our US Allies.

1.4.6. China's intentions revealed

The Chinese island fortress of Mischief Reef

During great power transitions, there is always a time when the intentions of a nation shift from the hidden to obvious. That is the point where the wise prepare for action. We have for over a decade warned of the rise of China and that its challenge to the world would ultimately not be a peaceful one, as so vehemently claimed by President Xi. Consequently, we have been following the construction of islands in the Spratly chain, based on the partially submerged reefs that lay below the high tide mark, all of which under UNCLOS (The United Nations Convention on the Law of the Sea) were considered not to be sovereign territory. However, the recent pictures released by the BBC clearly demonstrate Chinese territorial ambitions and their desire to expand their influence across the South China Sea. Judging by the impressive magnitude of these transformations, the Chinese vision will no doubt be a series of deep water naval and air bases from which they can project military power across the surrounding seas and especially to some of the exits from those seas. The evidence speaks for itself.

If there was ever any denial as to the Chinese objectives towards expansion, the magnitude and clear expansionary intention of China's building programme in the South China Sea should now quell any doubt. Under UNCLOS, any plane or ship should have the freedom to travel through/around these islands and yet the Chinese Navy insists on an exclusion zone.

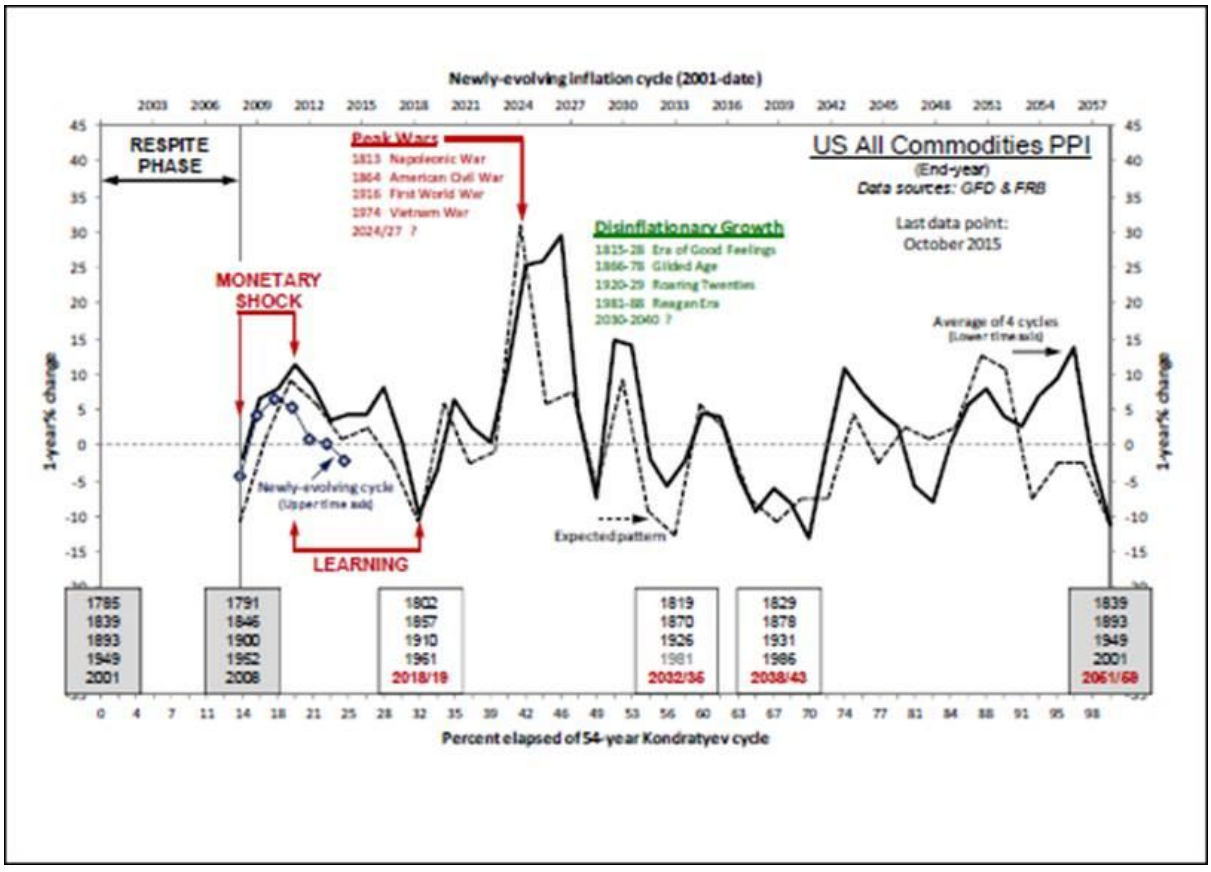
Both the US Navy and now an Australian plane have challenged this exclusion zone successfully. However, one has to wonder for how long this zone will be free to planes and ships that seek to force a free passage, especially when these zones are dominated by a fully operational interconnected series of military bases and can lock their weapons systems onto intruders.

It seems that this Chinese expansion strategy has been based on the expectation of a weak response from the Obama administration. Thus, one should expect that by the time of the

next US election in eleven months, these islands will become Chinese property in a *fait accompli*. After all, it is doubtful that the US Navy would start a war to remove these bases. However, the maintenance of strong naval forces by the USN and the RN combined with other forces of nations of the growing alliance will be critical in containing Chinese blue-water naval ambitions.

One just has to wonder and worry what or where will be the next Chinese target of acquisition once these islands are considered *defacto* as Chinese territory. The concern is that, having come up with a successful island acquisition strategy, what will stop the Chinese from repeating this process in other locations like the Maldives to extend their string of pearls further from the Chinese homeland?

1.5. TIMING OF THE NEXT POTENTIAL MAJOR WAR



The concepts in BTCH explained that the majority of wars are always driven by the need for resources and thus related to the 54-year Kondratiev cycle. The new current cycle commenced in 2000, rallied until 2010, and is now in a deep correction until 2018 which will create severe deflationary pressures much as the 1929 Wall Street Crash did. However, it will then be followed by an extremely powerful inflationary rally into a spiked peak around 2025/2027.

It is this cycle that could potentially catalyse a major war with Russia during the next two years of deflationary dip, as Russia's finances deteriorate and Putin creates a war designed to distract his population. We do not consider this to be a high-risk scenario if the West increases its commitment to its defence: However, we do consider the risk of Chinese aggression to be extremely high as the inflationary cycle moves into its final phase from 2022 onwards.

Within this context, the 2015 SDR was a disaster as it both failed to anticipate these very real risks and consequently has not set in motion the planning required to be ready for a major potentially global war within the next seven years, i.e., by 2022.

1.6. THE NATURE OF POTENTIAL THREATS BASED ON THE CYCLES OF EMPIRES

By employing the analyses from BTCH and the five stages of empire, America and Europe should be considered as old systems, while ISIL and China are at the very opposite end of the spectrum. They are both young expansive systems that have great energy and most importantly the quality of innovation that generates Revolutions in Military Affairs (RMAs) that changes military balances.

Russia, in contrast, is also old within the empire cycle and thus, as a potential enemy should be perceived as iterative rather than innovative. Most importantly, it isPutin that provides the national energy rather than the collective energy from its older declining population; Russia does not represent a determined and sustained threat as once did the USSR in 1950. Additionally, its human and industrial resource bases, without the agglomerated nations of the USSR, are certainly not equivalent to the old empire of the USSR.

Strangely, the only nation of the old Western Christian Empire which is on the upward curve of a new phase of regionalisation is Britain. As such, the stance it takes towards defence could well influence its allies significantly for the collective benefit, so that they will follow Britain's example.

Today, in a time when weapons systems are vastly more complex and take years longer to build than their counterparts in 1940, we are falling into the same trap as our ancestors. To send any of our airmen or sailors into war without stealthy systems to give them camouflage and a chance of survival it would be the equivalent of a sending airman in 1940 to war in Fairey Battle or Swordfish, i.e. careless and irresponsible.

Unless we act now and change our defence policies, and dramatically increase our spending on defence, in all probability, it will be third time unlucky for Britain and we will lose the next major war

SECTION 2: THE URGENT NEED FOR A NEW BRITISH DEFENCE POLICY

2.1. THIRD TIME UNLUCKY – BRITAIN'S FAILED HISTORY OF PREPARATION

Losses due to lack of preparedness at the Somme

As the memory fades of the details and the titanic nature of the struggle associated with both World Wars, today, we only remember our victories in WW1 and WW2, but we should not forget how those wars started, and how unprepared we were to fight them. In WW1, while our Navy was ready for the task in almost every way, we had neglected a critical component of our national defence: the regular army that was only seven divisions rather than the 70 we finished within 1918. As a result, we lost hundreds of thousands of soldiers while learning harsh lessons in building a mass continental army and it took almost four years before the desperate struggle turned in our favour at the Battle of Amiens in August 1918.

An unprepared nation saved by one man

By 1940, the political will of the nation to fight was almost zero having suffered a horrendous defeat in the Battle of France. Without the iron will of Churchill at the helm, Britain's war would have stopped then and there. Instead, he decided to fight on. However, as it had demonstrated so poignantly, the BEF was not positioned to fight a modern mobile blitzkrieg-type war with

France as its ally, despite having invented this mode of land warfare ourselves. The Navy was barely up to the task, especially being short of convoy escorts. While our airmen flew into war in outdated FaireyBattles, which were slow three man light bombers that during the battle for France were almost shot down to a plane. Meanwhile, the Fleet AirArm was appallingly equipped; its main strike arm comprised of Fairey Swordfish biplanes was more suited to the last war. The only arm that was just about ready was RAF Fighter Command, due to the vision of men like Lord Dowding and Lord Beaverbrook. But even the great victory of the Battle of Britain relied on the Luftwaffe making the mistake of diverting strategic bombing missions from the crippling attacks on Fighter Command's airfields to the cities, without which they would have been successful. It was the victory of the Battle of Britain along with the German attack on Russia that gave Britain the time to rearm and build its war machine. But even then, it was not until later in 1941 that the war turned in Britain's favour. If we were to ask any politician or leader from that time, as to what lessons we could learn from their experience, I am sure that top of the list would be to ensure that the nation would never again be caught so unprepared. Even in the last decade, we sent out armies into Afghanistan without the right equipment to protect against IEDs with devastating consequences. It would be both appropriate and reassuring to see some degree of remorse from current politicians and a determination not to repeat such mistakes.

2.2. THE FORGOTTEN VALUE OF DETERRENCE

The sad reality is that war is a blight that has not receded into the history books, but one that we continue to live with today. With the centenary of WW1 and the annual Poppy Remembrance Day services, should we not engender a national culture amongst our leaders that encourages them to examine and better understand why these World Wars started and how they might be avoided in the future, so that past lessons can be applied to current situations? Additionally, so as not just to understand how wars broke out, but also the manner in which they were won and how close we were to losing bothWW1 and WW2 at certain points of each conflict. Most importantly, politicians should understand the capability of modern weapons and how the next war might be fought. However, recognising that such study might be considered superfluous by our current Western leadership, I shall attempt to condense the three key lessons from past British actions:

1. Although Germany started WW1 in a bid for global dominance, the war might well have been averted if Britain had removed the ambiguity over its alliance with France and had clearly stated that it would join the war if Germany attacked France. Additionally, Britain should have backed its words with actions and, even though it was not prepared to match the massive standing armies of France and Germany, it should have made clear plans that if war broke out it would immediately raise an army of continental proportions to influence the

war's outcome. Instead, it took two years to put the inexperienced Kitchener's Army in the field against a battle-hardened enemy, with inevitable consequences at the Battle of the Somme, by which time the French armies were exhausted which then prolonged the war. The problem was compounded as the BEF was relatively small (150,000 men)compared to the other continental armies.However, it was highly experienced and could have been described as the most professional army in the world at the time. The high casualties that it endured in the opening stages of the war caused it to lose the core of its experienced soldiers - soldiers that would have been invaluable as the core of the new much expanded Kitchener's Army. Their absence was to cost the BEF dearly.

2. The collective British political denial of Hitler's aggressive intentions in the build-up to 1939 must have only emboldened his actions. The result was that Britain was unprepared for war on the continent and the BEF was ejected from France, leaving its equipment behind, which then made us vulnerable to a potential future German invasion (Operation Sea Lion). It is remarkable how similarly Britain responded to Germany in the build-up to WW2 even after the experience of WW1, when deterrence had failed.

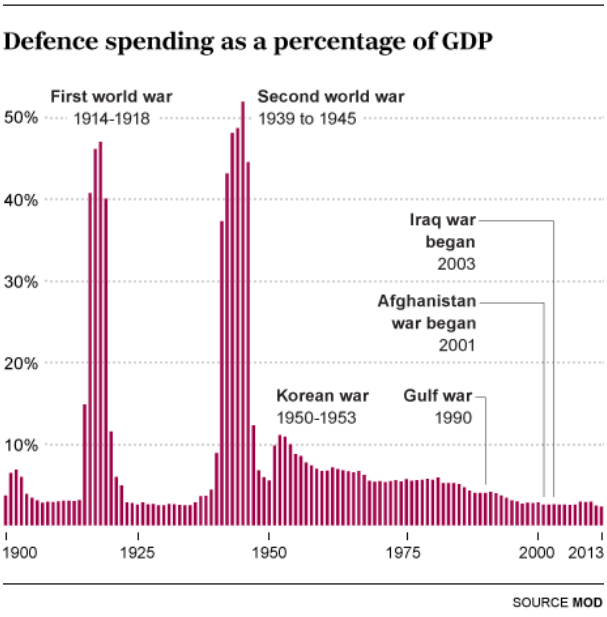
3. The Cold War was, however, very different as deterrence triumphed, thanks to Reagan and Thatcher, who ensured that NATO was stronger than ever at a time when the USSR was in economic collapse and might well have been drawn into military adventurism. In this case, the USSR perceived both military capabilities in its adversary and the intention to use it as demonstrated in the Falklands War. Historical documents in the Kremlin show that Britain's determination to defend its interests 8000 miles away came as a surprise, and from that point in time capitalist nations were no longer automatically considered by the USSR as weak-willed.

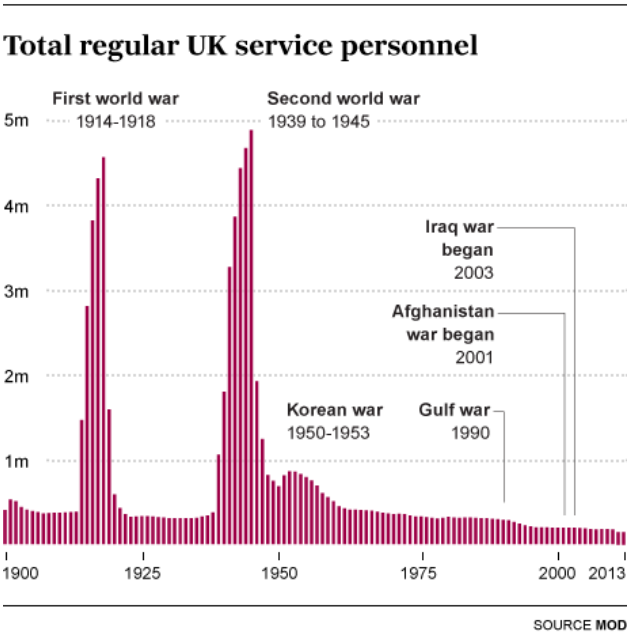
In summary, all major wars start with an expansive nation that seeks to challenge for power using military force. If deterrence fails, war succeeds. Although considered expensive at the time, deterrence is always cheaper than the war itself and its consequences, win or lose. However, it only works if there is a very high chance that an aggressor nation perceives that it will fail if it declares war, due to a combination of military capability and the political will to use force to protect national interests. So, the key to preventing wars does not seem to be to run down one's armed forces, but rather to ensure to be strong and capable and able to deter an enemy from aggression.

Today the stance Britain chooses to take on its defence can influence positively other European NATO members who might follow its lead.

2.3. BRITAIN'S HISTORICAL DEFENCE SPENDING

Historically, democracies have not been good at anticipating rising aggressor nations and preparing a commensurately strong defence. Furthermore, there is a long-established trend (not unique to the UK) of preparing for the last war rather than anticipating the next, and its change in nature. Consequently, the 2015 SDR has built in limitations and flaws that are of an institutional nature and repeat the errors of the past century's military planning. To avoid what could prove to be a terrible error, we have to form a defence policy from basic principles commensurate with the external threats we face.





The core question is: "What percentage of our GDP should we be spending on defence that is appropriate to the current threat scenario we face?" The answer starts with guidance from the past and the plots of expenditure and manpower levels over the past 115 years.

The first observation is that, surprisingly, the correlation between GDP expenditure and military manning levels is very high as the ratio of the manpower cost to higher technology seems to remain relatively constant.

The second observation is the massive spikes in GDP spending and manpower of WW1 and WW2 both consumed roughly 50% of our GDP for their duration. Irrespective of the horrendous human cost that these wars entailed these spikes are a clear reminder of the terrible cost of the failure of deterrence and the financial cost of war in which a nation fights for its very existence.

Post-WW2spending remained above 10% for the Korean war, and the peak of the Cold War around the 1970swas at 5% to 6%. For the duration of 25 years, this allowed Britain a

sustained and capable level of force projection. Then towards the end of the Cold War, in its last five years, spending dropped to around 4% as the threat from the USSR steadily receded. Naturally, there was then a peace dividend as there always has been in Western nations and average expenditure dropped to around 2%. However, at this lower level of 2%, we have been paring back our armed forces year after year with the consequence that they have been hollowed out to the point of being wholly unfit for their purpose. At what stage will the government and the nation realise that the times of peace have passed and that the defence spending needs to be returned to at minimum the 4 to 5% levels that were standard during the extended period of the cold war?

With the long lead times of modern weapons, we cannot wait until a war seems imminent or breaks out. Instead, we need to build in higher levels of defence spending and commensurate capability well in advance. Sadly, the geopolitical signals of impending danger are loud and clear, ringing in our ears and yet, our nation is still asleep at the switch which should trigger an increased expenditure on defence.

2.4. HOW WOULD AN EXPANSIVE PREDATORY NATION VIEW BRITAIN TODAY?

BTCH proposed that expensive predatory nations behave much like animal predators, in that they prefer to attack the weakest prey to limit any potential damage to themselves, which in turn could be life threatening. So how would such a power view the West and Britain in the light of our track record in the last two decades?

As America's closest ally, Britain's security record is entwined with that of America in this risk assessment:

1. We (America and Britain) failed badly across Iraq ultimately, gifting 2/3rds of the country to Iranian control. Specifically, the British army failed in Basra and withdrew under dubious circumstances. Today, the legacy is that ISIL has occupied sections of a country which not long before was under western control. This outcome can only be interpreted as a drastic failure that has since limited western policies of direct intervention in the Middle East.

2. We (America and Britain) withdrew our forces claiming that the Afghanistan army could take over the role of defending the country when they were just not ready. Our premature withdrawal could only be perceived by a potential enemy as weakness and has resulted in a resurgent Taliban who controls large regions of the country. The ultimate irony was that Afghanistan was invaded to prevent al-Qaeda from using it as a base from which to attack the West and today ISIL has gained a firm foothold.

3. The West, or more accurately America, failed to prevent Iran from gaining a clear path to nuclear weapons, which it now has following the agreement with the USA a relatively short breakout timeline to gain nuclear weapons. In effect Iran hoodwinked Obama, and while the agreement was signed, Iran worked against American interests in the Middle East to make America look weak. Similarly, North Korea became a nuclear power despite America's declared intention to prevent it from doing so.

4. When on March 10th 2016 Obama stated that chemical"red line" would not be crossed with impunity by Assad in Syria. When it was, there was no clear and definitive action by the US. This failure subsequently encouraged and emboldened Putin in the Ukraine, and again made America look weak.

5. The recent US defence cuts reduced the number of carrier strike and amphibious groups at sea at any one time. This reduction has not only reduced combat effectiveness but in effect reduced the flag-waving element of naval operations that spreads the image of American power globally.

6. UK's self-destruction of its defence capability and the emasculation of the RN and the reduction in the size of our army have had a considerable impact that extends far outside the UK as the bridge that links Europe to America.

7. Then, there is Europe's collective refusal to take responsibility for its defence, by keeping its expenditure low and relying on the American shield linked to NATO.

8. America and Britain have failed to prevent mass cyber espionage and the flow of intellectual property (IP) to China and Russia over the past decade. This represents erosion of decades of capital expenditure and our military technological edge.

9. The struggle with Islamic fundamentalism since 9/11 has created armed forces in the West that are optimised for asymmetric warfare against an unsophisticated enemy, rather than total open warfare against an industrialised enemy. This has created a widespread and dangerous perception that conventional warfare is outdated.

10. The lack of Western political will to ensure that military action is effective, e.g. in Iraq, Afghanistan and Libya. Coupled with the failure of the populations of the West to make Defence a key policy and be prepared to make economic sacrifices. Libya is yet another example of military intervention without the follow through a commitment to a viable long-term reconstruction plan.

11. In the UK. The destruction of the Foreign Office has reduced our capability to project effectively soft power and to understand other cultures, without which our ability to anticipate and understand evolving threats has been severely limited.

12. The Russian response in Ukraine and seizure of the Crimea that could not be prevented by the West showed the limits of American, European and NATO's power.

13. The Russians have been openly surveying transatlantic communication cables using submarines and the ship Yantar, equipped with cable cutting equipment. These activities have been observed in the Atlantic, North Sea and Asia. The goal seems to be to search for secret military and civilian communications, fibre optic lines/checking for weak points where they are hardest to repair once they have been cut. They could also be following Western Cold War successes of tapping into these lines of communication.

14. Russia's recent military deployment into Syria placed Putin's armed forces in the centre of the chess board, especially when in future higher oil prices force the US back into the Middle East.

15. China's island expansion policy that is continuing despite US protestations and has now become recognised as expansionary across the globe should awaken Britain's concerns as to China's aspirations and the threat they represent. The progress that China is making with its expansionary strategy is making America and the USN look impotent.

16. The West's failure to decisively eradicate ISIL, by deploying even a limited military presence on the ground, demonstrates the clear failure of western intent.

Viewed in the context of this long string of failures of political intent and military capability and coupled with clear demonstrations that defence expenditure is not a priority, Western politicians clearly show no commitment to military action and the inevitable setbacks associated with casualties. An aggressive and expansive nation would naturally surmise that the West was in decline and that time will only weaken its position. With such an outlook, aggression and military investment would undoubtedly look like a justifiable route to greater global influence and power.

In summary, Western weakness is encouraging global aggression from expensive systems in the Middle East and China. Sadly, and until the US, Britain and Europe wake up, we are sleepwalking into the next major war just as we did in the 1930's. There is every risk that we will be the losers as the lead time for new modern weapons is now so long that we will have to fight with what we have.

2.5. THE DANGER OF REVOLUTIONS IN MILITARY AFFAIRS (RMAS)

Both ISIL and China should be classified as young and consequently considered expanding systems, but only China is now in its innovative space, combine with having the economic resources to harness this energy and especially the inevitable revolution in military affairs. A new rising empire is always quicker than the older systems that it seeks to challenge, to harness innovation as a military advantage. Meanwhile, the USA, after decades of R&D, continues to provide technological momentum to keep pace. However, this should not be considered as a sufficient defence as over-time the advantage will swing to the Chinese.

Examples of current and future RMAs are as follows:

1. **The cyber war** that was started by the Chinese who harnessed its huge population to unleash what was reported to be 200,000 high IQ individuals to steal Western IP. They have now morphed into a much more threatening organisation that can penetrate critical infrastructures and possibly, networked weapon systems.

2. **Information networks** are continuing to be more complex and effective giving all those involved in the battle space more real-time information, which should make them more productive. However, this technology may well provide an Achilles heel if the opposition could use offensive cyber capabilities against such networks which could bring about the potential calamitous collapse of the other side in a war.

3. **The increased lethality** in all sectors of the battlefield has forced a new camouflage revolution on the battlefield known as stealth. Currently, continuing the old WW1 adage of 'if you cannot be seen you are less likely to be attacked', the US leads this area of new technology, although Britain's Astute class submarine is possibly the stealthiest of its kind. Notably, this technology has been spreading across many nations and military application this trend can only be expected to continue.

4. **Manned airpower** has, since WW2, been considered the king of the battlefield on land and at sea. However, with the advances in anti-ballistic missile technology, what chance does an aircraft stand of survival once detected? This situation will only be exacerbated by the deployment of laser weapons with their potential for rapid fire and multiple targeting. The result will be smaller and less visible unmanned platforms in all aspects of the aerial strike capability and air superiority. The nation that embraces this new evolution will have a significant advantage. The BAE Systems Taranis, a British demonstrator programme for Unmanned Combat Air Vehicle (UCAV) fits firmly into this line of development, but the US that has a decade lead over the UK in this field.

5. **Robotics** and the deployment of combat robots in all aspects of warfare could be another imminent revolution. Japan is most likely to achieve this as the combination of declining demographics and hi-tech will harness this technology to balance the Chinese threat.

6. **Artificial intelligence** is close at hand, and it will be a relatively small step to give unmanned vehicles full autonomy in the future.

7. **Laser and rail gun technology**, led by the US Navy, is now close to deployment and will change the battle space it dominates. However, it will require greater power supplies and, as such, warships and land vehicles will need to encompass increasingly larger power plants at the heart of their designs. Britain has been researching into this field with the Laser Directed Energy Weapon Capability Demonstrator, a project worth between £20m and £100m according to the MOD. However, once again the US is well ahead of having already deployed a laser weapon in the field aboard one of its ships. Such power demands will inevitably require nuclear reactors on the majority of surface combat ships.

8. **Space.** The high ground is always where the advantage lies, and in earth's case, the ultimate high ground is space. The Americans have pared back their programmes while the Chinese aspirations in space are growing. Space is one battle space that the UK has not focussed on and one that we need to address urgently.

2.6. THE MOD AND THE COST OF MILITARY ACQUISITIONS

2.6.1. The relative size of Britain's defence spending

The new Japanese 48 tonnes JGSDF type10 tank

Britain has the 5th or 6thbiggest defence budget in the world depending on how it is measured and by whom. The question has to be whether we are getting value for money and a comparable capability compared to the other nations. China has the advantage of lower production and manpower costs that probably makes its budget three times as effective as a similar budget in the USA. Russia, too, benefits from this mechanism. Japan, however, as a first world country ranking 7th or 9th (depending on the source) makes an interesting comparison with the UK.

The question is, when we compare capabilities between the two island nations, "Are we getting value for money?" Well, with some 150,000 regular soldiers the Japanese army is certainly much larger than the British army with its 82,000 soldiers. It is also better equipped with more modern armoured fighting vehicles. The Japanese Air Self-Defence Force has 50,000 personnel and 777 aircraft of which 373 are fighter aircraft. The RAF has 34,200 personnel and 793 aircraft of which only 100 are fast fighters or strike aircraft. The Japanese Maritime Self-Defence Force has 50,800 personnel, 154 ships and 346 aircraft. The RN has 32,880 personnel 76 ships and 174 aircraft, which is almost twice the number of main combat units currently in the Royal Navy.

	Japanese Maritime Defence Force	**Royal Navy**	**percentage difference from UK**
Personnel	50800	32880	55%
Ships	154	76	103%
Aircraft	346	174	99%

	Japanese Air Self-Defence Force	**Royal Air force**	**percentage defence from UK**
Personnel	50,000	34,200	46%
planes	777	793	-2%
fighters	373	100	273%

	Japanese Army	**British Army**	**percentage defence from UK**
Personnel	150,000	82,000	83%

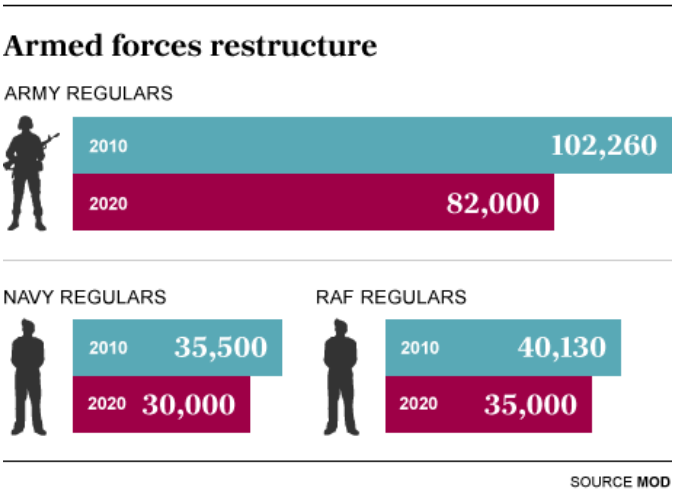
By this comparison, and considering that Japan spends almost 25% less than the UK on defence, it has between 50 to 100% more capability. From this analysis, it confirms that we have a major problem at the MOD on acquisition and force maintenance. On a global comparison, if we spent 5% rather than 2% of GDP we would spend a similar amount and China, although its lower purchasing power parity would still give it a significant advantage.

Rank	Country	Spending Bn $	%GDP
1	USA	581	3.0
2	China	129.4	1.2
3	Saudi Arabia	80.8	10.7
4	Russia	70	3.7
5	UK	61.8	2.1
6	France	53.1	1.8
7	Japan	47.7	1.0
8	India	45.2	2.2
9	Germany	43.9	1.1
10	South Korea	34.4	2.4

List by the International Institute for Strategic Studies
World Military Balance 2015 (for 2014)

2.6.2. The size of the MoD

One question has to be that with 55,000 MOD employees compared to157, 000 active and 75,000 reserve (30,000 volunteer and 45,000 regular) personnel in 2014 in the Armed Forces, "What do they all do?" The ratio of roughly three to one of active personnel to MOD employees seems well out of balance and must be reviewed for increased efficiency. However, rather than decreasing the size of the MOD, the answer may be well to increase the number of the current manpower force projections for 2022 by a factor of 2.5 assuming the MOD can be classified as a streamlined and efficient organisation today - an assumption that is far from certain.



2.6.3. Britain's military-industrial complex (MIC)

Nations have long recognised that they need independent military-industrial complexes to maintain their full geopolitical options. Britain has been foremost in this line of thinking. However, today the collapse of the British steel industry risks our ship and tank building capabilities and therefore the steel industry must be supported, and if necessary nationalised, as should be our submarine shipbuilding capability. Additionally, all our ships should be built in the UK and not abroad as was done recently with the construction of the four tide-class RFA tankers in South Korea.

One of the consequences of the sustained low expense expenditure has been the acute shrinkage of Britain's arms industry. In turn, this has increased the unit cost of each product to the point where compared to American equipment the relative costs are unsustainable. The cost overruns of Type 45 and Astute ships were in the main caused by the original order being considerably reduced (in the case of the Type 45s by 50%)which forced the R&D budgets to be carried by half the number of ships and, consequently increased the unit cost. It is not to say that there were no other cost overruns; however, in these cases, the politicians carry a major responsibility for the higher unit costs caused by the force reductions

One key consequence of increasing the GDP expenditure on defence would be greater job creation and the ordering of more combat systems that would lower the average cost of each unit, increasing cost effectiveness and combat capability. This is very relevant at a time when quantitative easing has failed, and the only option will be for the government to shift to a fiscal stimulus policy similar to the New Deal in America during the thirties.

While we, and our European partners, are more than holding our own with worship and associated weapons' design, as well as with theArmoured Fighting Vehicles (AFV)design, we have fallen behind on 5thgeneration fighter designs such as the F22 and F35, and so it was appropriate to buy these planes from America.

Britain should be mindful that China is creating a MIC that will inevitably exceed by tenfold that of America in the decade ahead. Although America currently leads in areas of military technology such as drones and robotics, we should expect China's creative energies and cyberespionage to narrow this gap much faster than we expect in the West.

Faced with this Chinese challenge, Britain will be every more dependent on the US MICforthehigh-tech products. However, this trend could be countered by partnering with India and or ideally Japan in technology transfer programmes that allow the UK to the build economies of scale into weapons production, i.e., reduced costs and standardisation with our partners.

2.6.4. The need for reform within the MOD

In August 2010, a Defence Reform Unit was created to bring about a wide-ranging reform within the MOD to remove the inefficiencies and misuse of public funds by the MOD during its acquisition process to optimise defence spending. Four years after his original report, Lord Levene claims that strong progress has been made, especially in financial management, by delegating expenditure down to the user. Indeed, the absence of ownership seems to have been corrected from the top down.

However, the reality is that change within such a large organisation with entrenched attitudes and habits will always take longer than expected, and thus the focus must remain on accurate cost assessments and alignments between all parties delivering the product, so the deadlines in price and time are met. Additionally, the reforms will require an infusion of private sector practices to overcome the less dynamic attitudes within a government agency that in the past seems to have resisted all pressures to evolve. The MOD should perhaps employ fewer personnel, but ensure that they are correctly motivated and rewarded. This process will demand radical overhauls and external pressure catalysed by government departments such as the Treasury which at one stage was threatening to manage the Trident programme directly. Most importantly, in a world of rapid technical innovations, changes will also require a considerable shorting of the cycle between weapons planning and deployment so that the systems developed are not out of date before they come into service.

One option would be to return the equipment procurement process to each service, giving them more control and accountability with their budgets. This may also foster the culture that teams see projects through from design to field, rather than in today's situation where many critical decisions cannot be allocated to anyone in retrospectively.

Without continuous and radical reforms, the MOD will not be able to deploy the defence budgeting the most efficient way to maximise our fighting capability. Perhaps lessons could be learned from the USA, and certainly from Japan, who seems to spend less and maintains a much more capable defence force in all three of its arms.

Lastly, it would make sense if the 30,000 reserve forces were predominantly drawn from the 55,000 employees of the MOD, as this would generate a greater sense of ownership knowing that the weapon systems that they procured would one day be operated by them! When their own lives might depend on the equipment they deliver into service, they might ensure that it is fit for purpose.

2.7. THE POLITICAL INTENTION REQUIRED TO DEFENCE THE NATION

2.7.1. The need for a strong defence capability

With new threats appearing around us, we are once more living in a world where the Sword of Damocles hangs over our heads.We now face a potential nuclear war with Russia again; that is even made more likely by Russia's new policy that advocates the use of nuclear weapons. Beside the Russian threat that can extend to a full-scale conventional war on land and sea, we face a much bigger foe in the form of China. Lastly, as we are all acutely aware, we are today confronted with Islamic terrorism on the home front and in the Middle East.The only defence that we have is to restore our long denuded and diminished armed forces to full operational strength as rapidly as possible. Following the fratricide of the 2010 Defence Review, this means spending a great deal more than 2% going forward, and probably 5% is needed to have any chance to repair our defences and once more contribute stability to the Western world (the USA spends 3.5% and Russia 4.5% of their GDP on defence).

Most importantly, a strong defence starts in the minds of our leaders who today seem steadfastly to refuse to appreciate that wars inevitably start when leaders like H.H. Asquith in the eight years up to 1914 and Neville Chamberlain from 1937 to 1940 choose not to confront a rising power and its aggression head-on. Like many before them, they hoped that confrontation would pass them by, like ostriches with their heads in the sand with their bottoms poking into the sky thinking that they cannot be observed. Simultaneously, we are also suffering from a generation of political leaders who have no idea about the many lessons provided by military history and who do not understand the concept of the strategic geopolitical game, and are not aware, one would suspect, of the basics of the military capability of our and our potential opponents' armed forces.

Could they, for example, explain the difference in capability between an F-22 Raptor and a Eurofighter Typhoon? Sadly, Mr Cameron could not, as attested by his2015 SDR statement in the House of Commons that the Eurofighter will remain a premier fighter in the coming decade (discussed below). Or could our political leaders explain why the US Navy prefers to have the Type 45 Destroyers as the anti-air escorts for its carriers, rather than its Aegis destroyers and cruisers? Without such basic knowledge, how can our politicians understand the vulnerability of our nation at this moment and the threats it will face.

2.7.2. The first intentional step to a solid defence

The hard reality is that wars are only prevented when an aggressor knows that victory is uncertain because his enemy will fight to the death and could seriously damage him. But I hear you say: "Don't worry, as history cannot be so stupid as to repeat itself, can it?"

Only recently, in the past couple of months, the Japanese displayed their naval strength in a fleet review with over 50 major vessels (of a total of 63, compared to the UK with 32) and 61 aircraft, including the recently unveiled Izumo-class helicopter carrier. This event was designed to be a clear demonstration of intent and capability to deter Chinese naval aggression in the South China Sea.However, this was not just a Japanese affair, but a show of solidarity by Japan's allies while warships from India, South Korea, Australia, France and the United States also participated in the event. Why you ask was the Royal Navy not in attendance? Because at the time, the British leadership was kowtowing to the Chinese president in a ridiculous, sycophantic display of appeasement that drove a wedge between Britain and her closest ally, America. So perhaps, sadly, history is repeating itself.

2.7.3. Our approach to defence in the past decade

The Blair Labour government was quick to deploy armed forces, but was at the same time was also a party to the grinding down of the very capability it wished to deploy. When it comes to the defence of our nation, the Conservatives have not been any better, with a policy big on words and small on actions. After all, it was the same politicians that in 2012 sold our whole force of 72 Harriers, the favoured fixed-wing ground support fighters in Afghanistan for £116m to the USA for spare parts. By doing so, the MOD ensured that for the decade ahead, the Royal Navy (the originator of naval aviation) would not be able to fly fixed-wing fighters at sea, a catastrophic decision that handicapped Britain in its efforts in Libya only a couple of months afterwards. Such minuscule, financial savings can never justify the capability gaps created by slash-and-burn tactics and the inevitable higher future costs to then fill that self-generated hole. Poor judgement indeed.

Then, there was the decision to cancel the world-beating Hawker Sidley Nimrod, a maritime patrol aircraft developed for anti-submarine warfare (ASW) that, although massively overbudget, was a vital element of controlling our maritime borders on and below the surface. The consequence is that we currently have an absence of maritime patrol planes putting our nuclear deterrence at risk. Notably, the three Merlin helicopters allocated to the task of delousing Russian submarines just cannot cover the same area as a maritime patrol aircraft. That our deterrence today founded on a single Trident submarine on patrol at one

time is concerning if, as regularly happened in the Cold War to the boomers of the USSR, our single ballistic submarine was to be followed by a Soviet attack boat. Russian submarines are becoming vastly more effective through noise reduction advances since then, and thus the silent risk is increasing, and if it became a reality, then our deterrent would have been invalidated in a stroke. Today, we have to ask foreign nations such as France and Canada to patrol our waters hunting for errant Russian submarines whose intent is clearly nefarious; which is a major admission of our self-inflicted national maritime weakness.

2.7.4. The dysfunctional use of the Armed Forces

However, by far, the most damaging element of the current approach to defence has been caused by a dysfunctional use of the Armed Forces. On the one hand, there has been a consistent political desire to use force wherever necessary; in Iraq, Afghanistan Libya and now Syria. On the other hand, it seems ludicrous to seek to deploy our forces when they are ill-equipped to meet the task in numbers and equipment to deliver winning outcomes. The British Army has been quietly grappling with their failures in Basra due to the lack of deployed resources, and simultaneously, in Afghanistan, in a war that seems to have made no difference to the peaceful and effective governance of the country.

These failures cost considerable losses of life, many of which might have been avoided if the soldiers had been fighting with the correct equipment and had been deployed in a more significant force structure. Then, with each failure, instead of learning the lessons and enlarging our forces, we have instead reduced them, creating further a death spiral of capability. Under such political leadership, it is not surprising that our armed forces are suffering from a dangerous collapse in morale that will take years of hard work and investment to be rebuilt. A further national failure has been the emasculation of what was once the world's most effective Foreign Service, the eyes and ears of our strategic policy. It is all very well having a foreign aid budget that is 25% of our defence budget, but it is useless if it cannot be deployed with long-term strategic understanding.

2.7.5. The role of the National Security Council (NSC)

This national leadership structure was obviously inspired by its US counterpart that has proven to be an excellent concept. In the UK, a ten-member committee was established in May 2019 by David Cameron to create a streamlined decision-making forum for all matters about issues relating to National Security including foreign, defence, international relations and development, resilience, energy and resource security. The NSC is responsible for the

coordination of government entities on threats as they appear and are advised by five subcommittees:

1. Threats, hazards, resilience and contingencies including a restricted group to consider intelligence matters
2. Nuclear deterrence and security
3. Matters relating to cyber programmes and policy development
4. Matters relating to countering terrorism
5. Matters relating to the implementing of the Strategic Defence and Security Review (SDSR) and National Security

Although members of the Security and Armed Forces may attend where necessary, the ultimate limitation of the NSC is quite simply the experience and the thought process of its members. Unlike times past (only a few decades ago and including Thatcher's time) that were influenced to some extent by Britain's Empire, none of the current members has any direct military experience or interest in the lessons provided by military history from which much guidance can be sought. Sadly, it would appear as manifested by current policies, that there is a lack of grasp of the great strategic game of geopolitics and the importance of defence within it.

To illuminate this point: in the 1914 war, initially the war cabinet was comprised of David Lloyd George and four other heavyweight members with a powerful understanding of strategy. In 1939, Chamberlain created a ten-man strong cabinet that was singularly ineffective and presided over decisions that led to catastrophe.

Because Churchill strongly believed that the War Cabinet should be limited to a relatively small number of individuals to allow efficient execution of the war effort, the cabinet was immediately reduced to a total of five members one of which was Churchill. His judgement and experience in this matter should today be considered most strongly. Anticipating and, most importantly, acting on threats is not a team activity, neither is creating strategic responses to overt threats. Rather, it is the domain of only a few individuals with exceptional qualities and knowledge of the military capabilities and political anticipation. Large committees (over the number of five) have the risk of diluting this raw, bold judgement capability and of creating average solutions that while they seem safe are in fact potentially disastrous. One solution would be to build an inner circle within the NSC of only half of the committee members who have ultimate authority over military matters.

2.7.6. The role of pre-emption

The rise of Nazi Germany during a period when up to 1938 its future enemies could have acted preemptively, is a situation that politicians should never forget. Recently, released secret information tells of an MI6 plan conceived with the perspective that war was inevitable, to assassinateHitler at his 50th birthday celebrations. This act was designed to precipitate a war that Britain could have won through a naval blockade; one that would have forced Germany to attackFrance before its plans were fully prepared and that would have potentially changed the war's outcome. In the end, Chamberlain quashed the plan, and the world went to war.

In today's world with the rise of some nations that seek to challenge our western democratic way of life through military power, the big question is what our politicians would do in a similar situation. Either preemptively attack in the hope to win a war before the enemy became too strong, or just watch the threat grow with inevitable consequences. This situation is one that any true democracy will always find impossible to manage, as its resolution is leadership based. However, there should be a secret and national document that aims to draw a historical balance argument as to when and why perception might be appropriate, and to ensure that all leaders of the nation read and understand its conclusions.

2.7.7. Summary: Requirement of political intention

The desire to place our national defence as a priority has to come from our politicians, the electorate and the press simultaneously. Only then can the release of more funds to rebuild our armed forces become apart of the solution. However, additionally, Britain must show the political will to manifest this increase in defence expenditure. To do this, the civilian leadership must develop a much greater understanding of the capabilities of each of our Armed Forces, their weapons systems and their limitations.

Simultaneously, this educational process must also take place within the Armed Forces where the traditional three-services-model needs to be integrated into a new mechanism the highest levels of commands. Surely, senior commanders should have a far greater experience than that of the single arm they currently derive from and understand the overall priorities needed to defend our nation. This would ensure that our military commanders place the nation's needs above their tribal loyalties to a given service.

The catalyst for such a profound change should come from the realisation that unlike previous World Wars when democracies struck the first blow, reeled and then recovered, the next major war will be so intense that it will be over faster than we can build new combat systems.

Thus, we will fight with what we have, with no chance of replacement and as such, Britain needs to be prepared and capable in every domain of its island's defence. In the following sections, we will review the main areas of UK defence capabilities and highlight their strengths and weaknesses.

SECTION 3: NATIONAL CYBER SECURITY

3.1. SECURITY OF INFORMATION

Nations, from the start of time, have always spied on each other and sought to steal their secrets, especially if a military advantage could be negated or a new one created. Thus, the arrival of the internet did not change national behaviour, but rather provided a new medium through which these activities could be conducted.

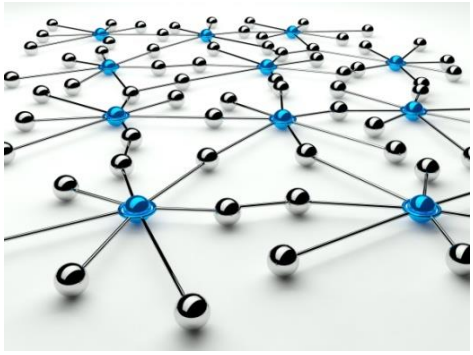
The Chinese were the quickest to realise that by harnessing their massive population to create a force of many hundreds of thousands of highly intelligent young party members it could access the superior technical knowledge of the West to accelerate its economic and military growth. The collective West has been extremely slow to respond over the past one and a half decades and during that period they have lost at least two decades of technical lead in many key areas to the Chinese. This situation has made the world a much more unstable place, as it has narrowed the two gaps, by allowing the Chinese economy to grow rapidly, and most importantly it has closed the military capability gap. Notably, this process is equally replicated by the Russians, who also have formidable cyber capabilities.

The West has now woken up to this threat and rather belatedly started to act accordingly. However, there will come a time when the Chinese creative energy manifests technologies that will lead the world, and it will be then that the tables will inevitably be reversed against the West. Thus there might soon come a time when the West will seek to steal technology from China. But that is little compensation, as by then Chinese power will be of the same magnitude as that of America and a bipolar world will once more be the norm. Thus, we can conclude that the West has lost the first battle of the war of Internet-Information security. However, it is vital that as the West creates new RMAs that we can preserve the information from the Russian and Chinese to ensure a durable advantage.

3.2. FINANCIAL INTEGRITY

There is now a generic security risk to the financial and commercial sectors. Thus, protecting the financial system from the banks all the way to the end consumer is a vital process to ensure the integrity of the nation's economy. Cyber fraud has been growing and represents a threat to the nation's economic wellbeing and so must be considered to be of national importance.

3.3. NETWORK VULNERABILITIES

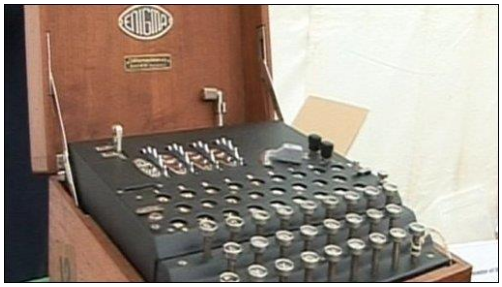


The Internet Revolution over the past decade has been the driver of information sharing across all aspects of the modern world. This has been replicated in the military where network-centric warfighting capabilities have proliferated. They are designed to give commanders and their subordinate's real time information that enhances combat capabilities. The world's forces are all now reliant on this complex process, and this raises the possibility that if a nation's information network were shut down, then the nation's combat capability could be destroyed or misdirected in a moment. There has never been a similar situation with a potential capability to at a stroke win a conflict. Even if a major outcome is not possible, localised disruptions to combat systems in conjunction with physical attacks, especially pre-emptive ones, have to be considered a real possibility in today's world. Thus, the integrity of networks and weapons software is now critical to a nation's warfighting ability and requires maximum resources to ensure that this remains the case.

3.4. BIG DATA

The ability to increasingly sort and order big datasets that once appeared random, into organised systems has the potential to revolutionise intelligence and warfighting. Intelligence allows hidden pattern of individuals and groups to be observed, and war fighting has the potential to find stealthy planes and ships against the background clutter. This area is highly dependent on computing speed and power. Thus developments in computer science and dramatically enhanced processing speeds are highly relevant to combat capabilities.

3.5. BREAKING OF CODES AND INTEGRITY OF COMMUNICATIONS



The first brute force methods using Colossus broke the German codes of the Enigma Machine in WW2. This single pioneering computer and code breaking team contributed enormously to the success of the Allied war effort. Today, it is all about the race for quantum computers and cryptography to ensure that communications can not be penetrated. The lessons of WW2 must remain in our minds as to the lengths we must go to ensure the integrity of communication and the ability to read other nations' communications to create accurate intelligence assessments.

3.6. THE GREY ZONE AND RISK OF DISTRACTION

The ability to attack a chosen target using cyber-capability opens up a new range of political/military options that have to be understood and countered. What would happen if a foreign power managed to make a nuclear reactor go critical in an untraceable attack? On a small island like Britain, this would have dire consequences, and it would also act as a serious distraction to the government at a time when it could also be facing an increase in tension elsewhere. There is also a grey zone where an attack with significant consequences could take place, but could not be attributed to any given nation. The challenges of solving such events have still to be faced and resolved, not just in Britain, but globally and require the maximum effort to ensure Britain's key infrastructure is appropriately well protected. At the same time, such a capability would be a very valuable component within our national armoury.

3.7. THE IMPORTANCE OF THE GOVERNMENT COMMUNICATIONS HEADQUARTERS (GCHQ)

During WW2 Britain's Bletchley Park lead the world in signals' intelligence and today, its modern day version of the GCHQ continues to do so. This intelligence and security organisations a critical national resource that has thankfully received more resources than publically declared as it seeks to contain the ever-growing cyber threat from terrorism, organised crime and hostile states. Officially, the number of employees is 5700, but in practice, its numbers are much higher, swelled by civilian contractors.

Threats are becoming ever more complex such as the disclosures by Edward Snowden that released vital information as to how agencies like GCHQ operate. In this light, one has to ask if GCHQ is large enough to meet today's challenges appropriately. In comparison, the National Security Administration (NSA) in America employs between 30,000 and 40,000 people. No information is in the public domain about the Russian agencies. However, they do have a very significant capability in this sector, possibly equalling that of the Chinese.

The Third Department of the General Staff Headquarters of China's People Liberation Army,also known as 3PLA,is responsible for monitoring the telecommunications of foreign armies and producing finished intelligence based on the military information collected, and is estimated to have well more than 100,000 hackers, linguists, analysts and officers across a dozen military intelligence bureaux.In addition, the government employs a huge labour force to monitor web traffic that some claim extends to 2 million employees.

When these numbers are compared to that employedby GCHQ, the latter looks rather understaffed. On this basis, there appears to be a need for drastic GCHQ expansion by at least a factor of three, especially, given not only the scale of the threats but also their massive potential to do damage to the nation.

SECTION 4: INTELLIGENCE AND SPECIAL FORCES CAPABILITIES

4.1. THE ISLAMIC THREAT

Countering terrorism at home and abroad has traditionally been one of Britain's strongest capabilities, using a combination of Intelligence and Special Forces.

However, the threat posed by Islamic terrorism is greater than any prior group and as such the government's proposed response to the domestic and overseas terrorist threat is entirely correct, with the SDR 2015 provision for an enlargedIntelligence Corps, Special Forces and police capability by some 1900 personnel. However, there is a limit to this expansion process as the ability to increase the size of these SF regiments have to be balanced against maintaining the exceptional standards of the personnel.

The only element that seems to be missing from the Western strategy is the essential underlying understanding of the nature of the threat and its demographic drivers. The principles of "the Five Stages of Empires within BTCH" are entirely applicable to better understanding this regional civil war and its potential outcomes as described in the article "The 21st Century Clash of Christian and Islamic Cultures" (Appendix 1).

It is vital that we systematically address the source of Islamic fundamentalism in the Middle East and create an integrated strategy: one that involves military action from the air and on the ground with the application of boots on the ground to deny ISIL its nascent statehood. However, the campaign must also involve political solutions that create strong and organised

alliances that survive beyond the point of military success so they can sustain the subsequent and inevitable counter-insurgency phase when ISIL goes back underground. Additionally,the power of the ISIL brand needs to be attacked in a brand erosion campaign that will break down the appeal of ISIL to new recruits. Lastly, there must be an effective aid and education programme to give whole populations a future, and remove the despair that powers young men to join the forces of Islamic fundamentalism. This process will inevitably be a long, hard road and the West must be psychologically and physically prepared for a multi-decade engagement in the Middle East and ongoing protection of its homelands. Rather than describing acts of violence against our homeland as terrorism, we should call all acts linked to ISIL acts of war; this might then change our half-hearted approach to what is essentially the rise of Islamic identity seeking nationhood and a caliphate.

4.2. BRITAIN'S SPECIAL FORCES

One further consideration is that our Special Forces need foreign bases, platforms at sea and capabilities in the air from which to launch themselves. However, as our conventional forces have shrunk, so have the number of available platforms along with the geographic distribution. Thus, this SF area of Britain's defence strategy should not be considered separate from the overall defence capability and force projection. The real danger from 15 years of asymmetric warfare is that our leadership and the nation have forgotten that this is not the future nature of war, but rather a phase in our nation's defence. One has to ask what role Britain'sBoerWar had in the country's lack of preparedness for the all-out war of 1914. As such, Britain needs to keep its counter-insurgency capability and, in parallel, it should significantly build its conventional capability in preparedness for a full-scale conflict. This threat requires that our deep reconnaissance capabilities that were at the core of UK cold war SF are maintained and fostered today.

Britain's three Special Forces' regiments are all involved in operations on an almost continuous basis in every part of the globe. They currently rely on charitable donations to ensure that their soldiers are financially supported if they are injured executing their duty, but they are handicapped by the sensitive nature of their roles in raising funds. Thus, it should be incumbent on the HMRC to provide the charitable funding required to ensure that the annual drawdowns do does not lower the capital below sustainable levels.

4.3. BUILDING VITAL INTELLIGENCE CAPABILITY AGAINST RUSSIA AND CHINA

MI6 Headquarters at Vauxhall

Lastly, it is vital that our Intelligence Services not only have sufficient resources to follow the Islamic threat globally, but also to have the capability to follow the Russian threat that has grown significantly, but which calls upon a well-established history of the Cold War. The hardest and the probably most significant new element will be to build an intelligence capability that is capable of following the growing threat from China in all its multiple forms. This will be a formidable challenge as China's culture is both complex and relatively alien to Western minds and governments. Thus the solution will require a new generation of Chinesefocussedoperatives in dedicated divisions.

SECTION 5: WAR AT SEA – THE ROYAL NAVY

5.1. THE RELEVANCE OF NAVAL POWER TODAY

Britain was the first great global naval empire, and subsequently passed its baton to America during WW2, which since then, has ruled the waves and provided global security. However, today, China seeks to challenge PAX Americana, and with the greatest shipbuilding capability in the world, it will soon out build every other nation on earth. Most importantly, as the Chinese will soon seek to project power into our waters, we must maintain the capability to return the gesture.

The first Chinese Carrier on operations

Meanwhile, the Russian naval resurgence means that while we wait for the Chinese threat to appear locally, the Russians are already here demanding a containment response at sea. Lastly, all long-range power projection essentially relies on naval power with examples that extend from the Falklands War to the invasion of Iraq and intervention in Libya. It is just incredible that today Britain has placed itself in the position of not having any fixed wing carrier-based force.

So in short, we conclude that in today's world theRoyal Navy is as relevant as it has ever been though it might be missing half its teeth. However, for the RN to maximise its relevance and effectiveness, it must have the right tools to do its job to keep the nation safe. With some 76 commissioned ships, of which less than thirty are main combat units (excluding the nuclear deterrent), the RN Force is half that deployed by the Japanese Navy. Consequently, it is obvious that the Royal Navy is just not big enough to do the job that the nation requires of it today with only:

- 4 Ballistic missile submarines
- 6 Type 45 destroyers
- 13 Type 23 frigates
- 6 Attack submarines (2 Astute and 4older Trafalgar's)
- 1 Amphibious assault ship
- 2 Amphibious dock ships

- 15 mine countermeasure ships
- 22 small patrol ships

While the dominant role of the global maritime policeman was taken over by the US Navy during WW2, it seems that we have forgotten our island's history and the vital importance of a powerful navy to a nation with global trade interests. However, it is ironic that for the first time in many decades, the RN will operate two weapons platforms that are truly world-class and best in their field. First is the Type 45 anti-air warfare destroyers that are the preferred escort of the US naval carrier groups, due to their extended sensor range. Secondly, we have the Astute-class attack submarines that can give the latest US Seawolf- and Virginia -classes a run for their money. Lastly, there are the two new carriers that will come into service in the future.

Importantly, although the Army and Air Force might disagree, the last great bastion of strategic thinking is the US Navy with its global responsibilities. Ensuring that the RN maintains strong links to the US Navy is critical to cross-fertilize strategic thinking and vital for Britain. Meanwhile, the stronger the RN becomes, the more effective it will be as a vital component of Western security architecture. Sadly, it is clear that we have forgotten the hard lessons of the battle of the Atlantic i.e. that without open sea lanes Britain is vulnerable and would soon starve.

5.2. THE STRATEGIC NUCLEAR DETERRENT

A Vanguard-class missile submarine leaving on patrol

Britain is one of the five recognised nuclear states and has since the inception of nuclear weapons believed and invested in Mutually Assured Destruction (MAD). MAD was the overarching security architecture that got the world through the Cold War. However, one has to ask if the same paradigm continues to operate today. Its foundation was the assumption that both sides wished to survive a war. In the case of Putin and his narrow power base, one has to wonder if MAD is valid, especially in a situation in which Putin thought his

life was threatened and he had nothing to lose. Additionally, the lack of defensive intent in the past decade shown by Britain might be misinterpreted as a lack of commitment to carrying through the threat of MAD in the nightmare scenario.

The RN is ultimately responsible for Britain's strategic nuclear deterrence or nuclear umbrella that in addition to that of America and France within the NATO construct, provides sovereign protection. From the perspective of a potential aggressor,the uncertainty of a nuclear response provided by three separate governments adds to the effectiveness of our national deterrent.

The Tory government appears committed to the continuation of nuclear deterrence. However, the cancellation of the Nimrod programme, so vital for maritime control and sweeping the seas for Russian attack boats ahead of a departing ballistic submarine going out on patrol, was a terrible mistake that could well be construed as an act of national weakness.

RN's ballistic missile submarines are today the most reliable instrument for maintaining the nation's nuclear deterrence. However, with only one submarine on patrol at any one time, if ever the Russians were able to follow this ballistic submarine (this is currently unlikely), as the West supposedly, regularly did to the USSR, then our deterrent would be instantly invalidated. Only just recently French and Canadian maritime planes have been called in to hunt a Russian submarine that was thought to be waiting for the next RN nuclear patrol departing our waters. Until the nine P-8 Maritime Patrol Aircraft (MPA) arrive from America, our nuclear deterrent is both compromised and no longer independent. This vulnerability comes back to the lack of investment in weapons platforms in the air and on the sea to keep our nuclear deterrent safe. Additionally, the planned extension of our deterrent by five years beyond its lifespan brings with it considerable risks associated with the advance in subsea detection technology. By then, the hull design of current nuclear boats will be out of date and much noisier than contemporary submarines of the decade ahead. Moreover, if the improvements in sensor sensitivity continue at the current pace, detection ranges will increase significantly, making our deterrent considerably more vulnerable to a preemptive counterstrike. While there is a risk that new technologies could make the oceans transparent, such technologies are not yet with us. As such any delay to Trident's replacement only sends signals to our potential enemies of a lack of intent to defend our Nation.

5.3. THE FUTURE VALUE OF AIRCRAFT CARRIERS

The two new HMS Queen Elizabeth-class 65,000 tonnes £3bn aircraft carriers in construction will be valuable assets to the nation's defence. However, although they are the largest warships ever built in the United Kingdom, with a much smaller aircraft complement and worryingly, a much lower combat speed, they do not come even close to the American Strike carriers. While the speed differential seems minor, the difference of 10 knots over 24 hours

means that the search area for a carrier group has to increase from 1,13million to 2.22million square nautical miles, making the fast carrier group hard to find and faster to redeploy. Additionally, the power failures that have plagued the T45, which use the same power plants as the new carriers, will hopefully have been solved.

Further, by not making these ships nuclear-powered it seems the government could have made a critical error as, although more expensive to build, the nuclear-powered carriers are more cost effective in the long run and, as will be discussed below, the power generation capabilities of Britain's ships for additional weapons may not be sufficient to install future direct energy weapons such as lasers and railguns..

HMS Queen Elizabeth under construction - Note the stealthy design

However, even if these new RN carriers are not quite the match of a US ship, they represent a considerable leap in the Royal Navy's capability to project power globally, and as such, they should be a welcome addition once they have received the full complement of combat F35s and helicopters. This will be a giant advance for the RN who not since F-4 Phantoms were flown off RN carriers, have they been able to deploy first-rate maritime fixed wing aviation in the form of the F-35. We should, without a doubt, buy some of the V-22 Ospreys to extend the power projection of our Special Forces from maritime platforms and to supply our carriers at sea. For those that feel that the aircraft carriers are a weapon system of the past, perhaps they should ask why the US maintains ten massive carriers with another 16 assault ships that are 2/3 the size of our new carriers. Meanwhile, the Russians are planning to build four nuclear carriers and the Chinese at least another four. The simple fact is that as instruments of national power projection carriers remain unsurpassed.

The V-22 Osprey would be a valuable addition to carrier operations for resupply missions and long range SF insertions

However, there is one enormous downside to the deployment plan, driven by budgetary limitations; Britain will not have its air wings of F-35s embarked on its two carriers until 2023/24. Even then, when they finally arrive on board, there will only be 12 F-35s allocated per aircraft carrier. Meanwhile, the hulls will have been in service since 2020, waiting in vain for their full, planned complement of 36 F-35s and four helicopters.This means that for at least three years, HMS Queen Elizabeth will have to rely on foreign nations' air wings embarked aboard, most probably US Fs35s, which is ultimately not the ideal situation for national power projection, unless we are involved in a conflict that is aligned with US interests.

The one area where USN and RN planning has failed is that it is based on the assumption that carriers can operate with air superiority that is assured. It was under this assumption that USN aircraft were designed with a short combat radius of some 600 nautical miles (NM) to ensure high combat sortie ratios. However, during the past decade standoff weapons have almost doubled their effective range making carrier groups vulnerable out to 1200NM. To counteract this threat, it is vital that and an air refuelling capability is added to the carrier wing. This would extend the F35B's range to give the carrier group greater survivability.

5.4. ATTACK SUBMARINES

HMS Astute

The maritime surface battle space is becoming increasingly hostile to surface ships placing emphasis on survivability on

the submarine fleet. A good example of this is the way that the USN is being squeezed out of the South China Sea by the Chinese navy (PLN).

The real problem for the RN is the very limited numbers of nuclear submarines (SSNs). However capable the platforms are, we currently just do not have enough ships to fulfil all the tasks that include ballistic missile submarine protection by at least one nuclear attack boat, carriers and amphibious group support above and below the surface and commitments to current patrol zones globally. When one considers that with only six nuclear attack boats in the fleet of which 1/3 will be under refit, 1/3 in dock and 1/3 deployed at any one time, there are now only two or three submarines on patrol globally. A painfully small force of what are the most effective units for sea control in the naval arsenal. Although the government has only committed to four of the seven planned Astute-class submarines, it would seem essential that the number of this highly capable submarine class is increased to at least 12 and ideally 18 by 2022. These SSNs should be the principal attack platform of the RN able to sink enemy SSNS, interdict trade routes and make surprise attacks on land targets.

The use of Chinese Kilo-class submarines significantly altered the balance of power in the regions close to the Chinese coastline. So the lesson should have been learned that non-nuclear submarines have a place in the modern fleet. Additionally, the technological advances in air-independent propulsion by the Germans make the 1,880 tonnes German Type 212 class submarines at £250m each (25% of an Astute)very attractive for coastal operations.

The RN should order 12 of such relatively cheap platforms and base them on three large depot ships that could lift the same 1,800 tonnes craft aboard and move them to critical choke points around the world while providing in theatre maintenance for ongoing operations.Alternatively, they could be operated out of UK waters to allow the nuclear boats to project power globally. This concept would be a very cost effective way of increased submarine capability, and release the nuclear 'capital' ships to roam more freely.

5.5. AMPHIBIOUS LANDING CAPABILITIES

HMS Ocean of non-stealthy design operating AH-64s

The future retirement in 2018 of the rather slow but valuable HMS Ocean with its 18 helicopter capability seems to be ridiculous. There is no doubt that with the threat levels rising globally, both of the new carriers will be inevitably employed in the strike role, and as such HMS Prince of Wales will not replace HMS Ocean in the amphibious role to support the two dock landing ships, HMS Bulwark and HMS Albion, and the four bay-class RFA amphibious ships.Notably, unlike the new generation of USN's San Antonio-class amphibious transport dock ships that are of stealthy design, all of the RN's current amphibious ships are of the old non-stealthy design and therefore could not be used in a contested landing against a sophisticated enemy unless total control of the landing zone on the sea and in the air had been achieved.

HMS Bulwark showing her dock facilities in operation and a Merlin on the back of the flight deck. Note the non-stealthy design.

However, without the expeditionary land force component, all the ships in the world will not

create an amphibious force. The elite light infantry of the 3 CommandoBrigade with its three commandos 40, 43 and 45 could be just such a force. Although the brigade includes its own indigenous light 105mm artillery, engineers and support elements, there is a strong case to provide more mobility with the new Ajax Scout vehicles, heavy Challenger2 armour and SA 90 self-propelled artillery and the Multiple Launch Rocket System (MLRS)in line with the US Marine Corps.However, there would have to be additional assault landing capability, similar to the US Marine Corps air-cushioned vehicles to ensure that the heavy equipment could be landed rapidly from the Landing dock ships HMS Albion and HMS Bulwark.With all the extra equipment now in reserve, it would make sense to increase the firepower of this highly capable elite organisation.

5.6. TYPE 45 AIR DEFENCE DESTROYERS AND TYPE 26 GLOBAL COMBAT SHIPS (FRIGATES)

Overall, by the most conservative measures, the RN needs a minimum of 30 surface ships comprising destroyers and frigates to fulfil its basic responsibilities. Today, it has just 19 hard-pressed ships which under current plans could be reduced to 14; notably, a modern Type 45 at 8,500tonnes is in tonnage equivalent to a WW2 cruiser, while the proposed Type 26 at 6,900 tonnes would equate to a WW2 light cruiser. However, despite the capability increase of these powerful ships, they are unable to be in more than one place at once.Thus, even a minimum 30 ships capability will not compensate for the fleet's demands on these extremely capable Type 45 destroyers for fleet air defence.Perhaps, even more importantly, the current class of six Type 45s would, if used as ballistic homeland missile defence platforms, be hard-pressed to meet commitments across the fleet.This implies that the number of type 45s should be increased to 12, which was the original number in the class.

A Type 45 air defence destroyer. Note the stealthy design and high position of the radar systems to enhance range capabilities.

However, this number does not take into account any anti-ballistic defence requirements for the homeland which should include another six dedicated anti-ballistic missile defence Type 45 destroyers from the protection of the homeland. There is a clear example of this role in the USN with the Aegis destroyers that

are specifically fitted out for this ABM role, four of which are deployed in Spain to cover Europe.

Another issue is that the Type 45 during a saturation attack can expend the whole of its missile magazines in less than 2 minutes. While this rapid fire capability is a wonderful naval revolution, the question has to be asked how the missile storage capability of Type45 and the fleet it protects could be increased.

Firstly, the gymnasiums forward ofType45's missile storage zone can be quickly modified to increase magazine storage, but that will then again be fired off in the next two minutes of engagement. Perhaps, the supply and large value ships like the aircraft carriers that travel with task groups should carry large magazines that can be launched and then directed from the Type 45s. This would dramatically increase the missile storage across a task group.

The recent announcement that all of the Types 45s will have to undergo significant power plant refits is due to the alarming habit of a characteristic of sudden power losses which renders them combat ineffective. This has occurred on a number of occasions to a number of the type 45s. This problem highlights two key issues. The first is that power generation is vital for the modern warship. Secondly those warships on deployment need redundancy, so the idea that one type 45 can defend a carrier task force is ludicrous, as a technical failure and battlefield damage require redundancy. Thus there is no substitute for numbers, and the RN needs significant numbers of Type 45s and 26s.

Artist's impression of the new stealth Type 26 frigate

The frigate fleet has 13 Type 23sin service, although a further three were built and sold abroad. Their design is of the pre-stealth era and thus, now outdated and due to be replaced by only eight of Type 26 global combat ships optimised for antisubmarine warfare (ASW) as the fleet workhorse. It will be a vastly more capable ship. However, the eight ships that have been ordered the 2015 review will shrink this vital component of the fleet to levels that seem minimalistic. Most of all, the in-service date starts in 2021 with the last ship not in service until after 2030, which will force the by then outdated type 23s to remain in service far longer than they ever should

have done. In the 2015SDR, there was also a commitment to a further five light frigates that might in the future be added to the fleet. What a light frigate would exactly look like is open to conjecture. However, we will examine this concept in the next Corvette section. Meanwhile, it seems crazy that the Type 26 does not comprise a class of at least 16 ships and ideally 21 ships similar to the fleet levels of 2000. This would be more realistic and provide a much needed global patrol and force projection capability along with the Type 45s

5.7. THE NEED FOR MANY CORVETTES

US Navy littoral combat Ships. Note the stealthy design.

With the increase in traditional ship tonnage classifications of destroyers and frigates,theType 45 would in WW2 have been classified as a light cruiser whiletheType 45is a heavy destroyer. Thus, there is an obvious need for a new class of numerous ships around 3,000 tonnes. This tonnage is equivalent to a large WW2 destroyer; today classified as a Corvette. With our ideal number of 12 Type 45s and 21 Type 26s, there is still need for a fleet of some 40 multi-purpose modular corvettes. These could provide additional combat capability and replace the seven Sandown- and eightHunt-class minehunters, the five survey ships and the fourRiver-class patrol vessels. This new class would additionally take the RN back up and above the critical 30 surface unit threshold. Not only would the RN have a fleet of interoperable,multi-mission ships, but the cost effectiveness of this corvette fleet would also make these workhorses a major cost-effective national asset.

USNavylittoral combat Ship.

Note the vast rear flight deck and internal volume enhancing the multi-role capability and the stealthy design.

The US Navy has faced the same challenges as the Royal Navy on a shortage of warships and came up with two different solutions, called littoral combat vessels. The one that has the most potential for a multirole capability the USS Independence with its trimaran aluminium hull conferring speed and manoeuvrability at 3,500 tonnes and a flight deck and hanger space that allows for operation of the largest rotorcraft and the V-22 and F35. In addition, it has a very large internal cargo carrying capability. Being able to operate forward F-35s from their platforms could be a new combat capability that could prove very useful in future operations. The hulls have the the huge logistical capacity for amphibious landings and a host of other capabilities.

The adoption of a large class of such ships with modular weapons systems would increase the RN's combat capability considerably and would be relatively inexpensive at about £150m per ship.Additionally, with full automation, such ships could require a small standing crew of 25 with additional mission crews deploying when needed, making this a very cost-effective vessel to run. If the national threat level increased, then more capable weapons packages could be fitted to these vessels, and then, simultaneously,hydrographic vessels could then become combat vessels.Additionally, the balance of minesweepers and other roles could be adapted according to the threat level faced at any one time.

One major criticism of the USN littoral combat ships (LCS) is their low level of firepower. However, it should be remembered that these ships were never designed to be battle line combat units, much like the Corvettes of WW2. However, with modern compact weapon systems, the equivalent RN ships should have a base level combat power, and a module upgrade design so that combat power could be quickly increased in time of conflict.

Notably, the MoD published in 2012 a joint concept note: Future'Black Swan' Class Sloop-of-War proposing a fleet of 20 multi purposes loops of 3,150 tonnes and 95 meters and a £65million price tag. The ships were similar to the US ships with multi-mission bays and a flight deck to land a Chinook. However, this avenue does not seem to have gained the traction

its deserves with the MOD. As demonstrated by the Trimaran designs of the USN ships, this design requirement should be examined with the utmost design creativity.

5.8. COASTAL PATROL VESSELS

The RN operate16 of the 54 tonneHMS Archer training and patrol boats that are only useful in unarmed missions.

The Swedish 640 tonnes Visby-class patrol vessel.

Note its stealthy design and helicopter deck

The air-cushioned 274 tonnes Norwegian Skjold-class

In the advent of a new and very capable stealthy coastal patrol craft class coming into service in foreign navies, it is time that the RN replaced its current patrol fleet. Two prime examples of this small-ship-class are theSwedish 640 tonneVisby-class patrol vessel and the Norwegian 240 tonnes Skjold-classic- cushioned catamaran. Both operate a 76mm gun and the Kongsberg Naval Strike Missile (SSM). With the advent of this new design class showing the way, it would make sense to replace the RN'srather pedestrian vessels with zero combat capability with a stealthy class of vessels.These designs could carry the cheap modular anti-ship missiles that allow them to patrol our coastlines and be deployed abroad in low threat environments.

5.9. POWER PROJECTION – REPLENISHMENT AT SEA (RAS)

Replenishment at Sea (RAS) is critical to the ability of any navy to project its combat ships and sustain operations with food, ammunition and oil to keep the warships fuelled. The US Navy has some 19 ships, and of course, its main carrier combat units are nuclear powered. Meanwhile, the Russians have seven and the Chinese eight ships compared to the RN six ships. Behind this falls Germany at five with Japan, France and India at four each. Monitoring the changes in this ship class will be critical to determine the intentions of foreign fleets and their capabilities. One thing is certain; that all new ships with this role will have stealthily designed characteristics to avoid giving their position away and that of the warships they are replenishing. Meanwhile, the civilian-manned Royal Fleet Auxiliary (RFA) operates a total of 13 replenishment ships and additionally, augments the Navy's amphibious capability. The auxiliary is manned by 1,850 civilian's that continue to seem anomalous as they operate in combat zones and will in all probability in future carry weapons systems to defend themselves.

5.10. FUTURE NAVAL RMAS

5.10.1. A new breed of ships as revolutionary as the HMS Dreadnought

The rate of technological advance in the past few decades is creating a revolution in naval affairs. As in all other battle zones, the combat zone has become more lethal, and as per the war on the Western Front in 1915, the only answer to increased firepower is greater interval spacing (i.e. a longer standoff range) and camouflage. Today stealth is the new camouflage, as the first defence is to be not seen in the first place. Hence, Type-23 is a ship very much of the past, while Type-26 is almost ship of the future. The big question is therefore whether all new RN warships should encompass the design lessons of the USS

Zumwalt? The answer has to be yes, just as when HMS Dreadnought was launched and all ships prior to that date became obsolete in one splash.

Above and on the right:

The USS Zumwalt, the shape of things to come just around the corner.

5.10.2. Air defence and lasers

The question has to be asked if the dominance of the aeroplane over the warship that has existed since the RN strike at Taranto on 14 November 1940 has now ended. This has taken place since the emergence of the US Aegis warships and now with the arrival of theType-45s. With these new warships, both missile and air attacks may now be defensible as long as the missile ammunition does not run out in repeated saturation attacks.However, the limitation to such air defence ships is the number of missiles that can be carried to withstand saturation attacks. To that end, the new US laser and rail gun technology that will, no doubt, become more reliable and lethal, offers a cheap and an unlimited number of shots against air and missile attacks.

5.10.3. The need for power

The USS Zumwalt is the new Dreadnought in its revolutionary capabilities. This powerful ship is all about stealth and power. Power for the weapons systems, radars and power to drive the ship. Thus, this next revolution in naval affairs is all about the need for power. Inevitably, it will imply the need for more nuclear reactors on warships. The operational capability of the Zumwalt will have to be watched very closely to ascertain if it is the new Dreadnought revolution in naval surface warships.

5.10.4. The concept of distributed lethality

One future concept that has been researched in the USNavy that also has a shortage of combat platforms is called distributed lethality. This concept provides every warship and support ship with modular missile systems that distribute fire power around the fleet - similar to the addition of guns to merchant fleets in WW2.Thus, the large internal volume of the new carriers, amphibious and support ships would be used to store and launch a range of weapons from anti-air to surface capabilities. This concept would go some way to increasing the RN's ability to project power but is not a substitute for double the number of platforms of attack submarines, destroyers, frigates and a new class of multirole corvettes.

5.10.5. Anti-torpedo torpedoes

In the new age of anti-missile defence, it is but a step away to deploy anti-torpedo systems that can be deployable once an incoming torpedo has been detected. Such a weapon could change the undersea power balance making the submarines traditional armament ineffective. Additionally, it is not difficult to foresee a time shortly when lasers could make ships relatively in vulnerable from air attack, which would then leave undersea attack as the only viable option. While the West has been slow to take up this line of innovation the Russians have been hard at work creating anti-torpedo torpedoes (ATTs).Anti-torpedoes help to destroy attacking hostile torpedoes on approach to the zone dangerous for a submarine or ship. As of today, on Russian ships, the torpedo defence system is implemented only as a surface ship configuration with a launch from 324-mm torpedo tubes. It is calledPaket-E/NK, and the system helps to neutralise the threat at the distance of 1,400m from a warship.Anti-torpedoes of the Paket-E/NK system are positioned under water with a program set by the ship's onboard equipment, and when approaching the target torpedo, they are guided by the acoustic active/passive homing system. An anti-torpedo is capable of speeds of up to 50 kph and carry a warhead yielding up to 80 kg in TNT equivalent. According to underwater weapons experts, including anti-torpedoes into an armament set of Russian submarines will considerably improve the effectiveness of their torpedo defence capability and export potential. This will make them much harder targets to destroy in future.

5.10.6. Drone fleets

It seems inevitable that the smaller autonomous air surface and submarine drones that can be launched from main combat ships will soon come into service, in which case internal storage space will become a design premium. In that regard, the proposed Littoral Combat Ship (LCS) design for the RN should build in a massive adoption capability. As the unit cost of such systems will in all probability be lower than that of the larger units, this could provide an

excellent opportunity for the British defence industry to stay up with this Remaindered, we must prepare for drone sub hunters that can be deployed in great numbers to hunt ballistic and hunter-killer submarines, which could change the balance of power under the seas.

5.10.7. Standoff range of Surface to surface missiles.

There has been a trend towards increased standoff range of surface to surface missiles that have left the trusted Harpoon missile a range well short of Russian and Chinese systems. This capability gap needs to be corrected rapidly in RN ships.

5.11. RESERVE SHIPS

Recognising that a modern sea war would be extremely intense, there should be plans to deploy civilian ships that can be adapted to support roles and added to the RFA. To make such a fleet combat ready, the RN should keep a reserve of modular self-defense weapons like Goalkeeper that can quickly be added to ships.

5.12. SUMMARY

One has to agree wholeheartedly with Lord West, a former First Sea Lord, who has described the total number of escort vessels a "national disgrace", and the fact we don't have any aircraft carriers as "madness". Indeed, it is obvious that the RN is in crisis and needs rapid and substantial attention. Our proposal would be to increase the number of submarines to 12 Astute vessels and a further 12 small air-independent submarines.

Both carriers must be operated as strike carriers with two full complements of F-35swhile the fleet of major surface vessels would be increased to 33, plus six dedicated ABM Type 45sandfurther enhanced with30 multipurpose corvettes. As we learnt in the Falklands, we will fight with what we have, and we will need sufficient reserves to cope with losses and still maintain our war effort. Today, the RN's combat capability has been sorely impaired, and it is vital that the next defence review rejuvenates the Royal Navy within five years. Critically, the Navy needs both ships and the manpower to operate them, so it is essential that the Navy is increased in size immediately by a minimum of 2,000 (a revision of the 2015 Defence Review which only allowed 700 new sailors), so that it can be ready to operate the few ships it actually owns in the next few years.

Lastly, allowance has to be made for the effects of climate change on basing strategies in locations such as Diego Garcia where rises in sea level could create sustainability challenges for the UK and US operations

5.12. KEY RECOMMENDATIONS FOR A 100 SHIP ROYAL NAVY BY 2022 (EXCLUDING PATROL CRAFT)

1. Ensure that the current and future manning requirements of the RN are met in full to enable it to operate all its commissioned ships.
2. Operate both carriers with full 36 F-35/UCLASS (purchased from the US) air wings and upgrade the point defence capability of each ship. Extend the F35 strike range to 1200NM within air refuelling.
3. Move forward with the delivery date of the first 24 F-35s to coincide with the commissioning of the first carrier, HMS Queen Elizabeth.
4. Place the operation of the F-35s back under the RN's Fleet Air Arm control, but keep common maintenance facilities with the RAF.
5. Extend HMS Ocean's commission as long as possible, to free up the new carriers for non-amphibious roles. Ensure that a stealthy alternative replaces her.
6. Plan construction of a new stealthy amphibious dock design class to replace HMS Bulwark and HMS Albion.
7. Enlarge the Astute-class in service to a total of 12 submarines by 2022.
8. Purchase from Germany or build indigenously 12 small air-independent submarines and, to a stealthy design, three support ships able to lift and maintain four submarines each.
9. Add twelve moreType-45s to the fleet by 2022. Six in the current fleet defence mode and a further six dedicated to national ballistic missile and fleet defence.
10. Enlarge the global combat ships to a 16 ship minimum and ideally 21 in Type-26 class and accelerate the delivery date of the class to be completed by 2022.
11. Create a new corvette-class of 40 3,500 tonnes stealthy and fully automated multipurpose ships to replace all classes of minesweepers and hydrographical ships. This additional patrol capability would allow us to carry out global commitments releasing the larger destroyers and frigates for high-value escort and ballistic missile defence. The majority of the class to be delivered by 2022.
12. Replace all current classes of toothless patrol boats with 22 new, stealthy and weapons capable craft for close coastal protection. This patrol fleet should be a mix of a 650tonnes and a smaller 250tonnes class. Both ships should be designed to be stealthy and fully automatic to reduce crew sizes to a minimum.
13. Stay abreast of the multiple RMAs unfolding and build in modularity to all designs to allow for inevitable upgrade son energy weapons and drone technology.
14. Ensure the fleet has ample supply of missiles, especially of the Type-45s to cope with high-intensity conflicts. This objective could be achieved by distributing missile batteries across the fleet that can be launched under the control of the Type-45s.

15. Move to a conversion of the RFA support fleet to a stealthy design so they can operate with the fleet without giving them away.
16. The proposed 100 major combat RN fleet would be comprised as follows;
    - 4ballistic missile submarines
    - 2strike carriers
    - 1amphibious assault ship
    - 2amphibious dock ships
    - 12 Type-45 destroyers
    - 6 ABM Type-45 destroyers
    - 16/21 Type-26frigates
    - 40 corvettes
    - 12 Astute attack submarines
    - 12 air-independent 1,800 tonnes conventional subs
    - Plus 22 stealthy patrol ships
    - 30 Merlin's and 40 V22s.

17. New procurement proposals above 2015 budget.
    - 12 Type-45 destroyers @£561.6M each = £7Bn
    - 21 Type-26 frigates @£350M each = £7.35Bn
    - 40 corvettes @£150M each = £6Bn
    - 6 Astute attack submarines @£1. 3M each =£7.8 Bn
    - 12 air-independent 1,800 tonnes conventional subs £400M each =£4.8 Bn
    - Plus 22 stealthy patrol ships @£50M each =£1.2BN
    - 24 UCAVs estimated @£40M each =£0.81 Bn
    - 24 F35s @£80M each =£1.92 Bn
    - 30 Merlin's @£20M each =0.6 Bn
    - 40 V22s @£50M each =£2 Bn
    - **Total new RN Ship Build = £39Bn or approx. 2% of GDP**.

SECTION 6: WAR IN THE AIR AND SPACE – THE RAF

RAF Euro fighters

6.1. AIR DEFENCE OF THE UK AIRSPACE

The lessons of the Battle of Britain should still ring in our ears, that our sovereignty must be protected, starting with the airspace around our island nation.This requires both early warning radars and Airborne Warning and Control Systems (AWACS) used to direct our fighters. The RAF currently has five frontline and one reserve Typhoon units; No.3 Squadron, No. 11 Squadron and No. 29 Squadron (Operational Conversion Unit) are based at RAF Coningsby and No. 1 Squadron, No. 2 Squadron and No. 6 Squadrons are based at RAF Lossiemouth. On 23 November 2015, it was announced that two additional frontline Typhoon squadrons would be formed consisting of Tranche 1 versions. Each squadron comprises 12 planes, so before the defence review, we had 60 planes assigned to air defence and afterwards we will deploy 84 planes. Of that force, four planes are patrolling the Falklands and a further four are helping NATO's air policing mission over the three Baltic States of Estonia, Latvia and Lithuania. Britain owns around 134 Eurofighter Typhoons allowing for a

reserve of airframes. Additionally, the Ministry of Defence has paid for 160 Typhoons in total, so it has yet to get its hands on 26 more Tranche 3A Typhoons. These reserves would allow the RAFto expand relatively rapidly if sufficient funds were released. Notably, in 2000, we had double this number of fighter squadrons in service. However, this considerable RAF fighter force does not make the UK invulnerable to future fighter attack.

The Eurofighter Typhoon is a 4.5 generation multirole fighter that was introduced into service in 2003 by its creators - BAE Systems, Airbus Group and Alenia Aermacchi. It flew with a delta wing setup with canards and a brand new twin engine. This is in effect a slightly improved version of the once sky-dominating fourth-generation F-15 which incidentally, following a programme of constant upgrades, remains at a similar capability level as the Typhoon. Begging the question of why we did not choose F-15s?

The U.S. Air Force F-22 air superiority fighter

However, the Eurofighter took such a long time to build and come into service, that it has been superseded by a newer 5thgeneration series of fighters that incorporate stealth properties, such as the F-22. During a dogfight, the F-22 might be vulnerable to the Typhoon, but at long range, it can detect a Eurofighter before it has been detected at almost three times the range: 200km versus 65km and a practical radar range of 180km versus 50km.This capability difference translates to an ability of the F-22 to kill the Typhoon well before it can see the F-22. The good news is that this design weakness has been factored into the RAF's planning with its order of 138 F-35Bs that are also 5th generation. The F-35 will keep pace with the threat as potential enemy designs like the Russian T-50 PAK-FA and Chinese J-20come into service. However, originally, the F-35 was a cheaper multirole companion to the F-22 which was dedicated the air superiority fighter. This is similar to the F-15/F-16 relationship. As such the optimal solution would have been to buy F-22s for air defence and F-35s for multirole strike applications, with a third of the 138 F-35s becoming F-22s.Although the latter are more expensive, they could have been coming into service sooner than the F-35s.Additionally, the F35 is s multirole plane and as such presents a range of compromises to

create a single solution. Notably, the F35 cannot beat the plane it is replacing in a dogfight: The F-16 Block 40, as it is not as manoeuvrable and has dismal rear visibility.

The F-35A is the most manoeuvrable F-35 variant, being capable of pulling 9g while the carrier-capable F-35C is capable of pulling 7.5g and the short take-off and vertical landing variant, the F-35B(the RAF/RN version), is only capable of pulling 7g.Despite this G-pulling performance difference like the Harrier before, the 35B with it vertical take-off capability can be deployed away from airfields. This is an important capability wherein a future high-intensity war the chances of keeping airfields open might be very slim.

6.2. EARLY WARNING AND BATTLEFIELD SURVEILLANCE

One of the RAF's six Sentry E-3D

Critical to the command and control process of the RAF's fighters the sixSentryE-3Ds (which have a UK designation of AEW1) aircraft formed into a No. V111 Squadron that provides airborne early warning to detect incoming enemy aircraft. The Sentry's roles include air and sea surveillance, airborne command and control, and weapons control. Meanwhile, the RAF operates five Sentinels to co-ordinate the ground battlefield, provide critical intelligence and target tracking information to British and coalition forces. Additionally, there are six Beechcraft Shadow R1 aircraft operated by the 14 Squadron at RAF Waddington that is home to the Intelligence, Surveillance, Target Acquisition and Reconnaissance (ISTAR) assets.

One of the three RAF Rivet Joints

Additionally, the three RC-135 Rivet Joints designated air seekers which are dedicated signal intelligence gathering aircraft of significant capability. In these communication command and control capabilities,

the RAF are well served, as it always should be, having originated the first integrated air defence system that swung the balance of the battle of Britain.

The maritime patrol Boeing P-8 Poseidon

The maritime patrol Boeing P-8 Poseidon will be procured by the RAFfollowing one of the most anticipated announcements of the 2015 Strategic Defence and Security Review: the purchase of a maritime patrol aircraft to replace the capability lost with the scrapping of the Nimrod MRA4 following the previous Defence Review in 2010. The UK has had to rely on NATO allies such as the United States and France to supply maritime patrol assets to identify and pursue Russian submarines in UK territorial waters. Notably, in the week before the 2015 SDR, the French Orion aircraft had to be deployed to locations in Scotland to hunt a suspected Russian Submarine. The UK will purchase 9 Boeing P-8 Poseidon aircraft, all of which will be stationed at RAF Lossiemouth in Scotland. They will include an 'overland surveillance capability', and it is posited that this aircraft will likely be the replacement for the Sentinel R1 in RAF service.

6.3. TACTICAL AND STRATEGIC CAPABILITY

The RAF's Panavia Tornado

6.3.1. Tactical strike

The RAF has four Tornado GR4 ground-attacks Squadronsthatemploythis30-year-oldaeroplanewith it's many upgrades. The 2010SDR significantly weakened the ground-attack force and the decision to sell off Britain's entire fleet of 74 Harrier jump jets to the US for a knock-down fee, left a significant capability gap. However, the RAF does have a considerable reserve of Tornadoes that could be brought back into service under pressure as it has some 98 serviceable planes. These planes are less capable in the close support role than the Harrier or the queen of the battlefield, the A-10.

While these ageing strike planes can bomb low tech enemies like ISIL in the Middle East, they are not suitable for high-intensity strikes against an enemy with a similar capability. It was for this reason that the US developed the F-117 and2 as stealthy bombers with low observance characteristics that could penetrate well-defended airspace. Until the F-35 strike

version comes in service, the RAF will not be equipped to fight a modern conventional war against a first world nation.

The long-awaited F-35A

What the British Government and RAF seem to have forgotten is that the F35, much like the F16 before it, was designed to form the second phase attack, following in the wake of the much more stealthy and effective F22 whose task would be to suppress the ground and air defences. Once the path was clear, then the F35s with internal weapons loads would follow, and lastly, the third phase of F35s carrying greater weapons load externally deliver the saturation attacks. The problem for the RAF is that they did not order any F22s!

The old but highly capable A-10 flown by the U.S. Air Force

However, the F35B will require new weapons to be built for the RAF that will fit inside its weapons bay. The good news is that these are already in progress.

Another area of weakness now the Harrier has been taken out of service is the ground attack role. The Army currently operates a substantial fleet of Apache helicopters which are capable in the counterinsurgency role and as per their original design in an anti-tank role. The question arises as to whether the RAF should create a requirement that replaces the Harrier complements by Apaches. The simple option would be to buy two Squadrons of the ageing A-10s from the U.S. Air Force for this role.

The A-10, although not a stealthy design, is an excellent ground attack plane that would have use in operations against ISIL. The USAF has for some time been trying to rationalise the removal of the A-10 from its fleet, but its value is of such level that this is not possible. Perhaps, the USAF could return the kindness when we sold them our Harriers?

The second and more realistic solution is to design an Unmanned Combat Aerial Vehicle (UCAV) that can do the same task with the added advantage of being an unmanned drone in a high-risk environ risk environment.

6.3.2. Strategic strike capability

Artist's impression of the B-2 replacement

The RAF gave up this capability with the retirement of the Vulcan bomber. However, the USAF has maintained this capability in the form of the B-52, B1 and B2 which allows them to project large bomb loads across very long distances. The USAF is now planning a new bomber to replace the B2 that is less revolutionary, but more iterative in its combination of current technologies and a much more capable Stealthy platform. This system will also be able to attack whole fleets at sea with precision weapons that could be a very useful capability for the RAF/RN for controlling the Atlantic approaches. The USAF believes projected that the Chinese Air Force will have theB2 equivalent technology by 2020. The fact that the USAF continues with this class of aircraft alludes to the limitations of the F-35 and also the potential of the B2 as a strategic weapon system. It seems irresponsible that Britain does not have this capability and it would make sense to join the USAFprogramme to purchase ten such aircraft to fill this current capability gap. Because the new plane will be iterative, rather than evolutionary, the costs should not be as high as the B2. Additionally, service arrangements could be made on a joint basis as per the Trident missiles. Such a capability would add to national security by adding a second leg to our strategic deterrence, should our ballistic submarines for some reason be compromised by the arrival of new technology in enemy submarines.

6.4. HEAVY LIFT

The RAF's heavy lift transportation is of moderate capability with its eight heavy lift globe masters with a total of six in service combined with a total of 22 Airbus A400M Atlas turboprops medium lift which will replace the 24 ageing Hercules transports. These would double the lift capacity and range of the fleet they replace. However, for a nation of the size of the UK, this is a very limited capability if the Army wished to carry out a full-scale expedition to a landlocked battle zone.

In sharp contrast, the Russians are planning to build a fleet of 80 supersonic transport planes by 2024, dubbed the PAK TA. These remarkable planes will have a 7,000km range and can

carry 200-tonne loads (four tanks) allowing the rapid transportation of a division equipped with 400 of the new, strategically mobile 48 tonneT-14 Armatatanks ammunition and accompanying vehicles. The PAK TA freighters will be multilevel, with automated cargo loading and will have the capability to airdrop hardware and personnel on any terrain. This capability would enable Russia to mount a rapid global military response to almost anywhere in the world. Notably, today the slower and smaller ANn124 can carry two such tanks and their crews.

Artistic impressions of the Russian new PAK TA

This Russian vision raises the critical question of the need for the RAF to match this capability. One such potential solution could be hybrid airships for a point-to-point heavy lift capability to deploy up to a similarly sized armoured division. Such a concept would create a new level of flexibility to maintain the 2020 model Army which will be based in the UK and needs to have the capability to be deployed rapidly to areas overseas where and when it is required.

The West and Britain included having the advantage of a large civilian Air fleet that can be deployed for emergency airlift missions. The key is to ensure that deployment plans are ready to go at short notice.

Artist's impression of a hybrid airship alongside Globe masters aircraft

As with all hybrid airships, the LMH-1 is a heavier-than-air vehicle with 80% of its lift coming from the buoyancy of the helium enclosed within it, and the remaining 20% coming from the aerodynamics of the rigid outer shell. Being heavier-than-air, it does not require mooring masts or tie-down points to secure it to the ground. Instead, it uses the Air Cushion Landing System (ACLS) that serves as something like a hovercraft, enabling the vehicle to manoeuvre on the ground. It can also provide suction to secure it better when loading or unloading cargo. The possibilities to develop a group of multi-mission pods that allow for maritime and submarine surveillance, air defence and transportation could make these craft invaluable.

6.5. RAF PERSONNEL

The RAF has two accession programmes for its pilots. One involves a shorter term of service than the other. The 12-year short-service commission is the least desired by the RAF but is the one most frequently chosen by the pilots. According to the RAF, a pilot signing in for 12 years has a yearly salary of £34.670 at the end of the training phase.

The 16/38 programme (service of16 years or age 38) is more desirable to the RAF, but not many follow this course. At age 38, there is a reasonable flow of experienced pilots from fighters to multi-engine aircraft; some helicopter pilots flow to fighter aircraft at an earlier age. It costs about £5.7 million (2002 figure) to train a pilot reporting to a squadron, with training taking 4.2 years on average.

The squadrons often have a shortage of experienced pilots from the recommended number of 15. This suboptimal situation has been caused by a combination of new pilots failing to achieve targets and pilots leaving early or not extending their service. The RAF (like USAF) is constrained by a maximum number of new pilots in flying units so as not to increase the ratio of inexperienced to experienced pilots to unacceptable levels.

Thus, like the navy, it is critical that new pilots are trained and brought up to standard, while increasing the retention levels of experienced pilots, without whom the RAF will become ineffective and unable to use all the machines in its inventory for maximum effectiveness. In short, the damage of the past five years has to be unwound as rapidly as possible.

The recent proposals to relieve the shortage of fast jet pilots by reducing the initial officer training course from 33 weeks to 24 weeks is a concerning indication of the manpower crisis in the RAF and the British Forces. This follows a move from fifteen years ago to extend the RAF Cranwell course to 33 weeks in line with the Army and Navy to ensure similar high standards of its officer corps. The phrase that ‘pilots are not grown on trees’ springs to our mind, and we must never find ourselves in the same position as Dowding at the Battle of Britain, desperate for more pilots.

6.6. FUTURE TECHNOLOGY

There seems to be little planning for an integrated air defence system across the British Isles that includes missiles and planes, and too great a reliance of fighters that currently have a large radar cross-section in an environment that is becoming increasing hostile and lethal. The next stage in the air war capability will be unmanned planes, which probably means that the F-35 will be the last manned fighter in RAF history. Interestingly, with the F-35B inbuilt lift fan allowing to land and take off vertically, the 25MW of power generated is more than sufficient output for a lethal laser, and so this planemay well be the first to deploy an airborne laser.

6.6.1. The Zephyr high-altitude UAV (an interim step into space-based sensors)

Separately from the 2015 SDR, Prime Minister David Cameron announced that "a British-designed unmanned aircraft will fly at the very edge of the earth's atmosphere and allow us to observe our adversaries for weeks on end, providing critical intelligence to our forces." It was only later that Gareth Jennings of IHS Jane's identified this aircraft as the solar-powered Zephyr UAV.This project is a very good example of British innovation to compensate for our lack of investment in satellite technology and commitment to space technology.

6.6.2. Medium-altitude, long-endurance (MALE) UAV

It seems inevitable that new smaller planes/drones will be supplied by the Scavenger programme. The various potential candidates for this new provision of next-generation medium-altitude, long endurance (MALE) UAV are as follows:

- The General Atomics Avenger (Predator C) which is a stealthy derivative of the MQ-9 Reaper (Predator B) with a unit cost of $12-$15million.It exemplifies how much cheaper UAVs are compared to manned planes.
- The EADS Talarionis very similar to the Predator though may not be as stealthy as the Avenger and has a unit cost of €200 million.
- BAE Systems Mantisis similar to a Reaper drone, except that a turboprop powers it.The derivative Telemosuses the same airframe but with a payload from Thales and integration by Dassault.

Despite these research programmes, it is hard to image that the European agencies can compete on price and capability against an established American lead in this field. This relativity extends to the next generation of Strategic Unmanned Air Vehicles aimed to replace the F-35.

6.6.3. Strategic Unmanned Air Vehicles

The BAE Systems Corax UAV.

BAE Systems Military Air and Information have been developing a class of aircraft in the form of the Corax, also known as Raven (*Cora* being Greek for Raven), a prototype unmanned aerial vehicle (UAV) for the British Armed Forces. Its first test flight was in 2004 after a ten-month development cycle. Cora was then first revealed to the public in January 2006.

Meanwhile, the BAE Taranisis one of the most advanced European UAV designs. The demonstrator will have two internal weapons bays. The current plan seems to be a collaboration with France to enter service in 2030for both ground attack and reconnaissance roles. It is an unmanned warplane that is designed to fly between continents. With the inclusion of "full autonomy," the intention is thus for this platform to be able to "think for itself" for a large part of the mission. It will carry a variety of weapons that will enable it to attack planes and also targets on the ground. It will utilise stealth technology making it difficult to detect and it can be flown from anywhere in the world via satellite communications. A £120 million Anglo-French defence contract was signed in the later part of 2014 for further development in the FCAS/UCAS programme.

Taranis Unmanned Combat Air Vehicle (UCAV) Demonstrator

6.6.4. Unmanned Carrier-Launched Airborne Surveillance and Strike

Meanwhile, the Americans are at least ten years ahead of the UK in this field with the **Northrop Grumman X-47B** (see pictures left and below). This is a demonstration unmanned (UCAV) designed for aircraft carrier-based operations. Developed by the American defence technology company Northrop Grumman, the X-47 project began as part of DARPA's J-UCAS programme and subsequently became part of the United States Navy's Unmanned Combat Air System Demonstration (UCAS-D) programme. The X-47B is a tailless jet-powered blended-wing-body aircraft capable of semi-autonomous operation and aerial refuelling.

The X-47B first flew in 2011, and as of 2015, its two active demonstrators have undergone extensive flight and operational integration testing, having performed a series of land- and carrier-based demonstrations. In August 2014, the US Navy announced that it had integrated the X-47B into carrier operations alongside manned aircraft, and by May 2015 the aircraft's primary test programme was declared complete. Northrop Grumman intends to develop the prototype X-47B into a battlefield-ready aircraft, the Unmanned Carrier-Launched Airborne Surveillance and Strike (UCLASS) system, which will enter service in the 2020s. The X-47B demonstrators themselves were

intended to become museum exhibits after the completion of their flight testing, but the Navy later decided to maintain them in flying condition pending further development.

The question for Britain is whether we should embark on another Eurofighter fiasco with an expensive machine coming online 20 years after the comparable F-15, or should we prepare to accept that the UCLASS system could be the route forward to optimising our two RN carriers with full air wings able to penetrate sophisticated air defence systems of modern nations. The choice seems obvious and one that should be made immediately by the government: deployment of this aircraft. The issue then, however, is: "Should an electromagnetic catapult be added to the second carrier to allow normal deck operations or would a short take-off version be possible?"

6.6.5. The Novel Air Concept

The Novel Air Concept is a "Capability Vision", an initiative of the Ministry of Defence to stimulate innovative solutions to long-term defence challenges that may lead to a future capability. The NAC concept, announced in 2009, envisages a UAV with folding rotor blades that would allow it to take off like a helicopter, fly like a jet and additionally operate in an urban environment. So far, there has been no progress on this concept. However, it does show that the MoD is thinking laterally. Today, theF35B could fulfil all these roles and act similar to the catapult launched Hurricanes that protected the Atlantic convoys. The critical point will be to have enough F35s to deploy in this decentralised structure.

6.6.6. Artificial intelligence in the air

Artificial intelligence is now coming of age, and without a doubt, it is possible that within the next decade we will see AI controlled drones operating in the fully autonomous role.

6.6.7. Point-defence for aircraft

With the trend in worship and tank self-defence capabilities, it is just a matter of time before aircraft field point-defence systems. This trend will only accelerate as lasers become deployable and miniaturised. The first steps will be their addition to larger aircraft as self-defence systems that will allow the large and slower transport planes a degree of protection. Mind you, systems like a goalkeeper and phalanx could be added today for just such a purpose on a stealth hybrid aircraft operating above a fleet of ships.

6.6.8. Summary of new technologies in the air war

Overall, we must conclude that the RAF, thanks to the patronage of Jock Stirrup , is relatively well equipped for the challenges in the foreseeable future in air defence, but its strike capability is currently only suitable for asymmetric wars and awaits the arrival of the F-35 to become up to date.

The recent cuts have least hit the RAF, but none the less, it needs immediate uplift on its shortage of pilots and the retention of the most capable members. However, looking forward there is a major revolution on the horizon away from manned aircraft towards drones and AI. The RAF must be careful not to be left behind, and indeed, be prepared to stay close to the USN and USAF as they currently possess the most advanced technology in this new field. Most importantly, we must expect the Chinese to adopt this new technology more rapidly than the West, assuming they have stolen enough of it to implement it in their forces. This new technology will be a game-changer as the unit cost of each craft will be much lower than that of a manned plane and the risk associated with combat losses will drop dramatically, changing the threshold of use and possibly the nature of modern war.

SECTION 7: NATIONAL MISSILE DEFENCE

The use of surface-to-air missiles to defend British airspace and that of any other battle zone we choose, such as the Falklands Islands, seems to have been neglected. This oversight has taken place at a time when technology has created the ability to build missiles that reliably can kill hard targets at very long range. One must criticise the RAF for placing their desire for manned fighters before adapting their strategy in line with missile development and the opportunity to create a layered defence network over the nation. Additionally, with the advent of anti-ballistic kill capabilities, land-based defence systems could take the load off the new Type-45 as the island's current only anti-ballistic capable missile system. In a period of nuclear missile proliferation of rogue nations like North Korea, Britain cannot afford to neglect its Anti-Ballistic-Missile (ABM) defences and to do that it must leave behind the ABM conventions of the Cold War.

7.1. POINT-DEFENCE SYSTEMS

7.1.1. Ground-based air defence (GBAD)

GBAD has often been a touchy subject for the British military, and it would seem to have been an area that has been ignored.

The CAMM (Common Anti-Air Modular Missile) will equip the various versions of FLAADS on land, sea and in the air

Today, the RAF still relies on the ancient point-defence missile system known as Rapier that was in use 30 years ago in the battle to reclaim the Falklands. Strangely enough, this failure to keep point-defence missiles systems upgraded extended to Sea Wolf missiles as the primary air-defence system for the Type-23 frigates. They are updated versions of a missile that was deployed during the 1982 Falklands War, but modern threats demand more. Britain will equip its Type-26global combat ships with a new generation of missiles, and simultaneously the RN desperately needs an option that will raise the limited number of air-defence missiles carried by its Type-45 air-defence destroyers.

The answer too many of these threats is under development in a single multi-strand programme costing£ 4 billion over ten years and is known as the "Team Complex Weapons" partnership with MBDA. The new design will be a quad-packed, intermediate-range air defence missile with an active radar guidance, which re-uses some features and technologies from British fighter jets' AIM-132 ASRAAM short-range air-to-air missile. Not only will it serve on British ships, but it is set to field as an army air defence missile, and may even fly on future British fighters. Thus, the Future Low-Altitude Air Defence System (FLAADS) is the British designation for the programme as a whole, which is projected to involve FLAADS (M) at sea, and FLAADS (L) on land. CAMM is the missile, which MBDA uses as a general base reference, but they sometimes mention "CAMM-M" and "CAMM-L" specifically. The naval CAMM-M version and its integration with ship systems are marketed globally under the name "Sea Captor".

The CAMM missile's range remains vague. Reports have cited 500 square nautical mile coverage, which amounts to a 12.6-mile circle. That is acceptable for a point-defence replacement, but MBDA refers to air-defence at ranges "greater than 25 km with some reports that it can reach 60km", as well as effectiveness against threats riding on the water. That would give it more versatility than the Sea Wolf missiles it will replace, and a range that compares very favourably with short-range peers like IAI/RAFAEL's Barak-1, Denel's Umkhonto, and MBDA's Crotale NG that sit in the 15 km/ 8 KM or less range.

Sea - The CAMM-M Sea Ceptor

MBDA's response to the saturation threat was to use active homing radar guidance with the same seeker as the AMRAAM air-to-air missile and a 2-way datalink for the missile, removing any strain on limited radar illuminators.

Sea Ceptor, the naval CAMM-M version

This is similar to Raytheon's approach with the much longer-range and more sophisticated SM-6, but in a simpler, more limited, and cheaper design. The SM-6 will be able to use the ship's more powerful radar as an option and be controlled by other vessels over the horizon. Most importantly, the SM-6 dual can either destroy incoming ballistic missiles (later in the missiles trajectory than the SM-3 though) or supersonic cruise missiles - the first such capability in the world. Equipped with a GPS, it will also be able to attack land targets and in

the future, warships making it the first multi-mission missile. Additionally, it will be modified to attack surface targets making it the most versatile missile in the world.

Sadly, Sea Ceptor cannot do those things. The ship's radar sees the incoming threat, the CAMM missile is launched, the data link updates the missile with the current location of the threat, and CAMM'S seeker takes over once it is close enough.

Further, to the concept of distributed lethality, a wide variety of ships could make good use of a missile like that, especially a missile that doesn't need ultra-sophisticated ship radars and illuminators/ trackers to be effective. MBDA's use of a piston-driven "soft launch" approach removes another big obstacle to integration on small ships like corvettes or FAC (Fast Attack Craft), widening the potential market even further. On the software and hardware end, MBDA is reportedly re-using some elements from the high-end PAAMS system that equips advanced British, French and Italian anti-aircraft destroyers.

Within the global market, CAMM-M/ Sea Ceptor seems to fit somewhere in between short-range bolt-on naval defence systems like MBDA's Crotale or Raytheon's RAM; and medium-range vertical-launch missiles like MBDA's Aster-15 or Raytheon's RIM-162 Evolved Sea Sparrow. That is a pretty useful niche. It encompasses the main danger zone for saturation anti-ship missile attacks, which threaten to overwhelm the targeting (illuminator) capabilities of ships that rely on older radar designs and semi-active radar homing missiles.

There will always be a temptation for navies to choose medium-range missiles for their superior protection of other ships, and smaller ships, in particular, create a temptation to default to bolt-on defences. If budgets don't allow more expensive missiles or navies decide that a smaller ship needs to do better than point defences, Sea Ceptor's main competitor will be MBDA's VL-MICA IIR/ARH missile family.

MBDA has confirmed to DID that the Naval Sea Ceptor will be loaded into Type 23 Sea Wolf vertical launch tubes as a 1 for one replacement. Reports also indicate that the missile is designed to be quad-packed into DCNS SYLVER A50/A70 launchers on ships like Britain's Type 45 destroyers, or in American Mk.41 tactical/strike length cells in common use by navies around the world.

That capability will be an especial help to the Type-45 Daring Class air defence destroyers, whose single-packed SYLVER A50 VLS cells left them with a low number of carried anti-aircraft missiles compared to their global peers. Giving up 12 Aster-15/30 missiles to get 36 Asters and 48 CAMM-Ms is a good trade. Fortunately, heavy FLAADS (M) re-use of elements from the Type 45's PAAMS combat & launch system should make integration relatively simple.

The £250 million ($379 million) contract for sister Sea Ceptor system was agreed in September 2013.However, in comparison US Forces have been protected by the Patriot systems that have long had an anti- ballistic missile capability and the British Army has been slow to respond.

7.1.3. On land – CAMM-L – FLAADS (L)

On land, FLAADS (L) would use the CAMM-L missile packed onto a truck mounted container system with 12 missiles per truck, plus a containerised command and control cabin. Because the missile carries its radar, FLAADS fire units aren't sold with their radars, just a secure MBDA-developed datalink. Fielding requires integration of the FLAADS (L) command module with existing air defence systems for cueing. This may seem like a limitation, but it makes the system quite dangerous. The fire units don't have emitting radar to give their location away and attract enemy attacks, and cueing from a variety of radar and non-radar assets makes it very difficult to silence the missile battery. The FLAADS (L) prototype was rolled out in the summer of 2009 and is still under development. CAMM-L is cued as the future replacement for Britain's Rapier missile batteries and is urgently needed to defence the Falklands from air threats when the Argentines upgrade their strike capability with leased Russian Jets.

With an expected operational range of at least 25 km (trials are understood to have shown a capability to travel 60 km) and a maximum missile speed of Mach 3.0, CAMM significantly outperforms the 8 km range and Mach 2.5 top speed of the Rapier missile. Besides the sheer improvement in interceptor performance, the new system should offer improved C2 and networked performance while CAMM's active radio frequency seeker and a dual-band data link offer further improved capabilities over the existing Rapier.

The contract was awarded in December 2014 and is valued at £228 million ($348 million) and should enter service after the 2020s, replacing bother RAFs missiles and the Royal Artillery (RA) five batteries of Rapier FSC missiles.

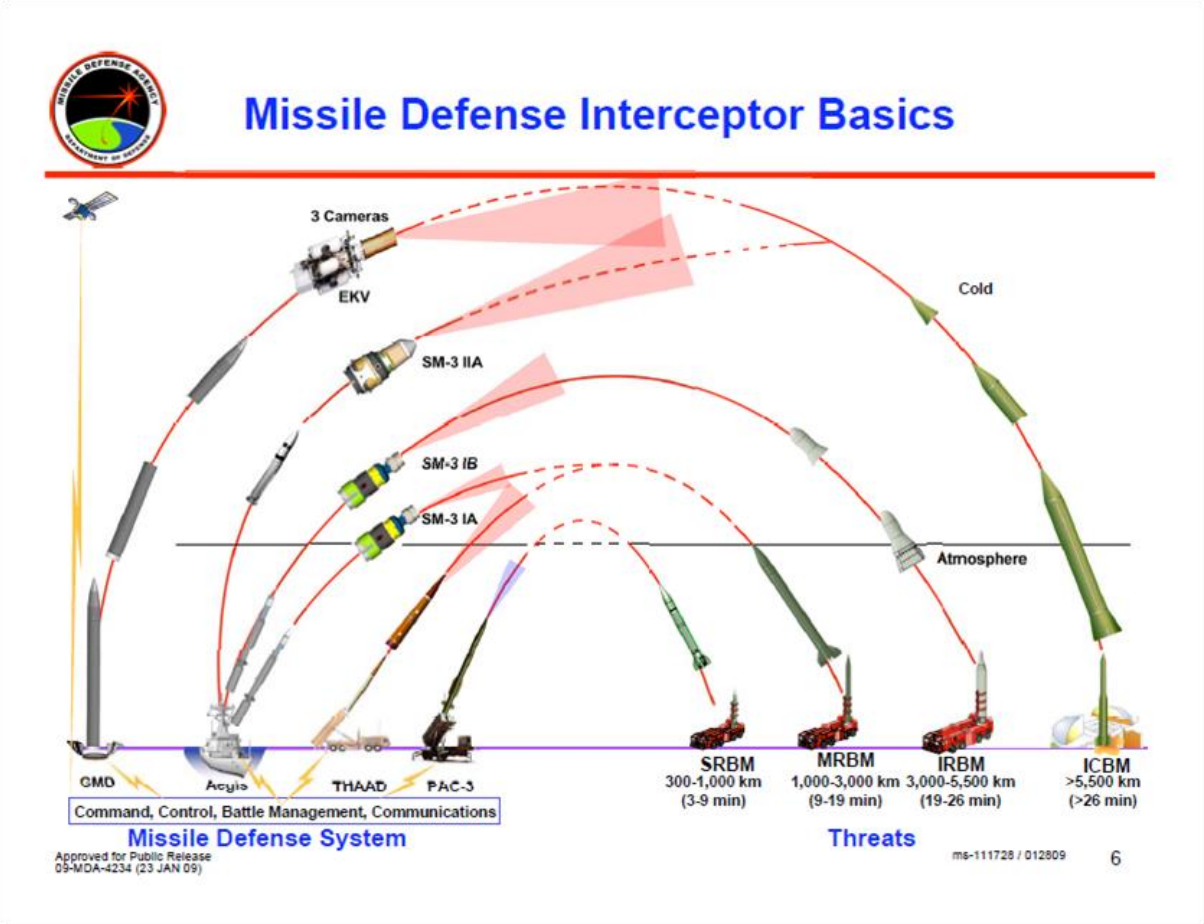
However, when these systems are compared to America's capability that has been developed in the Patriot missiles system over decades, it is very clear how badly we have neglected this area of our defence. The Patriot missile family in the US has had a sequence of upgrades to make it an extremely effective ground to air missile. The most recent upgrade is thePAC-3 which is a ballistic missile defence system that with its speciality is not as capable as the PAC-

2 against standard Ariel targets. If there any potential delay for delivery of the FLAADS (L) past 20202 purchase of the PAC-2 should be considered as a priority acquisition.

7.1.4. In the air – CAMM-A

Future years may also see a CAMM-A successor to the AIM-132 ASRAAM, flying on British fighters. Imaging infrared currently guides ASRAAM, but there are already air-to-air missiles, like the medium-range Russian AA-10 and French MICA, that come in both radar and IR versions. Short-range missiles haven't used radar guidance over the last couple of decades, but giant strides in fighter radar capabilities, and the CAMM design's long range for its class make this a viable future option for the RAF.

7.2. AREA DEFENCE/BALLISTIC DEFENCE PROGRAMMES



Ballistic missile intercepts phases

The UK will currently rely on a limited number of Type-45s as its defence against ballistic missiles from rogue states. At a time when the proliferation of nuclear weapons and ballistic missile delivery systems is increasing this seems slightly irresponsible. To rapidly compensate and take advantage of Britain's island topography we have proposed a dedicated fleet of six BMD destroyers. Meanwhile, the USA is the leader in the deployment of ballistic missile

defence so is worthy of close study and emulation by Britain. Including purchases of the essential components from the US urgently. The key components are**:**

7.2.1. Battle management, command, control and communications and intelligence (BMC3I)

Provided by Northrop Grumman to coordinate the battle space.

7.2.2. Radar systems

Comprising: Ground-based Raytheon radars (GBR),Upgraded Raytheon early (UEWR) (or PAVE PAWS), Forward-based X-band radars (FBXB) such as the sea-based Raytheon X-band platform that has not become operational and the AN/TPY-2.

SBX-1; The USN mounted ABM phased array radar on a 6th Generation semi-submersible oil platform located to give early warning of an Asian missile launch.

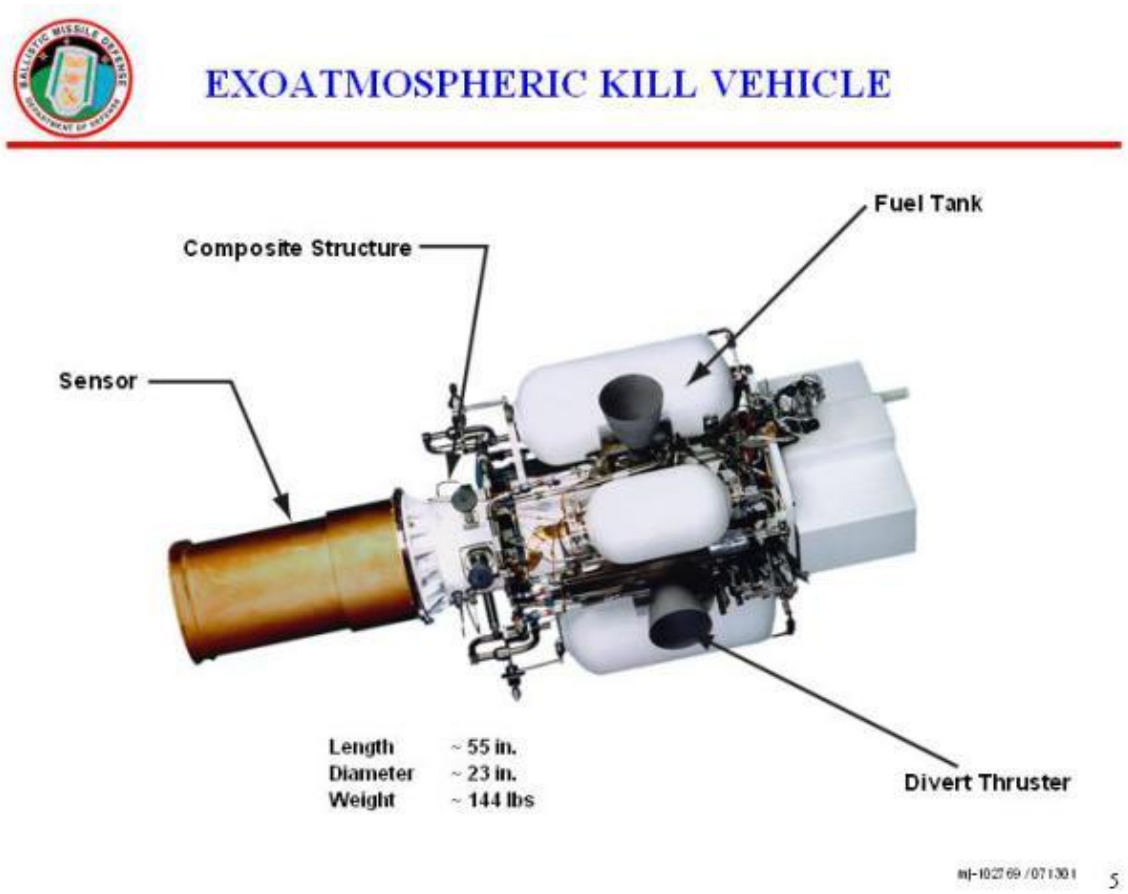
7.2.3. Ground-Based Midcourse Defence (GMD)

The

GBI Missiles carrying a steerable payload for high altitude interception.

GMD consists of ground-based interceptors (GBI) missiles which carry Raytheon's latest generation exo-atmospheric Kill Vehicle (EKV) and radars in the United States in Alaska. The single purpose of which is to intercept incoming ballistic warheads in space during the midcourse phase of trajectory flight. The GBI missiles are stationed at Vandenberg AFB in California and Fort Greenly in Alaska.

The GMD is the only current system designed for a mid-course interception in the space of ICBMs. It relies on a set of integrated sensors to detect the target early enough. This is the most expensive of all the BMD programs, but no doubt America would be happy to share the R&D costs of $40Bn with Britain if we choose to buy this system.



7.2.4. Sea-based ballistic interceptors

These are fired from Aegis SM-3 US Navy ships. Officially, the final deployment goal is the "C3" phase, intended to counter tens of complex warheads from two GMD locations utilising 200 ABMs "or more". The system design permits further expansion and upgrades beyond the C3 level. Notable SM-3 missiles can engage missiles above the

SM-3 launched from an ArleighBurke-class destroyer

atmosphere during the midcourse and SM-2 Block IVs can engage missiles in the atmosphere for a terminal kill. Notably, the Japanese and Australian warships are similarly equipped widening the defence network.

The arrival of the Chinese DF-21D anti-ship ballistic missile designed as a carrier-killer with a maximum range of 1,450km has added a significant level of risk for USN ships operating within range of this system. The USN has assigned most of its SM3 capable ships to the Pacific as a result, although its midcourse intercept capability would require it to be launched at the same time as the incoming missile to make the intercept successfully. This requires an extensive system of sensors designed to pick up balletic missile launches system to detect the launch of the DF-21D. However, the SM-4 is designed to interact such ballistic missiles in their terminal phase in the atmosphere, and its future deployment will add an added layer of security against such missiles. One has to conclude that other nations like the Russians will consider deploying their own versions.

The DF-21D carrier killer on parade

7.2.5. Aegis ashore

Aegis Ashore is the land-based component of the Aegis Ballistic Missile Defence (BMD) System.

7.2.6. Terminal High Altitude Area Defence (THAAD)

THAAD in deployment

Formerly Theatre High Altitude Area Defence is a United States Army anti-ballistic missile system designed to shoot down short, medium, and intermediate ballistic missiles in their terminal phase

using a hit-to-kill approach. The missile carries no warhead but relies on the kinetic energy of the impact to destroy the incoming missile. A kinetic energy hit minimises the risk of exploding conventional warhead ballistic missiles, and nuclear-tipped ballistic missiles won't explode after a kinetic energy hit, although chemical or biological warheads may disintegrate or explode and pose a risk of contaminating the environment. THAAD was designed to hit Scuds and similar weapons with a range more than 200Km giving it a reach beyond other shorter range systems like the Patriot, the Aegis SM2 and SM3 and Israeli Arrow missile. One THAAD battery costs $800 million. Although originally a U.S. Army programme, THAAD has come under the umbrella of the Missile Defence Agency and fills the gap between high and low altitude missile intercepts when integrated with other BMD systems and sensors.

7.3. RUSSIAN SYSTEMS

To express how Britain has been left behind in the field of missile development, the Russians deploy the S-300 (NATO reporting name*SA-10 Grumble*) which is a series of initially Soviet and later Russian long range surface-to-air missile systems produced by NPO Almaz, based on the initial S-300P version. The S-300 system was developed to defend against aircraft and cruise missiles for the Soviet Air Defence Forces. Subsequent variations were developed to intercept ballistic missiles.

The S-300 was first deployed by the Soviet Union 1979 and designed for the air defence of large industrial and administrative facilities, military bases, and control of airspace against enemy strike aircraft. The system has a fully automated operational mode, although manual observation and operation are also possible.

The S-300 is widely considered to be one of the most potent anti-aircraft missile systems currently fielded. An evolved version of the S-300 system is the S-400 (NATO reporting name*SA-21 Growler*) which has entered limited service. This system is an anti-aircraft weapon system developed by Russia's Almaz Central Design Bureau in the 1990s as an upgrade to the S-300 family. It has been in service with the Russian Armed Forces since 2007.

The S-400 uses three different missiles to cover its entire performance envelope. These are the extremely long range 40N6 (400km), long range 48N6, medium range 9M96 (250 km) and short range (120km) missile. In April 2004, a ballistic missile was intercepted in a test of the upgraded 48N6DM interceptor missile, officially accepted into service in 2007. It has the capability to control huge volumes of airspace, as NATO is now finding out to its cost in Syria.

7.4. NEW STRATEGIC THREATS.

To every offence, there is a defence and thus as ABM technology improves it is to be expected that Russia and China will find ways of negating that advantage. The Russians are supposedly building a nuclear torpedo (Status -6) that is nuclear powered can travel at speeds of 100knts for 6200 miles where it would explode a nuclear weapon close inshore. To counter this weapons system coastlines will have to be protected by fixed arrays of sonar buoys and automated drones that hunt such torpedo and subs to enhance RN sub hunting capabilities.

7.5. SUMMARY

7.5.1. The need for a comprehensive missile defence

It is now time to follow urgently America's lead and create a new separate missile defence command that can coordinate and command a network of missiles designed to protect the British homeland from ballistic and cruise missile attack. The announcement that Britain will be building a new radar site goes some way to show that this problem is being in the process of being discussed, however, without missiles on the ground we are toothless so this must be made a major priority and resources allocated. This would provide for the three layers of GMD, THAD and PAC-3 systems in addition to the proposed BMD Type 45s.

7.5.2. RAF capability

The RAF is in relatively good shape today. However, it must increase its heavy transport capability to match the Army's needs. Most importantly, the RAF desperately needs a fixed wing ground support capability of a plane such as the A-10. Attempts to use Eurofighters are akin to getting a pedigree race horse to pull a cart.

Critically, the RAF must address the massive capability gap in missile defence that was disregarded in the all-out pursuit of the Eurofighter; a decision which can only be described as somewhat misplaced.With the RAF's obsession with fast jets, going forward it may be more sensible to create a new missile defence force and command that is independent.Further, as weapons technology continues to evolve even more rapidly, the long lead times between

conception and delivery, experienced with the Eurofighter must not be repeated. Otherwise, this will result in expensive programmes delivering already out of date capabilities. To that end, with the sledge of the US aerospace industry, the default position will inevitably be to buy American systems and time goes on.

7.6. RECOMMENDATIONS FOR THE RAF 2022

1. Urgently increase the size of the RAF's personnel to ensure that it has pilot integrity and personnel to operate effectively up to 50%.
2. Immediately buy 30 F-22 fighters for the UK's dedicated air defence role. Transfer the same number of F-35s to carrier operations to increase the RN's quota.
3. Move the delivery date forward for theF-35s so they are all in service by 2022.
4. Buy two squadrons of A-10s from the USAF for direct ground attack role to support the AH-64s. Plan for a ground attack UCAV to replace the A-10s by 2022.
5. Add one squadron of the USAF B2 replacement, for the strategic bombing, maritime strike and the second leg of Britain's nuclear deterrent.
6. Expand the RAF's heavy lift capability, and especially, its point-to-point capability using hybrid so that a fully armoured division can be deployed, within a week to anywhere in Europe.
7. Continue to expand the drone fleet and develop AI capabilities.
8. Add Northrop Grumman X-47B squadrons to the carriers F-35 squadrons to increase their air power. This would be subject to the British carriers not having catapult systems to launch the X-47B type drones.
9. An urgent priority must be to develop an integrated ballistic and area defence programme for the UK. However, the limited number of Type-45s should not be considered as the solution, but rather as an added resource to this much-needed capability. This should be set up under a separate command within the RAF.
10. New procurement proposals above 2015 budget.
    - 30 F22s @£130M each = £4.9Bn
    - 24 A10 squadron @£15M each = £0.36Bn
    - 10 B2s version 2s@£1.4 each =$14Bn
    - Fleet of Hybrid Airlander airships £5Bn
    - GMD capability £10Bn
    - 4 THAD batteries £3.6Bn
    - 48 Patriot batteries @£2.5 each =£0.120Bn
    - **Total =£38Bn approx. 2% of GDP.**

SECTION 8: THE BRITISH ARMY

8.1. THE SIZE OF THE BRITISH ARMY IN HISTORICAL CONTEXT

The British Army up until 1914 had always been a small but highly dedicated force of regular soldiers. All that changed in 1914 when Kitchener's Army started a massive expansion to five full army groups (meaning groups of divisions similar in size to an army). By the end of 1918, there were over 4 million men in the BEF that became the most effective fighting force on the Western Front. Then once more in peacetime, the Army shrunk dramatically and then was forced to expand again to almost5milliontо meet the demands of WW2.

From 1957 to 1962, after Korea and the Suez Crisis, the Armed Forces were reduced from 690,000 to 375,000. From the role of global policeman, the Armed Forces were re-focussed to a NATO role with some 80,000 soldiers permanently stationed in Germany as a deterrent against the Warsaw Pact forces on the other side of the Iron Curtain. By the end of the Cold War in 1990, there were 300,000 men in the British Army. Since the 2004 Defence Review when the number of regular infantry battalions was reduced from 40 to 36, and historic single battalions were amalgamated, the process of slash and cut has continued to the point of irresponsibility. Administrators who presided over these recent cuts have much to answer for in their poor decision making.Today's politicians seem to have failed to recognise that one of

the reasons why the British Army has proved so effective over the past three centuries is the tribalism associated with the regimental structure. This focused tribalism has been threatened by some of the amalgamations of the past decade where famous proud regimental names have been replaced with pedestrian names that might not inspire as much feral loyalty in combat.

8.2. THE BRITISH ARMY TODAY

Under the 2020 plans for the British Army, there will be only 82,000 regular soldiers, and 30,000 reserves. The Army Reserves were previously known as the Territorial Force.The Army will thus comprise 112,000 men. By 2020, the total strength of the Army will consist of 46 (50 now) battalions of which 32will be regular infantry (36 now) and 14 territorial infantry battalions. These forces will be structured within 17 regiments (each with multiple battalions). There are currently 11 armoured regiments in the British Army that will be further reduced by two Challenger Battalions to four and total of Four Heavy Regiments. These will be designated Armoured. Then there are five formations that are designated as Formations reconnaissance who are equipped with lighter vehicles. Apart from the Household Cavalry, all armoured units are grouped under the Royal Armoured Corps. The Royal Artillery comprises of combat 12 regular and one ceremonial regiment supported by five reserve regiments, and one surveillance and acquisition regiment.

The Army 2020 construct is claimed to represent a fundamental and imaginative break from the way in which the British Army is currently structured. This change is also claimed to be as significant as any seen over the last fifty years. The battalions within the regimental

administrative structure have some different key roles. For the Mechanised InfantryDivision, there are four key functions:

- Armoured
- Armoured Cavalry
- Armoured Infantry
- Heavy Protected Mobility

While in the Infantry Brigades of the 1st UK Division the key roles are:

- Light Cavalry Light
- Protected Mobility Infantry
- Light Role Infantry

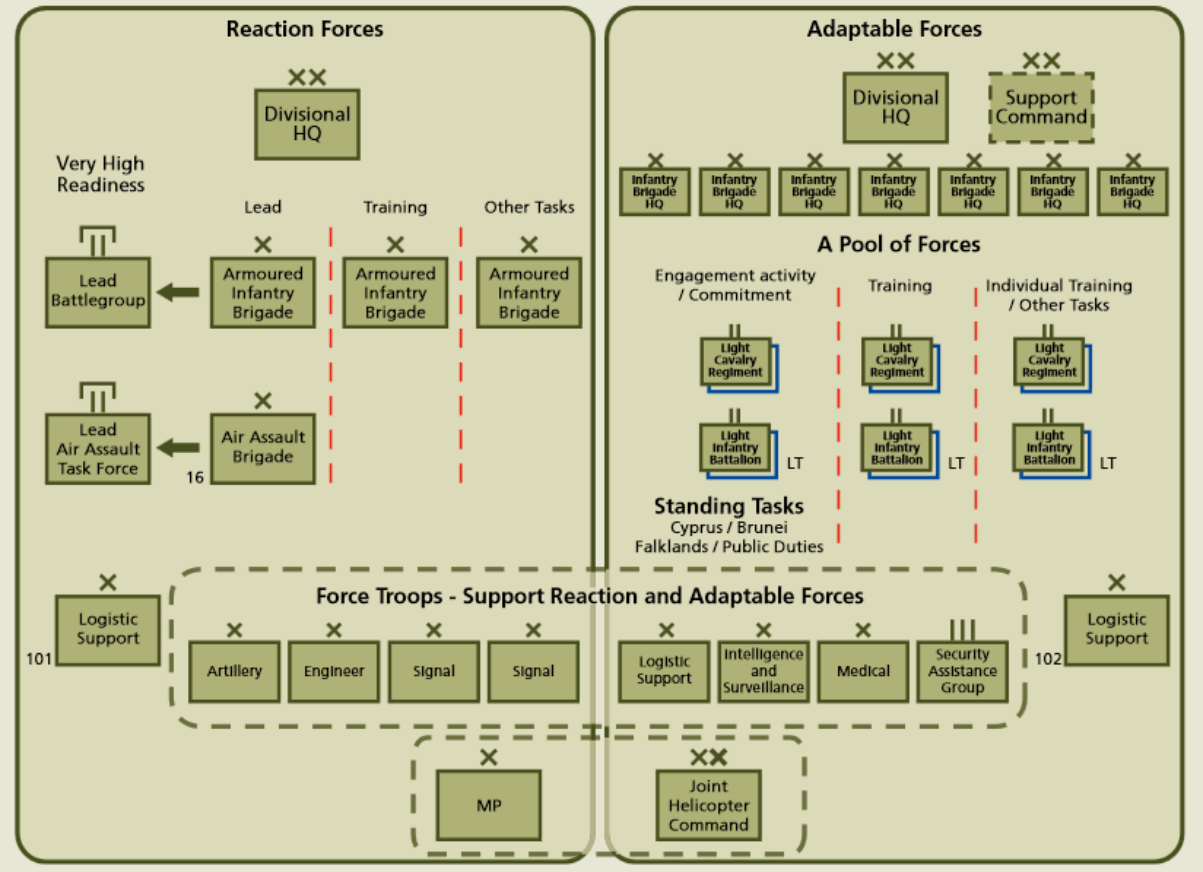
8.3. THE 2020 ARMY ORGANISATION

8.3.1. The three core forces

The Army has been organised into three core elements, designed for so-called maximum flexibility:

1. Reaction Forces
2. Adaptable Forces
3. Force Troops

This Army claims that this structure will be both adaptable and resilient, able to generate appropriate forces with the necessary skills at the required levels of readiness, to undertake a broad range of tasks. Should the strategic situation require, it would also be capable of generating the required force structure to support an enduring stabilisation operation, at the same time maintaining a very high-readiness force to deal with contingent operations at the level set by the Strategic Defence and Security Review? The one advantage that that has is to maintain a single and discrete Mechanised Division that is suitable for a more conventional conflict.

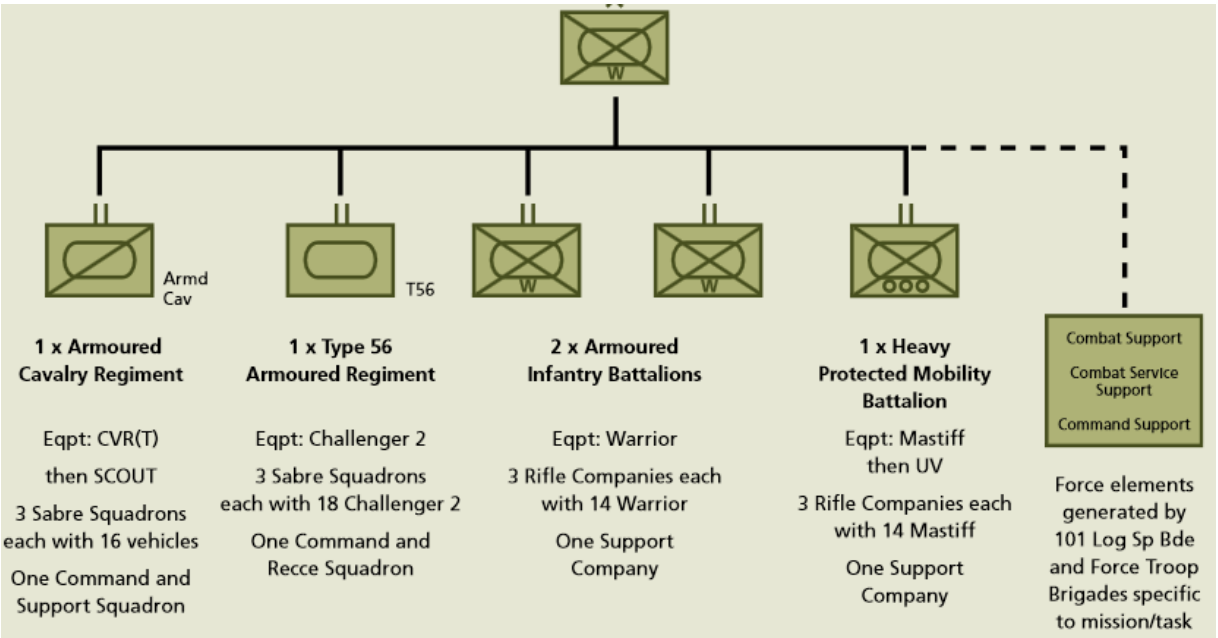


8.3.2. The Reaction Force

TheReaction Force provides the high-readiness force which will undertake short notice contingency tasks and provide the conventional deterrence for defence. Trained and equipped to undertake the full spectrum of intervention tasks. This force, based on three Armoured Infantry Brigade under divisional headquarters with associated enablers and an Air Assault Brigade, will provide the basis for any future enduring operation. Given the high-readiness nature of this force, it will comprise predominantly Regular Forces with approximately 10% coming from the Reserve force.

The complete Air Assault Brigade and a fully mechanised brigade will be available for deployment within three months. All three brigades' HQs are to be based in the Salisbury Plain Training area. The Force comprises as follows:

- **The 16th Air Assault Brigade**, comprising two battalions of the Regiment and two Corps Regiments of attack helicopters. This will deliver a very high-readiness Lead Air Assault Task Force, with the rest of the brigade ready to move at longer notice.
- 3rd UK Division. Formally, the 3rd (UK) Mechanised Division will be the heavy division in the British Army capable of fighting a conventional military engagement. This famous division was once known as Monty's Iron Sides and today comprises of three armoured infantry brigades:1st Armoured Infantry Brigade, 12th Armoured Infantry Brigade and 20thArmoured Infantry Brigade. These three brigades will rotate; with one being the lead brigade, a second involved in training and the third involved in other tasks. The lead brigade will deliver a Lead Battlegroup at very high readiness, with the rest of the brigades at longer notice. Each armoured infantry brigade that is effetely reinforced by traditional force standards will be made up of:



  - **1 Type 56 armoured regiment** comprising:
    - ThreeSabre squadrons, each of 18 Challenger 2main battle tanks;
    - One command and reconnaissance squadron.
  - **One armoured cavalry regiment** comprising:
    - Three Sabre squadrons, each of 16 CVR(T) vehicles (to be replaced by the Scout SV);
    - One command and support squadron.
  - **Two armoured infantry battalions**, each comprising:
    - Three rifle companies each with 14 upgraded Warrior infantry;
    - One Support Company.
  - **One heavy protected mobility infantry battalion** comprising:

- Three rifle companies, each with 14 Mastiff infantry (to be replaced by the Utility Vehicle);
- One support company.

- **101st Logistic Support Brigade**
- Royal Wessex Yeomanry is providing Armoured Resilience (tank maintenance) to the three Challenger 2 regiments.

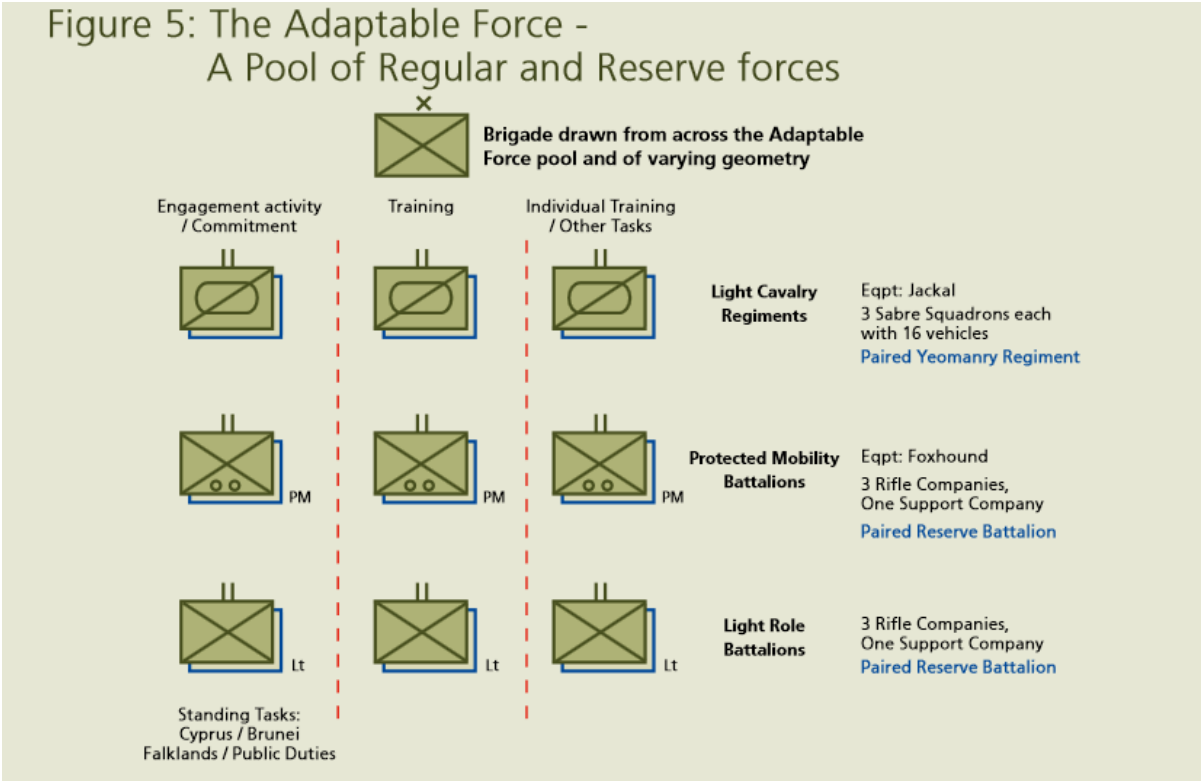
The concern with this divisional structure is that if the Army seeks to be able to fight the full spectrum of wars, then rather than a mechanised division, the 3rd Division should be an armoured division with the additional force of three heavy Challenger56 regiments and one Armoured Cavalry Regiment and an additional armoured resilience regiment.

8.3.3. The Adaptable Force

The Adaptable Force comprises a pool of Regular and Reserve Forces organised during peacetime under seven regionally based Infantry Brigade headquarters for training and administrative purposes. For a given operation, however, a force package will be selected from across the pool of forces, as set out in Figure 5 (below), based on the balance of capabilities required for that specific task. The seven Infantry Brigade headquarters will come under the command of an outward looking divisional headquarters and Headquarters Support Command, which will provide command and control for homeland resilience and engagement with UK society. This force will deliver the force elements for the Army's Standing Commitments (Cyprus, Brunei, the Falkland Islands and Ceremonial Duties) and UN commitments. As an adaptable force, at a graduated level of readiness, it will also be capable of undertaking a variety of challenging tasks including:

- Overseas military capacity building - training and developing indigenous armies to strengthen nations and prevent future conflict.
- Military support to homeland resilience - including maintaining a contingent capability to deal with natural disasters, public service strikes and other tasks.
- Follow-on forces for future enduring operations requiring the Adaptable Forces to maintain institutional readiness at an appropriate level of training.

Figure 5: The Adaptable Force - A Pool of Regular and Reserve forces



- **1st (United Kingdom) Division**; Formally The 1st Armoured Division, along with Support Command, is made up of seven infantry brigades (4th, 7th, 11th, 38th, 42nd, 51st and 160th) of various sizes, each made up of paired regular and reserve army forces, drawn from an Adaptable Force pool of units. This division is configured to be a light force deployable against insurgencies, and not one suitable for a high-intensity war. These infantry brigades are optimised to U.K. operations or overseas commitments (such as the Falkland Islands, Brunei and Cyprus) or, with sufficient notice, as a brigade level contribution to enduring stabilisation operations. This force pool will comprise: of the following Army 2020 Armoured Infantry Brigade Structure
    - **Three Light Cavalry battalions**, Paired with three yeomanry regiments, each comprising:
        - ThreeSabre squadrons, each with 16 Jackal vehicles;
    - **Six light protected mobility infantry battalions** equipped with Foxhound vehicles, each comprising:
        - Three rifle companies.
        - One Support Company.
    - **Several light role infantry battalions,** each comprising:
        - Three rifle companies.
        - One Support Company.
- 102 Logistic Support Brigade.

8.3.4. Force Troops Command

Integral to the Reaction and Adaptable Forces are the Force Troop Brigades, which provide a wide range of Regular and Reserve capabilities including engineer, artillery and medical support from a centralised pool of resources, as well as a coordination and control function for key tasks such as an overseas capacity building. Four of the Force Troop Brigade headquarters will also have additional regional responsibilities to deliver military support to homeland resilience and engagement with UK society.

This combat support and combat service support command of the Army will comprise:

- 104 Logistic Support Brigade
- 1 Signal Brigade
- 11 Signal Brigade
- 1st Artillery Brigade
- Joint Ground-Based Air Defence Command (administrative control, joint with Air Command)
- 1st Intelligence, Surveillance and Reconnaissance Brigade
- 2 Medical Brigade
- 77th Brigade, formerly the Security Assistance Group, will for the core of counter hybrid warfare.
- 8th Engineer Brigade
- 1st Military Police Brigade

Concerns about this force are that it does not include a heavy armoured or Armoured Cavalry capability, which ideally, could be added to the Adaptable Force when and where required. This seems to be a major shortfall, as it would have to be supplied from the reaction force.

8.3.5. Basing of the Army

By 2020, the British Army will predominantly be UK-based for the first time in decades. The proposed geographical lay down will seek to maximise training resources and the provision of logistic and administrative support. The Reaction Forces are now centred on Salisbury Plain Training Area and the Adaptable Force brigades and those Force Troop Brigade headquarters with regional responsibilities, being centred close to principal population centres across the UK. With the basing of the British Army on home territory, there will be key issues as to the transportation capacity required to move forces rapidly to the positions on the globe where they are required. This topic is addressed under RAF transportation command i.e. the rapid positioning of forces to counter a Russian land attack in Europe.

8.3.6. The reliance on Reserves

The 2015 SDR confirmed that the Army 2020 would deliver a committed and transformed Army Reserve, manned, trained and equipped as part of the whole Force. This model has been inspired by the US National Guard and US reserve model. There will broadly be no change to current levels of Reservist peacetime training requirements. However, when the Nation is committed to an enduring operation, the contribution of the Army Reserve is anticipated to be both predictable and programmed so that the civilian employees can plan for role substitution. The official Army view of the reserve force is as follows:

> *Critical to the delivery of Army 2020 is the full integration of the Reserves into the Army structure. Without integration, the Regular reduced force would be unable to complete all of the tasks set out in the Strategic Defence and Security Review. In future, the Reserves will be used routinely, rather than in extremis, for roles such as overseas Defence engagement and United Nations commitments, in addition to providing troops for enduring stabilisation operations. The Reserve contribution will range from the provision of individual augments and specialist teams to formed sub-units and units. To achieve a truly integrated force and ensure that the Reserves have the required expertise to fulfil the tasks required of them, units will be routinely partnered with Regular Units for training in peacetime.*
>
> *They will also form an integral element of that unit when it is required to deploy on operations. Importantly, this pairing will also allow closer links to be built with the local communities to aid recruiting and engagement with UK society.*

However, in an era of ever more demanding civilian workplace coupled with the military environment with its complex weaponry and intense firepower, this view seems to be a fundamental error based on a limited budget. Surely, the main combat power should come from a full-time professional army, and the reserves should be just that, an additional capability that provides a pool of manpower in times of war. Only in the case of 77 Brigade can a clear crossover be seen between the civilian world and that of the army. This whole strategy seems driven by the budget rather than a military requirement and will undoubtedly significantly reduce the Army's capability.

To have any chance of coming close to achieving this integrated goal, there will need to be a step change in the relationship between the Army, its Reservists and their employers which in the demanding world environment of today seems a tall order. Unless the majority of the reserve force is derived from the 50,000 MoD employees, who would have obvious advantages. Consequently, we conclude that this element of the SDR is impracticable and in practice will reduce the effectiveness of combat units.

However, if the reserve force were to comprise only ex-members of the forces who are paid to continue to be fit and available in addition to their day jobs, it would be a very different position. The Territorials could then be a genuine reserve for combat, lost if they were only subject to accelerated training as the threat of conflict approached.

8.4. TO WHAT PURPOSE?

The question has to be asked with today's Army configuration, what role would they be expected to play and are they capable of achieving it?

From the force structure, the rapid first elements to deploy would be from 16 Air Assault Brigade to the First Brigade of the 3rd UK Division. This would represent two brigades in the combat zone to be later followed by the other two brigades of the 3rd UK Division. This four brigade force would constitute a very limited expeditionary capability for a country the size of Great Britain.

Sadly, it would seem that the recent expeditionary wars in Iraq and Afghanistan with the deployment of counter-insurgency roles has shaped the political expectations of the Army. However, with the rising risks of state conflicts with Russia and China, should not the British Army be focussed on a more conventional role that requires mass and firepower with the latest technology to be effective? We have seen the RMAs in the sea and air warfare unfolding at an alarming rate, so it is reasonable to assume that they also will take place in land warfare and will leave our Army as unprepared as it was for WWs 1 and 2.

8.5. THE CAPABILITY SHORTFALLS

8.5.1. The loss of combat power

The combination of fewer soldiers and a reduction in the heavy armoured element of the Army structure means that undoubtedly the combat power of the British Army has been

reduced to the bone. To only have 168 Heavy Challenger Tanks built into a combat formation in the context of the current trends of modern warfare is shockingly irresponsible. The British Army should at the very least be given provision for a full Armoured Division equipped with 336 challengers in six regiments and a significant force of supporting heavy artillery SA-90s and MLRS. The mandate being that this formation should be able to hold more than its own in the most intense of combat environments.

8.5.2. Transportation

The positioning of the British Army in the UK is a good plan. However, it depends on the rapid transportation to the point on the globe where it is needed. The Russian Army already have such a plan comprising a have a 400 tank structure (of 2 light divisions). Thus a similar plan needs to be developed for the British Army in conjunction with the RAF, post haste. The objective should be to be able to deploy the 3rdDivision anywhere in Europe in a week by air. The most obvious way to do this is point-to-point with a fleet of hybrid airships described in the RAF section earlier.

8.5.3. Amphibious Brigade

The RM-3 Commando Brigade is discussed in the RN section. However, as its support elements come from the Army with commando training, this brigade should be strengthened with indigenous Challenger Tanks and heavy artillery SA-90 and MLRS to give it more options when facing opposition with greater indigenous firepower that can be employed landing. This would be the equivalent of a US Marine Expeditionary Brigade (MEB).

8.5.4. Equipment

Officially the Army claims that:

> *The 2020 model depends on a balanced, coherent and affordable equipment programme. The delivery of this is underway with the Warrior Capability Sustainment Programme confirmed and a commitment to an armoured vehicle programme that will see the delivery of Scout for the Armoured Cavalry Regiments and a family of Utility Vehicles across the Army. Work is underway to determine which Urgent Operational Requirement equipment procured for Afghanistan should be taken into the core programme. The confirmed investment in the helicopter fleet, in complex weapons, in modern communications and electronic countermeasures demonstrates a genuine commitment to providing the Army with the most up to date and effective equipment available*

However, there are numerous RMAs that have impacted war at sea and in the air, and yet the British Army has a family of vehicles that do not seem to allow for this next evolutionary stage of land warfare.

8.6. TANKS IN TODAY'S ARMY

8.6.1. Weight of numbers

According to recent RUSI estimates, there are about 108,000 main battle tanks currently in service across the globe:

- **10,000 Abrams**M1A1s and 610 M1A2s belonging to the US Army, USMC, Australia and various 'friendly' Arab nations.
- **3,800 Leopard 2s** of various variants in service with the armies of Germany, Switzerland, Canada, Australia, Norway, Finland, Sweden, Spain, Greece, Turkey, Singapore and Chile. (Holland is presently trying to sell all 400 of its Leopard 2s). Further, 1000 may be sold to Saudi Arabia and Qatar.
- **1,000 Japanese**Type-74s and Type-90s, plus 200 of the newer Type-10. South Korea has more than 1,000 K1 tanks.
- **1,000 Israeli Merkavas** of various marks
- **400 French Leclercs**
- **200 ItalianAries**
- **250 British Challenger 2s** (albeit with a further 200 in mothballs) about to reduce well under 180.
- **In total NATO and its allies could mobilise around 18,000 tanks.**

That leaves more than 90,000 tanks that could potentially be ranged against us. The vast majority of these are older T-55, T-62, T-64 and T-72 models belonging to Russia, China, North Korea and various Arab states including Iran (which has a mixed fleet of 2,000 tanks including old American M-60s and British Chieftains).

Notably, the Russian Federation has maintained a fleet of 2,000 to 3,000 of newer T-80/ T-84 and T-90 tanks backed by a reserve of several thousand older vehicles.

Meanwhile, in addition to substantial fleets of older tank models, China has recently deployed its new Type 99, adding to a formidable line-up of Type 96s.

Of the total, it is estimated that Russia, China, North Korea and Iran have around 40,000 third-generation battle tanks. Approximately 20,000 are capable of matching the West's best.

It is not clear how many potential enemy vehicles are fully serviceable, but allowing some adjustment for inaccuracies and unknown factors, the large number of tanks that could potentially be used to attack NATO and its allies cannot be ignored.Thus, despite the British Army's belief otherwise; the tank will obviously continue to be a vital element of industrialising total land warfare. One thing for certain that was learned from the Cold War gaming is that we would want to delay a nuclear response for as long as possible if only to buy negotiating time to de-escalate the conflict. However without a powerful conventional defence based on a heavy tank force this strategy would be impossible

8.6.2. How to kill a modern tank? History seems to suggest that the best means of eliminating a tank is with another tank, but the ongoing development of simple to use hand-held systems, as well as increasingly powerful long-range ATGWs (anti-armour guided weapons) might until recently have created the belief that the balance of power had shifted away from the tank. However, recent developments in passive and active protection of Armoured fighting vehicles are about to redress this status balance. The attack helicopter as advocated by the Apache armed with its Hellfire missiles was designed to stop a USSR armoured thrust in its tracks, once A10s had destroyed the indigenous AA capability. However, but since they cost around 5-10 times as much as the main battle tank, the economic case for their use might not stack up in a protracted conflict against an enemy able to down our choppers with relative ease. The latter has especially been true in a world where MANPADS (Man-portable air-defence systems) are so cheap and effective, and when tanks like the T-14 carry their AA radar systems.

Similarly, strike aircraft cannot be expected to operate with impunity without air superiority. Additionally, if the tanks were to become more stealthy and harder to detect from the air, it would neutralise this counter tank capability.

Which brings us back full circle to the fact that a tank is the best possible method of killing another tank. Moreover, as we all know, neither attack helicopters nor aircraft can hold ground.

8.6.3. The Western tank design

NATO tanks design reached its apogee towards the end of the Cold War with the arrival of the MIA1 Abram's tanks which is now upgraded to the M1A2. Similarly, the Leopard 2 and the British Challenger were equally as capable. The latter is perhaps the best armoured of the three designs.

The performance of the M1A1 in the Persian Gulf Waris often cited as proving its superiority over Russian tanks like the T-72. In the decisive engagement at the Battle of 73 Easting during the Gulf War, one particular troop of 12 M1s destroyed 28 tanks, 16 armoured personnel

carriers, and 30 trucks in less than half an hour. The essence to this decisive victory was the use of thermal Imaging, allowing the American tanks to see their targets while being invisible themselves. This victory seems to have created a sense in the European powers that tanks were no longer relevant in their heavy form as if this enemy had been beaten once and for all. With this bizarre attitude of neglect, research into quantum evolutions in tank design, that incorporated new technologies have been side-lined.

The Leopard 2A5 tank

Only in Germany with the Leopard design has there been some attempt at the continuous evolution of capability. This evolution has taken place in the armour and fire control systems, and variants have evolved to the 2A7 and 2A7+. They have proven very effective in combat, and it is rumoured to be one of the options to replace the Challenger 2 tank.

8.6.4. A Russian wakeup call

Because Russia has traditionally been a land power, even before WW2, the Russians realised the value of the tank and were dedicated to building innovative and effective main battle tanks. This pattern continued through the Cold War, and thus, it should be no surprise that the Russians under Putin in May 2015 unveiled the most ambitious ground vehicle programme since the end of the Cold War.

The New Armata –T14 tank

The Armata Universal Combat Platform is Russia's vision of an interconnected family of tanks, infantry fighting vehicles, armoured personnel carriers, self-propelled guns and other vehicles. It incorporates the most modern innovations from other areas of the defence industry. The centrepiece is the T-14 Armata main battle tank, a radical design that highlights a troubling lack of fighting vehicle development in the West over the past 35 years. This new design illustrates significant advances:

1. **Weight/Mobility.** The tank is to be classified as a Medium Battle Tank at 48 tonnes compared to a Main Battle Tank(MBT) of 60 tonnes. This key choice will make it extremely mobile both in the field and over bridges of average strength and will also facilitate more rapid deployment by air as discussed early. Critically, with the new technologies embedded in this design and while the T-14 is 20% lighter than an MBT, it would appear to be more capable in many areas of performance than current western tanks.

2. **The Suspension.**TheT-14 has a 12-speed automatic gearbox, with a top speed of 80–90 kph (50–56 mph) and a range of 500 km (310 mi). At least one expert speculated that the transmission might be an electronically controlled mechanical gearbox with an external reverse and de-multiplier gears, giving the tank equal forward and reverse gear ranges and speeds.

   Unlike previous Russian and Soviet designs, such as the T-90/80/72/64, the T-14 has seven 700 mm road wheels, based on the T-80variant. It can adjust the suspension of at least the two first road wheels and, probably, the last one. This and some recently published design blueprints suggest a partial hydraulic suspension system based on the adjustable lever arm shock absorbers that now double as suspension actuators. This wouldupgrade the pivoting ability of the tank as an active suspension system improves the target lock time by a factor of 2.2, and the timeframe between target detection and the reaction is reduced by 31 percent. Additionally, the resulting smoother ride creates better crew efficiency in combat.

3. **The Turret** is completely unmanned and has a groundbreaking automatic loading system, while the three crew members operate the tank in a compartment at the front of the hull. This provides several advantages.

   There is more room in the turret for armament. Currently, the T-14 is equipped with the latest upgrade of Russia's standard 125mm tank gun, the 2A82A; in addition to the wide variety of Russian armor-piercing and high-explosive shells available, the gun is also capable of firing anti-tank guided missiles.

   The turret is notably taller than previous Russian designs and contemporary Western tanks. This is a distinct disadvantage as a tall profile hinders the ability of the tank to go "hull down" behind cover, a quintessential tactic of armour warfare. But the larger turret could accommodate a larger 152mm main gun, increasing the T-14's firepower considerably.

   The remote turret could also theoretically allow a single crew member to manoeuvre and fire the T-14's weapons simultaneously, albeit much less effectively. Additionally,

the tank has the potential to become fully automated without a crew, potentially allowing it to become the first drone tank.

4. **Secondary Armament.**There are reports of additional secondary and independent armament in the form of a co-axial 30mm auto cannon and commandersPKT machine gun, giving the T-14 the ability to engage a wide variety of independent targets simultaneously which will include antiaircraft/helicopter capabilities. This represents ability for self-defence against what has in the past decades been the greatest threat to a Russian tank, was an AH-64 Apache attack helicopter. This means that each tank has the capability to defend itself against air attack, which could further be enhanced with the addition of SAMs.

5. **Active Protection.** The T-14 design shows an unprecedented shift to prioritise both passive and active protection over mobility, which shaped the design of many Soviet tanks.

   The T-14 will incorporate several revolutionary active protection systems designed to kill incoming missiles before they even strike the tank. These include an active protection system *Afghanit* (Russian: Афганит). This system includes millimetre wavelength radar to detect, track and intercept incoming anti-tank munitions, both kinetic energy penetrators and tandem-charges. Currently, the maximum speed of the interceptable target is 1,700 m/s, with projected future increases of up to 3,000 m/s that would make it invulnerable to Western tank 120mm gunfire, unless it was saturated with fire.

   The *Afghanit* main sensors are the four panels mounted on a turret's sides, which are probably the AESA radar planes spread out for the 360° view, and possibly one more on top of the turret allowing protection for the tank from all sides.

   The active part of the system consists of both a hard kill and soft kill elements, first of which actively destroys the incoming projectile (such as a dumb rocket or artillery shell), while the second confuses the guidance systems of ATGMs and such, causing it to lose the infrared or laser guided target lock. They believe that it would be effective against most modern ATGMs, including Hellfire, TOW, Javelin, Spike, Brimstone, JAGM, etc. The *Afghanit* hard-kill launchers are the long tubes mounted in groups of five between the turret's front sides and the chassis. These send out electronically activated charges that shoot an Explosively Formed Penetrator towards the target (in all directions).Additionally, the tank is also equipped with the NII State's Upper Hemisphere Protection Complex, which consists of two steerable cartridges with 12 smaller charges each, and a turret-top VLS with two more similar cartridges. These probably correspond to the soft-kill system. Additionally, using the combination of the

AESA radar and anti-aircraft machine gun it is possible to destroy incoming missiles and slow-flying shells.

6. **Passive Protection.** The three-man crew are positioned together in the hull surrounded by the thickest armour sections in the tank of 900mm RHA equivalent, which effectively lightens the overall weight of the Tank. Both the chassis and the turret are equipped with the latest Russian Explosive Reactive Armour (ERA) system from the front, sides and the top. Passive protection is provided by the dual-armour Malachite providing an increased defence against projectiles that are designed to trigger the active armour with the first charge and penetrate with the second charge. Completing the passive defence are slat armour panels at the rear, which provide some protection against shoulder-launched anti-tank weapons. The overall armour composition is new, but its makeup is unknown. It is likely similar to the laminate "Cobham" and "Dorchester" composite armour developed by the British Ministry of Defence, putting it on par with tanks used by NATO nations.
7. **New sensor and c3 capabilities.** One of the most innovative and advanced new elements is a massively enhanced new target and sensor package, including an active electronically scanned phased array 26,5–40 GHz radar suite derived from a fighter jet, enabling the T-14 to track multiple targets simultaneously to a range of 100Km. This radar additionally provides the information to the active defence system for the T-14. Up to 40 airborne or 25 ground targets up to 0.3 m in size can be tracked simultaneously. The tracking system then provides an automatic firing solution to the destruction of the target, which can then be automatically transferred to either the APS or the main gun control computers.

   Additionally, with this radar capability and in a net work-centric role the tank will be able to give target designations for the artillery, serve in air defence role and provide reconnaissance functions. The T-14 uses highly protected communication channels that connect a group of T-14s and the command post. The sensor suit naturally massively enhances the crew and higher commands situational awareness and target acquisition on land and in the air.

8. **Crew situational awareness.** Has been expanded to new horizons.The commander and gunner have largely identical multispectral image sights, with the visible electromagnetic spectrum and thermograph channels and laser rangefinders. The commander's sight is installed on the turret top and has 360° field of view. While the gunner's one, situated in the turret's niche to the gun's left, is slaved to it and is additionally equipped with the direct-vision periscope channel and laser designator for the gun-launched, Semi-automatic command to line of light anti-tank missiles.[2] The detection distance of tank-sized object for both of the sights is 7,500 m during the

day through the TV/periscope channel, and ≈3,500 m at night through the thermal channel. Additionally, a backup night-vision capable sight is installed, with 2,000/1,000 m respective detection distances.

The driver in addition to the traditional vision periscopes has an infrared camera and a number of zooming closed-circuit television cameras for an all-round field of view. Video cameras are installed for an all-round vision for the crew since it lacks the normal vantage point of turret roof hatches. 360-degree camera coverage is perhaps one of the T-14's unique features, although made necessary because of the extremely limited visibility without them. With the crew clustered in front of the hull, they would have poor situation awareness if the camera setup and video feeds were to fail in combat.

9. **Automation.** The T-14 uses the integrated computerised control system which monitors the state and functions of all tank modules. In battle, the software can analyse threats and then either suggest or automatically take the actions to eliminate them, while without the external threat it can detect and rectify crew errors. It is thus obvious that this T-14 tanks will in future be capable of the remote control to operate in a drone land function for the riskiest combat roles.

10. **Stealthy Design.** The turret's shape is designed to decrease its radio and thermal signatures in a clear intent to make the tank as stealthy as possible, especially when it chooses to go into silent mode with its radar off. In July 2015, the deputy director of the Uralvagonzavod tank manufacturing company claimed the T-14 would be invisible to radar and infrared detection through radar-absorbing paint and Components with sensors deep in the hull that could adjust the tanks heat signature to that of its surroundings. Although, there are many armour experts who have doubts about these unproven claims.The intention to design stealth qualities into this tanks is groundbreaking. Set against the ground clutter these design elements may make the T-14 indistinguishable from its surroundings and thus invisible from the air and relatively immune to air attack.

According to reports, the Russian military intends to purchase 2,300 T-14s over the next five years. With the struggling Russian economy, it’s likely that Armata-based vehicles will be offered for export to offset the cost. Even if Russia continues the “monkey model” policy for export gear, a downgrade T-14 could still stack up well against Western tanks, like the Abram’s, Leopard 2, and Challenger 2. Additionally, although the Russians are unlikely to sell the T-14 to the Chinese, there is no doubt that it will not be long before they develop a similar tank of equal capabilities in high numbers.

Therefore, the overmatch the Abrams enjoyed may fast be disappearing. Plans to upgrade the tank to "M1A3" status won't happen until at least 2020, and its modest changes of upgraded electronics and a lighter 120mm main gun won't put it on par with the T-14. Tank designs from the South Korea and China have leap-frogged the Abram's regarding fire-control capability. The Army plans to keep the Abram's design until 2050, after the Ground Combat Vehicle programme intended to replace many ground vehicles was cancelled, itself replacing another cancelled programme called Future Combat Systems Manned Ground Vehicle.

Even then, upgrading the Abrams presents problems. The M1A3 upgrades assume the 120mm cannon and associated ammo will be sufficient to engage modern tanks like the T-14. 120mm guns are about the heaviest tank calibre able to accommodate a human loader. While the United States has experimented with a 140mm gun, it has never put an auto loading tank into full production. "Up gunning" the Abrams would require a redesign to fit an autoloading system. Then there's the armour. While it was very effective in 1991, the Abrams' composite armour has proved vulnerable to IEDs and tandem-shaped charge warheads. There are also two of the most glaring flaws of the Abrams. It's heavy at over 60 tonnes, making it difficult to airlift. And it has a gas turbine engine that while powerful and relatively quiet compared to the diesel option, guzzles gas and limits the tank's range.

If Britain, the United States and its allies continue to assume their tanks are adequate for future confrontations in the face of these new designs, they may find out what the Iraqi experience was like at 73 Easting. So the time has come to match the Russian lead and built a new generation of land battleships that use the technologies from other weapons technologies afloat and in the air and apply them to a single family of vehicles that act as tanks APC (armoured personnel carrier) and other support systems.

8.7. REGIMENTAL ROLES AND THEIR EQUIPMENT

8.7.1. The case for more heavy armoured battalions and MBTs

The three Heavy Armoured Regiments of the British Army deploy 58 Challengers each in three Sabre Squadrons of 18 tanks and with one command and recce squadron with 8 CVR (T) Scimitars. These are supported by yeoman armoured resilience regiment with 12 challengers used for training crews and providing reserves.

This current rather puny heavy tank force is a product of the 2015 SDR which removed of 96 tanks within two regiments placing a total of 250 in mothballs. Given the Challenger tanks' considerable success, this reduction can only be considered as incredibly short sighted on a par with the removal of the Harrier Force. Four of the Royal Armoured Corps' Regiments will merge into two regiments: the 9th/12th Royal Lancers and Queen's Royal Lancers will merge to become Lancers, while the 1st Royal Tank Regiment and 2nd Royal Tank Regiment will

merge to form simply the Royal Tank Regiment. The new Type-58 Armoured Regiments will each have 58 Challenger 2s and 8 CVR (T) Scimitars.

This reduction in combat power is of great concern and represents a significant capability gap going forward, especially with the arrival of the Russian T1-14 in service, with its self-defense capability against all projectiles except very high-velocity tank fired rounds. Additionally, it seems to have been forgotten that the modern tank is the tip of the spear for both attack and defensive modern high-intensity warfare.

But how has the decision been made? To answer, we can only turn to the repetitive theme of cycles that repeat themselves in human affairs that are described in BTCH. One such cycle seems to be taking place in the British Army today and once more it would seem that the British Army is preparing for the last war and not the next, as it has done numerous times before.

Tanks had played a critical role in the victory of WW1, but these new potent machines were inexplicably and quickly removed from the line of battle,so that by 1922 there were only two tank regiments left in service. In comparison, the cavalry arm which had been so ineffective was grown once more.Consequently, there were many more horses than tanks. This was a fundamental strategic mistake that caused Britain to lose a hard-earned lead in tank design and tactics that we failed to recover during WW2. Only in the later part of the Cold War with the world-class Chieftain tank did we do so, but how many lives were lost before that happened? Meanwhile, with the new 2020 model army, we seem again to have more horses than tanks in our army.

Challenger 2s operating in Baser Iraq

Notably, only recently in Afghanistan, the US Army and Marine Corps used tanks to great effect, with significant psychological impact on the Taliban. Requests for Challengers to deploy from Commanders in the country were refused on the basis that they were not flexible and required a long logistic train, despite the fact that following modifications after Iraq, they were ideally suited to urban combat. Indeed, there had been a specific Streetfighter armoured package to optimise the Challenger 2 in such environments. One has to wonder how many fewer British soldiers would have died in Afganistan if Challengers were deployed from the outset.

For those not familiar with the Challenger2, this British tank is considered to be one of the best-protected tanks in the world, if not slightly underpowered and now operating an outdated fire control and electronics systems. The turret and hull are protected with second generation Cobham armour (also known as Dorchester). The only two recorded combat damages to a Challenger took place in Iraq during August 2006, during the post-invasion stage of the Iraq War. The incident was caused by an RPG (rocket-propelled grenade), which was fired at a Challenger 2 that was climbing a ramp, exposing the front underside hull armour of the tank which was not augmented with an ERA(explosive reactive armour) package. The RPG hit and damaged this relatively vulnerable zone. But, as an example of the toughness of this tank, it subsequently returned to base under its power and was quickly repaired and back on duty the following day. As a result, the ERA package was replaced with a Dorchester block and the steel underbelly lined with armour as part of the 'Street fighter' upgrade as a direct response to this incident.

To date, the only time the tank has ever been seriously damaged during operations, was by another Challenger 2 in a 'blue on blue' (friendly fire) incident. This record compares extremely favourably to the record of the M1A2 tanks which proved vulnerable to RPG fire from the rear. However, the fire control and sensor package are certainly not as advanced as the latest models of the Abram and Leopard 2.

Regarding budgets, a single MBT costs around £5.5 million so for the price of one Type-45 destroyer it would be possible to buy 73 new MBTs to equip an Armoured Division. It was reported that at the DSEI 2015, army officials expressed their concern with the Challenger 2's armament which is the only rifled 120mm tank gun in service and thus it has a limited ammunition supply creating its inevitable obsolescence in coming years. Additionally, it is not powerful enough to cope with the armour of Russian T-90s and certainly not the T-14. Thus, the arrival of the T-14 has created a major impact on the British Army and cast serious doubts on the gun's ability to penetrate the new tanks 'ultra-thick armour.

Senior army and procurement officials are looking at either upgrading the Challenger 2 to a new Challenger 3 associated with a life extension programme, replacing it with the most recent version of the Leopard or designing and building a completely new tank. In the light of the arrival of theT-14, we would advocate new tanks on an accelerated full delivery by 2021 and a temporary upgrade to the Challenger2 and any shortfalls in tank numbers to be made up with the most modern Leopard tanks.

Overall, we strongly advocate the reintroduction into service of all the 408 Challenger 2 tanks. Firstly, this should be implemented immediately with the conversion of the Mechanised 3rdUK Division to an armoured division with the addition of three heavy armoured tank regiments and their supporting armoured cavalry regiments. Secondly, we propose the creation of a new 1st Mechanised Division along the lines of the force structure of the current 3rd division. Until this new Division is operational, the new tank regiments should be attached to the adaptable force.

Furthermore, as soon as possible, this new division and the 3rd UK Division should be provided with a new generation of tanks and AFVs that are hopefully superior to the T-14 and T-15 programme that allows for much greater mobility and rapid deployment.

8.7.2. Armoured Cavalry Battalions

Formation Reconnaissance Regiments, as the name would indicate, are intended to provide Armoured Reconnaissance for a higher-level formation, usually a division or a heavy brigade. In a large-scale defensive operation, they would delay attacking forces while screening heavier units as they moved to engage the enemy.

Armoured Cavalry (Armd Cav) regiments provide a unique, highly mobile reconnaissance capability to the Mechanised 3rd UK Division of the Reactive Force that can manoeuvre rapidly and over great distance to have an effect on the enemy. Armd Cav regiments provide the commander with the intuition that can only be delivered by a man on the ground. Armd Cav soldiers can operate independently in small teams or mass to fight for information at the very front of the Army's Reaction Force. Armd Cav regiments are currently equipped with the covert and battle proven CVR(T) family. The main combat strength is provided by 12 Strikers and 36 Scimitars organised into three full time and one reserve squadrons and a headquarters troop. There are three regiments of this type in the British Army:

- The Household Cavalry Regiment (HGR)
- The Royal Dragoon Guards (RDG)
- The Royal Lancer (RL)

From 2019 onwards, these regiments will be equipped with the British Army's newest 38-tonne reconnaissance vehicle the Scout SV.

8.7.2.1. The CVR (T) Scorpion and Scimitar Scouts

These ultra-light Scorpion and Scimitar tanks weigh 8 tonnes and entered service in the early seventies in the reconnaissance role and will have served for almost 50 years before they are replaced. Surely, they must qualify with the dubious titles of being one of the longest in-service AFV in the history of the British Army. These simple light AFVs have provided remarkably tough and durable in action and their speed and small size have been highly prized by the reconnaissance forces that have operated them in action. The Scout will replace the CVR (T) by 2026.

A Scimitar in action in the desert

8.7.2.2. Ajax and Ares Scouts

It is interesting to note that the CVR (T) replacement for the SV Scout has, due to the lessons learned over the past ten years in combat, become four times heavier and consequently larger than the Scout SV. Thus, it will be less covert due to its higher visibility on the battlefield by the mark one eyeball and also with radar now employed on the T-14s and thermal aides. However, overall this vehicle will provide a step change in capability on the battlefield, with advanced sensors in a fully digitised vehicle providing an information gathering and processing hub that doubles the range at which enemy targets are identified. Armed with a potent 40mm cannon firing armour piercing rounds, with Scout SV, the armed cavalry soldier will be able to manoeuvre to the decisive point on the battlefield to directly influence the action and provide the information that commanders need to make battle-winning decisions.

Ajax Scout with its CT40 Cannon

589 of various variants of the new Ajax Scout SV have been ordered at a total cost of £3.5 billion. These will replace the 592 ageing CVR (T) light tanks used in reconnaissance, APC, ambulance command and recovery since 1971. Originally 1010 vehicles were to be ordered, but the number has now been almost halved. The name Ajax will apply to the family as a whole but also to the turreted variant specifically. The reconnaissance support variant is to be named Ares; the command-and-control variant is to be named Athena; the repair equipment vehicle is to be named Apollo; the equipment

recovery variant is to be named Atlas, and the engineering reconnaissance variant is to be named Argus. The systems incorporated state of the art sensors and information sharing to locate targets on the battlefield. Note at 38 to 42 tonnes this is easy air transportable. Additionally, it would be a valuable asset for the three commandos' mobility group.

A pre-production model of the Ares APC version

There are in the light of the arrival of the T-14a number of concerns. Firstly, the Scout has not been designed as a stealthy tank and so will be detected by the T-14 long before it can see its enemy. Secondly, it does not carry a secondary heavy anti-tank system with which it could defend itself when it finds contact with the enemy.

8.7.3. Armoured Infantry Battalions

These heavy infantry units are designed to fight alongside the MBT Challengers with two battalions attached to one Challenger battalion. Each battalion will comprise of 3 rifle companies with 14 upgraded warriors and a support company.

The Warrior

Current Warrior

The Warrior is the current operational APC (armoured personnel carrier) in the British Army and is designed with the speed, mobility and armour to keep up with the Challenger 2 in armoured formations. 445 of the original 781 vehicles of the Warrior family will be upgraded in a £1billion deal with Lockheed Martin UK; 285 of which will receive the new improved turret with a new stabilised 40mm CTA International cannon which will allow it to fire effectively on the move over rough terrain.

Upgraded Warrior with the new turret

With our positive view on the value of tanks and armoured warfare, we approve of the continued service of the Warrior under the Capability Sustainment Programme (WCSP).

However, we would like to see the full complement of 781 vehicles upgraded to equip a new armoured division. Lockheed Martin UK's upgrades and enhancements will extend the British Army's Warrior vehicles' service life to beyond 2040. Looking to the future and using the T-14 model, then the next APC should use a common chaise and system as the next British MBT. If there is a shortage of Warriors to upgrade the heavy infantry, then Bradley fighting vehicles should be purchased to operate in this role.

The Germany Army has ordered the new Puma APC, which is a piece of art 31.5 tonnes APC with a remote weapons system and provisions for hard and soft kill self-defence. This vehicle is greatly superior to the upgradedWarrior and in the long run, perhaps the decision should have been taken to buy the Puma instead of upgrading the Warrior.

The new German designed Puma with its remote high elevation turret

8.7.4. Heavy Mobility Battalions

These formations were known as mechanised infantry and equipped with the Bulldog tracked vehicle. However, since the mid-2000s and the conflicts in Iraq and Afghanistan they have been using protected mobility vehicles like Mastiff PPV. Each battalion will have three rifle companies, each with 14 Mastiff infantry; there will be one battalion per Armoured Brigade.

Protected Mobility Vehicles PMV

The PMV (protected mobility vehicle) evolved with the new type of counter-insurgency war in Iraq and Afghanistan generated the need for a new family of combat vehicles known as protected mobility. They are designed specially to withstand IED (improvised explosive device) explosions and protect the crew. Sadly, the evolution was slower than would have been ideal. The Cougar and Mastiff are 6×6 variants while the Ridgeback is a smaller 4×4 variant. The Wolfhound is a 6×6 armoured tactical support variant of the Mastiff. This class of PMV is designed to provide protection and firepower to infantry forces and can be equipped with either a 12.7mm heavy machine gun or a 40mm grenade machine gun.

Following withdrawal from Afghanistan, the MoD has committed to bringing 400 Mastiffs, 160 Ridgebacks, and 125 Wolfhounds into the core budget. These PMV vehicles will replace the old Bulldogs. However, in an armoured formation, this switch does not seem an appropriate substitution for infantry operating a mechanised or armoured division. Surely these battalions should be equipped with Warriors or at worst Bulldogs for high-intensity warfare. And should PMVs be kept in storage and only used if ever they are deployed in counterinsurgency roles or should they be given to a battalion attached to the Adaptable Force?

FV 423 upgraded in 2006 with the Bulldog new reactive armour

Despite entering service during the 1960s, the FV430 series have been in front line service for over 50 years. A recent upgrade programme has "up armoured" the fleet, which now offers the same levels of protection as the FV510 Warrior. The 15 tonnesFV430 series is currently in service with the armoured infantry and mechanised infantry battalions. Instead of being replaced by protected mobility vehicles these APCs should be replaced with Warriors or a new APC family. Bulldog armoured/mechanised vehicles will stay at least till 2030. Originally, the upgraded FV 432 vehicles served as mortar carriers in the Warrior Armoured Infantry Regiments, possibly troop-carrying vehicles for Support Companies and medical armoured vehicles in the Medical Armoured Regiments.

In the future, it is planned that these PMVs will be replaced by the Utility Vehicles (UV). The original UV was theFRES UV, which was to be a similar design to the FRES SV (now SCOUT SV) vehicle. However, it is now anticipated to be an 18 tonnes, 8 wheeled armoured fighting vehicles known as the Mechanized Infantry Vehicle (MIV) similar to the French VBIC eight-wheeled vehicle. This class of vehicles will equip mechanised infantry in the heavy protected mobility battalions which seem a good solution, and if not delayed would be a significant

increase combat power of these formations. The US Strykers are one potential candidate for this role.

8.7.5. Light Cavalry Battalions (Lt Cav)

These battalions provide the reconnaissance element of the Adaptable Brigades which comprise of three regular light cavalry battalions, paired with three yeomanry regiments, each comprising threeSabreSquadrons, each with 16 Jackal vehicles.

The Lt Cav regiments provide a highly mobile reconnaissance capability that can manoeuvre well ahead of the rest of the army to find battle winning information. Routinely organised within the Adaptable Force (AF), Lt Cav regiments provide the force commander with the intuition and 24 hours all-weather capability that can only be achieved with a man on the ground. Lt Cav soldiers use guile and stealth to operate independently in small teams, often behind enemy lines and over prolonged periods. They are trained to work in conjunction with foreign military personnel around the world to conduct overseas engagement and provide training to our partner nations.

Jackal AFV

Regular Light Cav Regiments are currently equipped with the battle proven Jackal and the longer Coyote fighting vehicles which are due to be replaced by 2030. These platforms combine high speed, excellent cross-country mobility, good range and endurance to enable the Lt Cav soldier to manoeuvre in depth, to inform the commander's decision and influence the course of battle. Light and air portable, Jackal and Coyote, can be rapidly flown into a country ahead of the heavy armoured units to prepare the way for the main body. While the vehicle is well suited to the hot environments, it was designed for in temperate climates an enclosed armoured wheeled vehicle with a turret might be more suitable. Jackals are also used by the Royal Marines and Air Assault Brigade.

Reserve Lt Cav regiments are equipped with the RWMIK Land Rover. This soft skin jeep mounts the same Heavy Machine Gun and Grenade Machine Gun as the Jackal and Coyote. Reserve Cavalry Regiments train with their paired Regular Lt Cav Regiment and will deploy with them on operations and training exercises. The six regiments are

- The Queen's Dragoon Guards (QDG)

- The Royal Scots Dragoon Guards (SCOTS DG)
- The Light Dragoons (LD)
- Reserves - The Royal Yeomanry (RY)
- Reserves - The Scottish and North Irish Yeomanry (SNIY)
- Reserves - The Queen's Own Yeomanry (QOY)

8.7.6. Light Protected Mobility Infantry Battalions

These battalions are equipped with Foxhound vehicles, each comprising three rifle companies with one support company.

The Foxhound is a lighter and smaller PMV when compared to other protected vehicles (such as the Mastiff). It is designed for enhanced mobility and fighting in compact urban areas. Despite its weight of 7.2 tonnes (about three times the weight of the average family car), it can exceed speeds of 70 mph. The Foxhound equips the Light Protected Mobility Battalions

8.7.7. Light Role Infantry Battalions

Most affected by the Army 2020 changes, the Light Role Infantry Battalions are restructuring to reduce their regular manpower and integrate reserve contributions to make up for part of the loss. The light infantry battalions have a full unit establishment, all-ranks, all-corps, and in 2020are just 561 men comprising:

- Three rifle companies
- One support company

The reduction has had the most visible effect on the Rifle Companies, which are all losing a Rifle Platoon (from 3 to 2), which is to be replaced by a platoon supplied by the paired Reserve Battalion.

The third regular platoon from each Rifle Coy is being re-rolled to a Manoeuvre Support Platoon armed with 6 GPMGs (general purpose machine gun) with Support Fire equipment. The result is that the Machine Gun Platoon in the Manoeuvre Support Company vanishes; replaced by three platoons assigned directly to the Rifle Company. The Recce platoon within the battalion has seen a downsizing from 32 to 24 men in three sections.

The basis of the new structure was to limit the number of lost battalions to only five in the manpower cuts and avoid the controversy of lost cap badges. To achieve that goal, battalions' strengths had to be cut, and the reserves interacted. This is not a plan that is based on the optimal battalion structure but one that has been forced through defence cuts. The reliance on the combination of full time and professional platoons is very obvious in the new structure of the rifle battalions. One is left hoping that this new structure can be made to work or else it will undermine the combat power at the lowest formational level of the British army.

It is important that the old SA80 rifle will be replaced with a new and more effective weapon that is world class and will avoid the chequered and expensive development cycle of the old weapons.The ultimate drive came from the SAS and other Special Forces units, which have a free choice of weapons and have never favoured the SA80. Scrapping the SA80, which was introduced in 1986 and is due to stay in service until 2020, would be uplift to general morale at a precarious time. British troops continue to mistrust it as their standard issue combat weapon. Potential replacements include the Belgian F2000whichhas excellent protection against dust and dirt and the G36 made in Germany by the British-owned firm Heckler & Koch. Both can be fired left- or right-handed.

However, just as important is the research into programs that make the soldier more survivable on the modern battlefield. This is especially import with such a small army and the political risk that accompanies casualties.

8.7.8. AA capabilities

With the demise of the concept of a high-intensity land war, the requirement for an indigenous mobile medium range AA capability seems to have been placed low down on the Army's priority list.

However, the short-range AA missile is provided by infantry operated MANPADS (Man-portable air-defence systems) and the 12th Regiment Royal Artillery's 145 Starstreak Lightweight Multiple Launcher (LML). The Starstreak HVM (High-Velocity Missile) is designed to counter threats from very high performance, low-flying aircraft and fast 'pop up' strikes by helicopters. This short-range, highly mobile air defence system in its stand-alone variant holds three missiles ready for firing and can be used as either a stationary launch unit or mounted on a light vehicle, such as a Land Rover. Starstreaks can also be used as surface attack weapons, capable of penetrating the frontal armour of even AFVs. Starstreak systems are mounted on the Alvis Stormer AFV with an 8-round launcher and internal storage for a further 12 missiles. Under Army 2020, Stormer HVM will equip three regular and two reserve artillery batteries.

Centurion C-RAM

During the occupation of Iraq, the British Army acquired at least six point-defence Centurion C-RAMs, which are a land-based variant of the Phalanx CIWS 20mm Gatling cannon used in the US Navy. This system covers a 1.2 km square area and can intercept incoming artillery and mortar munitions via radar and FLIR guidance firing at a rate of 4,500 rounds per minute. This system was able to defend HQs and camps from attack. However, these systems are now due to be mounted on the Navy new aircraft carriers.

The question is why would the Army not order more of these, or a similar system to defend key positions on both a counterinsurgency and high-intensity battlefield?

A US Patriot Missile battery

In the US Army, the medium range AA capability is provided by US Patriot PAC-3s and Hawks on track vehicles to keep up with armoured columns. The current capability gap needs to be filled as soon as possible perhaps with US Patriot Missiles.

8.7.9. Army Air Corps

RAF Boeing AH-64 operating from HMS Ocean

The twoArmy Air Corps Regiments 1fly the highly capable Westland Apache of which there will be 66 in total with 67, of which 48 will be in the front line and 13used in training in service and 16 mothballed. These capable helicopters have proved excellent against counter-insurgency targets. However, to enhance its effectiveness, the Apachedesperately needs to be combined with the A10 type ground support air cover. Especially, if it is deployed in a high-intensity war; the A10 can destroy the AA elements of an enemy column before the Apaches can safely go to work.Additionally, when operated from amphibious assault ships they would provide a key support element for amphibious landings.

8.7.10. The Royal Artillery

Similarly to the Armoured Divisions, the heavy elements of the Royal Artillery continue to be decimated by the Strategic Defence and Security Review.

The Guided Multiple Launch Rocket System (GMLRS), nicknamed the '70 km Sniper' or 'GSRM (Grid Square Removal System)', provides pinpoint accuracy, delivering a 200 lb high-explosive warhead to its target. It has twice the range of other artillery systems used by the British Army. The deep fire 39 Regiment Royal Artillery will disband, with its Guided Systems being transferred to the rest of the Royal Artillery where 50 vehicles are in operation with1 RHA, 19 RA and 26 RA. Any future replacement is expected to be in line with US Army upgrades and replacements of this system.

Meanwhile, the number of AS-90 self-propelled guns will be reduced by 35% from the 117 currently in service to equip three regiments. The reduction of both of this long range heavy artillery capability should be reversed immediately to equip the proposed new Armoured Division. There are some sources that would propose that the ammunition for this artillery piece should be upgraded to enhance effectiveness.

Additionally, there are now more capable systems like the German Panzerhaubitze 2000 ("armoured howitzer 2000"), abbreviated PzH 2000 which can adjust the elevation of its barrel to fire three rounds so that they all hit the target simultaneously, massively enhancing the shock effect. Why these heavy artillery systems were not deployedin Afghanistan in support of our ground forces remains unanswered.

8.8. RMAS ON LAND

8.8.1. The remote Turret weapon systems

M2 heavy machine gun aboard US Stryker

Since the campaigns in Afghanistan and Iraq, there has been a significant shift from manned weapons on vehicles towards newer remote weapons systems (RWS).

The Tactical Remote Turret (TRT) is a fire support weapon that offers several advantages over legacy systems, including improved protection for the operator, multiple weapon systems on one turret, rapid-fire cannons (20mm or 30mm), a co-axial machine gun and anti-tank guided missiles. These weapons can then be added to enhanced sensor systems such as electro-optical sights which means that the enemy can be fired upon from up to 3,000m away, and with infra-red, almost 8,000m away at night.

A protector M151

8.8.2. Lasers – the directed energy weapon option

The 1K 17 "Szhatiye" projects that went into service in 1992 with the Russian Army.

Looking beyond conventional bombs and bullets, manufacturers are also experimenting with vehicle-mounted directed energy weapons (DEW) - or lasers. Boeing converted one of its AN/TWQ-1 Avenger air defence systems - a modified Humvee capable of firing Stinger missiles - into a solid-state laser weapon. The 'Laser Avenger' system was the first-ever vehicle to shoot down a UAV with a laser. Boeing says the system can be operational within a year and can also destroy IEDs (improved explosive devices).

Lasers offer some advantages over conventional weapons. They do not require ammunition resupplies - reducing logistics costs - and also offer rapid engagement of multiple targets. However, lasers are dependent on clear weather and a large power source as they will need lots of power (25MW) to be effective; this will limit their deplorability.

8.8.3. Vehicle active defence capabilities

As demonstrated by the T-14, the time has come where land battleships and tanks are back on the agenda. The miniaturisation and enhanced speed of processors mean that the defence of armoured vehicles is moving from passive to active armoured route onto active systems that not only decoy and confuse but will be able to intercept incoming missiles and projectiles and destroy them before they can hit their target. Additionally, there are systems that alert the crew to their tanks being targeted by lasers and other designators.

This has immense implications for the balance of armour and armament and thanks once more become a relatively invulnerable battlefield weapon. However, the same technology may give softer skinned and lighter vehicles similar levels of protection.

The French Galix countermeasure system is in service and mounted on the Leclerc MBT and consists of an electrical control unit and launching tubes set into the rear of the turret. The Galix is turret mounted and provides 360° protection. It can fire 80mmsmoke rounds, anti-personnel rounds, or decoy rounds out to 30-50 metres, in single rounds or salvos. The Galix system reaction time is less than one second.

Meanwhile, in America, Boeing is one of many such programmes under contracts with the Defence Advanced Research Projects Agency (DARPA). Boeing is developing a small, low-cost, fully self-contained active defence system for military vehicles and high-value assets. The system, designated the “SLID,” for “small, low-cost Interceptordevice,” will provide protection from missile and artillery threats which are defeated at stand-off ranges of up to 250 metres and include ATGMs, HEAT rounds, mortar rounds, and artillery shells. Boeing is also evaluating advanced SLID applications, including protection of assets from anti-radiation missiles, cruise missiles, and unmanned aerial vehicle threats.

The second programme is the Counter Active Protective Systems (CAPS). The U.S. military is not sitting idly while APS technology improves and proliferates worldwide. The CAPS programme is designed to counter a threat to an armoured force. The purpose of the CAPS programme is to demonstrate a suite of technologies that, when applied to current and future Army antitank missiles, will neutralise the effectiveness of threat tanks equipped with any one of a variety of APSs. Technology components of the CAPS suite are expected to include electronic countermeasures, advanced long-standoff warheads, decoys, ballistic hardening countermeasures.

The third programme is the Quick Kill, which is part of the Future Combat Systems and is an active protection system

(APS) designed to destroy incoming anti-tank missiles, rockets, and grenades. The Quick Kill system is designed and produced by Raytheon for the U.S. Army.

Another American system, known as Iron Curtain, utilises two sensors to reduce false alarms and defeats threats inches from their target by firing a kinetic countermeasure designed to minimise collateral damage

***Iron Curtain mounted on the roof of an armoured truck**.*

There are many other examples of active countermeasures. For example, the Russian-made Arena system utilises a Doppler radar to detect incoming threats and fires a rocket to eliminate the threat. This system has now evolved to the vastly more capable system now fielded on theT-14 which seeks to destroy high-velocity kinetic kill weapons fired from main battle tanks.

8.8.4. Land drones

With the advent of drone technology in the air and sea environment, it is but a matter of time before drones, tanks and weapons become a feature of the next battlefield. These smaller vehicles could revolutionise land warfare.

8.8.5. The future integrated soldier technology

This is a suite of equipment capable of enhancing an infantryman's effectiveness as part of the 'Future Soldier' programme which is designed to optimise:

- Command and control
- Lethality
- Mobility
- Survivability
- Sustainability

This area of study designed to give first world infantrymen an advantage on the battlefield is the subject of many nations' research programmes. As an interim solution, a new body armour system known as Virtus is under development as a replacement for the Osprey vest and Mk7 Helmet while the UK MoD has a requirement to acquire a new Modular Assault Rifle System (MARS) for deployment with certain military units. However, there is an essential need to replace the SA-70 with a new more effective weapon across the British army.

8.8.6. Command, control and communications

"Future vehicles will give soldiers unrivalled tactical capabilities by being networked to other military assets."

This technology was first pioneered by the 4th US Infantry Division with the successful Force XXI Battle Command, Brigade-and-Below (FBCB2) communications platform across its deployed vehicle fleet. The system, which first saw use in Iraq, allows vehicle commanders to view real-time data on the location of friendly and enemy forces. The information is relayed on ruggedized touch-screen displays, which can give accurate locations on detailed maps and email-like communication between units.

Looking forward, future vehicles and personnel equipment will give soldiers unrivalled tactical capabilities by being networked to other military assets while also being able to fight and move in all weather conditions, day and night. This is thanks to systems which give the warfighter real-time situational awareness on the battlefield and unrivalled command and control capabilities giving a massive force multiplier effect on combat capability.

8.8.7. The Vision of future of armoured warfare

Taking the T-14 and T-15 concepts to their ultimate conclusion,armoured warfare would comprise of the main battle tanks and an associated APC (armoured personnel carrier) based on the same chassis and electronic sensor systems, that has the potential to become autonomous at a later date.

The MBT would have the high-velocity gun with an autoloader. As per the T-14, greater penetration could be created with a larger 150mm gun, which until now has been impossible with manual loading. However, the USN development of the railgun offers the tank a potential weapon of smaller calibre but much greater range and penetration power. Thus any 125mm sized turret could in future be retrofitted with a rail gun. Additionally, such a weapon could also be used in the indirect fire mode to provide long range precise artillery. Both the MBT and APC would have phased array radar to acquire targets out to 100km and vertical launching SAMSs (surface-to-air missiles) with armoured protection giving the armoured column indigenous air cover. This would also be a long-range chain gun slaved to the targeting computer for secondary targets and anti-craft roles. All vehicles would have linked sensors and fire control; similar to ships in a fleet, and be proceeded by resonance drones on land and in the air linked to the battle formation. Naturally, all vehicles would have the ability to defend themselves against incoming projectiles and then provide the information of other vehicles to destroy the new target almost instantly preventing the second shot.

Such a design evolution could then combine artillery with Main Battle Tanks (MBTS) and Armoured Personnel Carriers (APC) formations allowing greater numbers in service and an armed force of much more combat power.

Although the rail gun is not yet production capable, all other systems are, and as such allowing for a turret change. Such a future main battle vehicle has the potential to transform the British Army's combat capability and enhance maintenance and lower unit costs.

Lastly, the next generation of AFVs will in all probability be the last manned versions of their family, as drones will inevitably follow them. Thus, designing them so that they can be enhanced to follow the evolution would seem critical

8.8.8. Summary of the British Army

The question is: "Has the British Army methodically followed in the footsteps of its Argentine foe?"

The British Army seems to have been operating in its old pattern of planning to fight the last war and failing to predict the next one. What is surprising is that with the recent Afghan war experience, the British Army is about to make another core mistake with the Army 2020 plan extrapolating the last war into the next.

While it should be expected that the British Army will be involved in expeditionary counterinsurgency wars in the years ahead, this capability must now be considered secondary to the need for a high-intensity war fighting capability, requiring mass and firepower. What is most concerning is that the Army has made these 2020 plans for its new force structure, after a period where it failed to anticipate the counterinsurgency wars in Iraq and Afghanistan. Human systems have a habit of making poor decisions, which are then almost inevitably followed by more poor decisions unless there is a radical rethink on leadership.

The Army was slow to adapt to the new combat environment Afghanistan and especially to follow the path of their colonial forefathers in understanding the essential nature of the country and the culture in which they were conducting operations.This approach was a fundamental error and failure. Predictably, however, it was an almost inevitable consequence of the loss of collective emotional intelligence in dealing with a foreign culture that was hard-won by the British Empire.

The Army's deployment strategy for the first Brigade in the country was incomprehensible, and in no small part was due to the lack of clear strategic objectives and consequent resourcing.

This situation was, however, a direct product of the assumption and fundamental misjudgement that the Air Assault Brigade would not have to fight as it was on a peacekeeping mission. However, once on the ground, the appalling tactical decisions that led to the beleaguered battalion house strategy cannot be defended by the obvious lack of integrated planning that resulted in the 16th Air Assault Brigade being so unprepared.

Once the war took hold, the Army's inability to speedily develop and deploy vehicles resistant to IEDs cost many lives. Importantly, coalition partners viewed British commanders as arrogant and unwilling to accept new ideas. The command structure was compromised by the requirement for commanders in the field relying on their superiors at home to gain political agreement for operations. Because the British politicians were without military experience and historical context, one can conjecture that commanders at times played down the potential casualties from operations rather than communicating hard assessments which would then not have resulted in operations taking place. Instead, the generals' relations with their political masters should have been sufficiently politically robust to communicate the reality of the situation and educate politicians as to the real nature of the war they were fighting. Especially, with respect to the time, resources and losses it would take to be able to prevail.

This complex command structure leading back to the UK and Downing Street created delays in decisions to take action, an aversion to risk and consequent ineffectiveness of operations. This 8-year experience will have no doubt permeated from top to bottom and compromised

the Army's future effectiveness. On the one hand, there is no doubt that the Army itself emerged as a resilient combat-hardened and self-confident organisation. However, with 454 killed and some 2000 wounded in the campaign, one has to ask how many of those losses could have been averted?

The refusal to deploy Challengers 2s into the battle zone is a prime example of poor thinking. This was despite our allies who all deployed tanks with great effect in combat both kinetically and psychologically. There is no doubt that Challengersoperating in Afghanistan would have saved lives and changed tactical outcomes. The decision against such a deployment was reasoned by the prohibitively long logistical training required. This outcome and the excuses are just not acceptable and are symptomatic of the overall failure to recognise that we were fighting a war that demanded maximum resources to minimise our casualties.It is also symptomatic of the Army'sfailure to value tanks as a battlefield winning weapon, which was subsequently reflected in the reduction of the Challenger2 force.

One core undeniable product of the war was the increased politicisation of the Army due to the way the command chain operated. This has no doubt inhibited the Army's capability to be able to develop its strategic concepts independently and then fight for them politically. With such a collective mindset one has to have great concern that it has negatively affected the current reorganisational structure of the Army 2020 plan.

The Army 2020 plan has been driven not by the requirement to make the army more effective, but primarily by budgetary drivers having left the army in a precarious situation.

The 3rd UK Division of the Reaction Force is a clearly structured combat unit which should allow for a full spectrum response as an armoured division with at least three more Challengers' regiments in its formation. Our recommendation is that this division is upgraded with more tank regiments to a fully armoured capability and that a new 1st mechanised division is created.

However, the Adaptable Force resembles an assembly of what is left rather than a clear cut

divisional fighting unit with three brigades that in reality are only two effective brigades. Indeed, there should, at least, be a third effective brigade to make this structure up to full divisional strength. There is also a key requirement for the Forces Command to receive greater resources of artillery and AA systems to current commitments. Indeed, the recommendation of this review is to support and expand the number of divisions beyond the 2020 SDR

There seems to be a fundamental failure to think strategically and anticipate the very nature of future warfare. While the British Army consigned the role of the tank to the dustbin, the Russians with their reliance on land war, seem to have created a vision in the T-14 of powerful defendable and mobile land power that Britain now needs to recognise as being a major threat and to seek to meet it.

This dual threat environment of asymmetric and conventional configurations will be extremely challenging, but one should remember that the British Army operated in both roles in Northern Ireland while simultaneously facing off with NATO against the USSR in Europe with large conventional forces. So, why this cannot be done again if the Army is given sufficient financial resources to do so?

Today, under Army 2020 while the current forces are configured for light force intervention, they are certainly not structured for a major war, with only a single mechanised division available based in the UK. However, even these heavy forces might be of questionable value due to their current inability to be rapidly deployed to the theatre where and when needed.

Consequently, it is vital that the Army is expanded to include the proposed armoured and mechanised divisions with a third fully armoured 2nd (UK) Division with the equipment current in mothballs and that this force and its sister 3rd Division will be provided with the most up-to-date equipment and capability in the world in the next seven years. Additionally, a new concept of heavy airlift capability via planes or hybrid airships needs to be developed quickly, to allow our forces to be swiftly moved forward and deployed to where they are needed in a timely fashion.

Additionally, there seems to be a shortage of fighting vehicles that have commonality and combat effectiveness, on the scale that a modern army needs to be mobile, sustainable and resilient. The Army's equipment programmes seem to be massively delayed and at times of questionable suitability. When the upgraded Warriors compared to the German Puma APC, this becomes very obvious.

Most importantly with the army receiving such a low national priority, its mindset seems to be one of survival rather that the creative optimism required to anticipate the future changes to land warfare that could result in the capability gap that could make the British Army ineffective in a future high-intensity war.

The Army's and MoD need to shorten all their delivery programmes of new systems to ensure that all the key elements of the army's system programme are replaced and delayed by 2022.This shortened cycle is a tall order for such an inefficient process but without it, the nation will have only a shadow of the capability it will in all probability require that time.

With the expansion of the Army to three armoured and mechanised divisions (i.e. a corps) the Force Troops Command with its vital artillery will need to be expanded to support the reaction force. This brings up the key issue that perhaps the artillery should be integrated permanently in these heavy divisions.

The sale of key Army bases, especially those with historical value like the Royal Military School of Music seems very short-sighted, given the impending need to expand the army once more. They are irreplaceable in a nation that seems to have less land available and additionally they represent a connection with the past that is an integral part of the nation's armed forces.

In summary, the current state of the British Army is a national disgrace. This condition is a product of irresponsible defence cuts, but also a clear lack of strategic vision on behalf of its commanders to appreciate the future demands of a high-intensity land war and to embrace the new technologies that have by now come over the horizon and which are close at hand to our potential enemies. The Army needs a radical overall enlargement to be ready for the challenges it will inevitably face ahead.

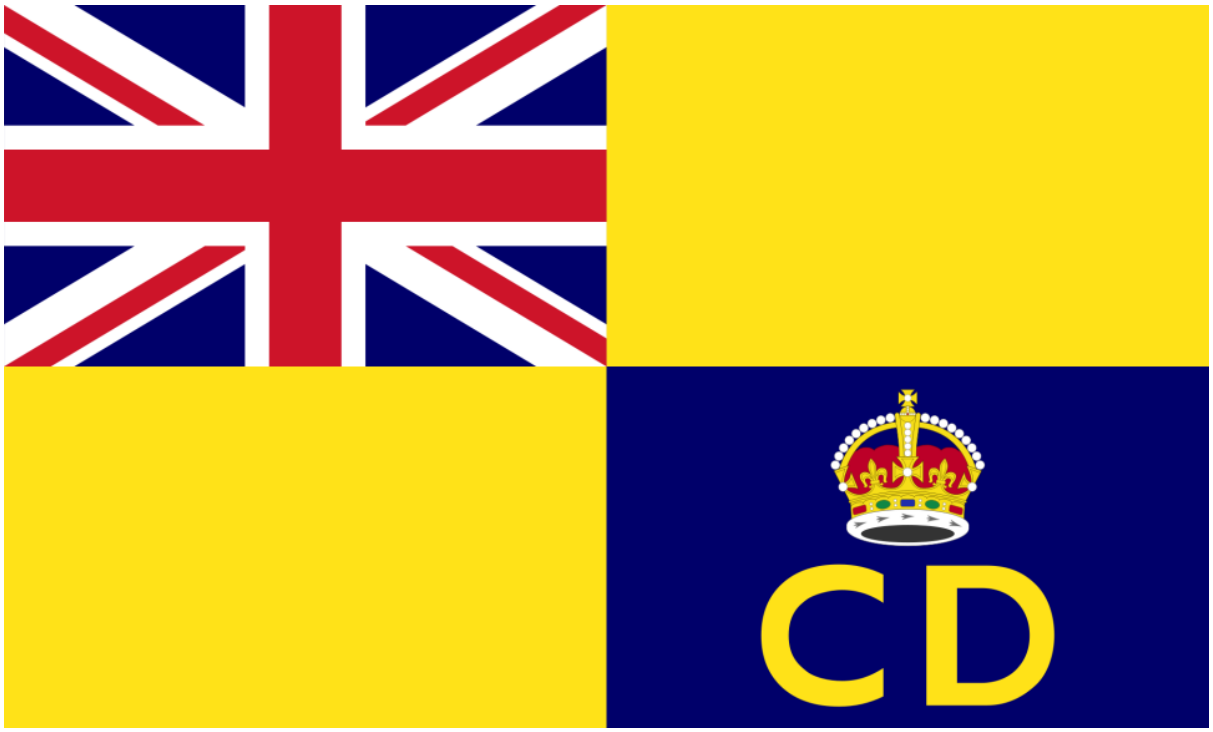
8.8.9. Recommendations for the Army 2022:

1. Increase the army’s size by 30,000 to 112,000 regulars and soon after to 142,000.
2. Replace the SA-80 immediately.
3. Invest in future soldier programs to make the man on the ground more survivable.
4. There is a genuine concern that, with one out of four platoons being made up of reserves in the new model army, which means that any failure to fully integrate the reserves will have profound effects on the army's capability going forward.
5. Upgrade the 3rd UK Division to an armoured division with the addition of three more Challenger regiments.
6. Make the UK 1st Division fully mechanised
7. Build a new Mechanised 2nd (UK) Divisions based in the UK and using all the mothballed equipment including 290 Challengers and some 300 Warriors.
8. Create plans and equipment for a2ndArmoured Division 4th Reserve (UK) based in the UK and using all the mothballed equipment that can be ready for deployment from reserve forces in 6 months. This would avoid the situation we found ourselves in post-1914 with the BEF.
9. Enlarge the Adaptable Force to be able to field three full strength Light Brigades.
10. Upgraded all armoured vehicles and bring forward delivery dates to 2022 and ensure that they are suitably/optimised for the roles in which they will be deployed.Thus, the

upgrading programmes for the Challenger 2, the Warrior, the UV programme and even the SCOUT SV programme need to be on track.

11. Deploy a new replacement for a Challenger AFV on a common chassis by 2022 with a superior capability to the T-14/T-15.
12. Develop and deploy AFV self-protection mechanisms similar to the T-14.
13. Concern that the new Scout does not have stealthy capabilities or protection from high powerful kinetic weapons
14. Expanded the AA battlefield capability by either bring forward the FLAADS (L) delivery system for both in point-defence or buying US systems like the Patriot to fill the capability gap.
15. Battlefield missile defence is an urgent gap that needs to be filled with US Patriot batteries.
16. Buy a squadron of USAF A10s for the Army Air Corps AH-64s in high-intensity combat zones.
17. Formulate and agree an integrated Armoured Divisional concept that is transportable air point-to-point.
18. Ensure all new combat vehicles are stealthy to ensure survival.
19. Proposed budget increases are as follows.
    - 750 main battle tanks @£5.5 M each = £4.125 BN
    - 1500 new heavy APCs @£40 M each = £6.0 Bn
    - AA missiles shields FLAADS and PAC-3s = £3.0Bn
    - 250 New RZH 2000 artillery = £0.75Bn
    - 1500 upgraded light scouts @£3m each = £4.5Bn
    - Manpower increases
    - **Total ex-manpower =£18 Bn (approx. 1% of GDP)**

SECTION 9: NATIONAL RESILIENCE OR CIVIL DEFENCE OF BRITAIN



9.1. THE NEED FOR CIVIL DEFENCE

In the days of the Cold War where a nuclear attack threatened the nation, there was a Civil Defence Force. Although in comparison to Switzerland, our national preparedness was much lower, there was the key concept of preparedness against national attack.

Today, since the end of the Cold War, the plans that would create national resistance are not of sufficient importance to allocate the required resources. However, with the increased threat of rogue nuclear proliferation and a limited rather than a mass nuclear attack now potentially possible, perhaps we should begin to plan and invest in a new programme commensurate with the rising risks. Notably, Britain now reserves the right for the first use of nuclear weapons, which is a dramatic step away from the past Cold War doctrine.

The risks to the nation are not just from a missile attack but also from dirty bombs from radiological devices and nuclear incidents such as Fukushima. In America, larger cities now have underground emergency operations centres that can perform civil defence coordination, but in Britain, we have no such preparations.

With an expanding population, it would make sense to have a significant volunteer force trained to cope with both nuclear attacks, biological threats including epidemics and natural

disasters associated with climate change incidents. Such a force would draw in people and national resources into a cohesive unit that really can cope with large-scale national emergencies. It would serve to create a sense of national cohesion and preparedness and remind us that we cannot continue to be so complacent.

The starting process must be to create a set of probable and less probable national emergencies and then work out what it would take to resolve the majority regarding resources and command structures. At the very least we should have comprehensive plans in place that could shorten implementation for when they might be demanded in the future

9.2. SUMMARY OF THE CURRENT BRITISH DEFENCE POLICY

1. **<u>Britain's Intelligence Services</u>** Have continued to receive relatively generous funding over the past decade from an absolute spending perspective; it would appear that our capability does not match the expanding multiple threats. Especially in the cyber domain, but also in the traditional intelligence services we encounter three major threats requiring ongoing monitoring: Islamic fundamentalism, Russia and China. To respond appropriately, the government needs to at least double its organisational strength in the intelligence services and the case of GCHQ (Government Communications Headquarters) possibly further than that.

2. **The Royal Navy** In our overall review of Britain's defence, the Royal Navy comes out relatively the best of the three services in its design of suitable weapons platforms for future threats in the face of horrendous cost cutting. It has managed to design, build and operate at least two world class weapons platforms and seeks to re-establish airpower at sea, with all the associated power projection capability. However, the Royal Navy is in crisis and urgent need of investment and expansion. In a post-Brexit world where Britain will inevitable once more seek to become a global maritime trading nation, the reliance on an effective Navy is even more marked. It will be vital to maintaining open sea lanes and power projection, especially in a world where both Russia and especially China seek to manifest powerful blue water navies. To achieve this Royal Navy is desperate for more platforms, as regardless of how capable each one now is; they cannot be in two places at once. Hence, our recommendation for an immediate expansion of a 100 ship Royal Navy. Coincident with this ship expansion the Navy has to urgently solve a major shortage of manpower.

3. **The Royal Air Force** currently has the capability to defend our airspace and deploy tactical strike capabilities to a low-intensity war. However, it has been guilty of failing to demonstrate the foresight to create an integrated air defence of the UK, using combinations of missiles and fighter aircraft. Additionally, if it is to support a new mobile British Army, it will need to enhance its heavy lift capability significantly. There is also a strong case to give the RAF the equivalent of a ten plane strong Strategic Bomber Force of the B-2 replacements for maritime control and strategic nuclear delivery as a backup to Trident.

4. **The Army's** After almost a decade and half of continuous land operations the Army's condition is lamentable, and consequently, it is the worst positioned of the three services. It is now focused on a light intervention role and has abandoned the concept that it could be involved in a high-intensity war. This is a critical misjudgement that needs to be corrected urgently. Additionally, with the trend in battlefield innovations, there is an opportunity for the British Army to create a new force concept that can deploy a heavy Division and ideally, Corps sized force to the point where they are needed rapidly. One can only conclude that to execute its role in defence of the nation the army is in an urgent need of overhaul and expansion.
   To rectify the Army's condition, one has to ask the question why the Army has fallen into such disrepair. One cause is its increased politicisation of senior officers following the Afghanistan War, filtering out the more maverick straight talking generals needed to look forward with capable and independent thought. Without which innovation at a senior level will continue to be absent. The second cause is that the Army may well be in a state of trauma, not dissimilar to that which the US Army faced after Vietnam.

It seems to lack a new young leadership that can create a new more effective force similar to the one prepared to confront the end phases of the Cold War. One can only conclude that the very nature of leadership and the quality of the army generals need to be reviewed to ensure that the leadership can develop a realistic force structure that can fight a high-intensity war. It should be noted that the pattern that the Army is unready to fight the next war has been a regular theme in the past century. Such that the issue may trend current events and be founded on the very tribalistic nature of the regimental structure in the Army; which is absent from the other two services. Additionally, the complexity of the weapons seen in the Army is far below that of the other services, perhaps maybe because the Army allows its senior officers to rise to power without an appreciation of the modern technology and the rate at which it is improving. The question that springs to mind is: "Is this a repeat of thepost-WW1 old horse versus tank paradigm, in a modern form?"

5. **Space** is the next high ground of the modern battle space, and it would seem that Britain feels precluded by a lack of money. However, this is an area where cooperation with the US is vital and could bear Hugh benefits. As would be the creation of a new missile defence command integrated into the RAF's responsibility for air defence of the UK.

6. **Civil Defence or, as we call it, 'National Resilience'**, is the other area that has been neglected. It was once relevant with the massive arsenals associated with the Cold War and its mutually assured detection strategy (MAD). However, today, slowly the risk of a nuclear exchange has increased as the Russians and Chinese have changed their first use policies, and North Korea continues on its path to developing the hydrogen bomb. Thus it is the time that we created a plan against the most horrendous concept of a limited nuclear strike against the nation: not to do so would be irresponsible in the utmost.

7. **Higher Command** There needs to be a new model for the higher command structure that demands that its commanders have mastery and a deep understanding of the capabilities of each service and how best to integrate them into a combined Arms Forces across the battlefield. There also needs to be an institutional acceptance of the errors and mistakes that have been made in Iraq and Afghanistan.
   We are living at a time when new technology is evolving rapidly, which has the potential to revolutionise a battle space. A good example of this is the advent of lasers, rail guns and hypersonic missiles, all of which are game changers. Thus there is a critical need to create a future warfare centre that employs not just the military but

the brightest minds in the land to anticipate new technologies and ensure that they are developed in time to meet any threat.

Regarding the leadership of the head of the armed forces, there is an urgent requirement for a visionary and politically able, hard talking leader to take the case of the Armed Forces to the politicians and champion rapid expansion in manpower and equipment. This leader should not ideally be from the Army with its current crisis, but on the basis that the Navy has shown the best level of vision and preparedness, this leader should be an Admiral, rather than an Air Marshal. That aside, all the services require a strong and smart leader at such a critical stage of vulnerability and a new culture of cross-fertilisation and integration. This is because the wars of the future will demand ever more integration of land, air and sea capabilities. Hence, there is a desperate need for senior leadership that not only transcends the partisan approach of Jock Stirrup, but someone who will have a deep knowledge of all the systems and capabilities in the air and on the ground so that he can judge the weak links, understand where our strength lies and which weakness needs to be addressed.This new leadership would need a radical reformation of the senior officer corps, but with such a currently top heavy structure, this could be the time to put high flyers into cross-services posts and to create a new senior joint command course that addresses these issues.

8. **Political Intention**, The British people, require its politicians and senior military leaders to take action to protect the nation. We need to create a new armed force that acts as a deterrent rather than transmitting the current signal that the West and we are weak and unprepared, as such a situation historically has only encouraged the next conflict. Most importantly, with the long lead time to build new weapons systems, there will be no chance in a future high-intensity war to recover from the first blow and fight back. We will quite simply live or die as a nation with the capability with which we enter a future war, with no second chance. To mobilise collective support for marinating our nation's security we need a political campaign placing ***Defence First.***

9. In summary, Britain has chosen to stand alone from the EU and assert its independence. However, the price of freedom is one of constant vigilance and the willingness to fight back. Today, there is no doubt that Britain faces an ever increasing threat environment, with a resurgent Russia, and long-term challenge from ISIL and the growth of Chinese global power. The question for the nation, its leadership and citizens is: "Do we wish to suffer such a fate? "And if not, then we need to act now before it is too late. To remedy the situation, we need to make defence a national priority, radically reorganise our armed forces and increase spending to 5% of GDP as

quickly as possible and adopt a revolutionary **new model approach to Britain's Defence.**

APPENDIX 1: HOW COULD THE USN HOLD BACK THE RISING CHINESE CHALLENGE?

The BTCH analysis is that China is a rapidly expanding power that seeks to challenge and relieve America of its superpower status. Thus, the key question is: "Can America resist this direct challenge which could in all probability lead to war two to three years before the critical commodity peak in 2025?" To become the global superpower, China must build a navy that can push the USN from the high seas. Thus, the Chinese challenge is essentially a naval challenge, much as Germany once sought to overpower the Grand Fleet of Britain in the years leading up to 1914.

In China's favour is its increasing wealth and economic power that has given it the largest shipbuilding and manufacturing capability in the world, a foremost requirement for dominance of the world's oceans. This coupled with centralised government control, a large defence budget with a much lower cost of production than America combined with a powerful national ambition makes China a formidable opponent.

In comparison, America is an empire in late decline with an astronomic debt burden and increasing budget cuts that are biting deeply into the US armed forces and especially the USN. One might argue that in America's favour is a long history of blue water naval operations which is not matched by the PLN. However, if the lessons of history are to be heeded, even if they date back to antiquity when the Romans who were at the time a rapidly expanding land

power, but not a sea power, America's operational advantage may not protect it. When the Romans found a Carthaginian galley washed up on the beach, they reverse-engineered the galley (the antique equivalent of modern cyber espionage) and built 200 of their own galleys. The addition of a wooden ramp with a large spike, called a corpus, that could be lowered to lock enemy galleys in place and allow soldiers to board the enemy turned a sea battle into a land battle so that well trained Roman marines could prevail. The Romans crushed the Carthaginian fleet not more than six months after the arrival of the galley on the beach. The lesson to never underestimate an expanding power's industry, creativity or determination echoes through time to today.

With the potential failure of all other options to mitigate the PLN challenge, one rapidly comes to the conclusion that America and the Western World's salvation can only come from Regan's legacy, popularly known as Star Wars. His far-sighted vision was that new technology could prevail against the masses of the Russian armed forces, and he started the quest for high-tech weapons that has continued to this day and may still yet provide a shield against Chinese ambitions.

Only recently, the USN with 261 ships announced that it believed it was 161 ships short of meeting its global commitments. How then in the increasing world of budget cuts, can the USN hold its own? Firstly, through increased automation and reducing the huge fixed cost of crews. The new and revolutionary Zumwalt-class destroyers are a fine example of this trend with reduction of crew sizes to come across the fleet. Secondly, through the widespread development of drone technology in the air, on the land and under the sea that will revolutionise both capability and the numbers of combat units, all with a reduced operating cost and a lower risk to the combat operators. Lastly, through new technologies that will revolutionise USN combat power, as long as their secrets can be protected against Chinese cyber incursions that could level the playing field. We will now look at various new USN programmes and their ability to push back against the Chinese expansion in three critical capabilities:

- Aircraft carriers
- Surface ships
- Subsurface warfare.

Without a doubt, over the next decade, we will once more face a quantum shift like maritime warfare, and the question is: "Will it be America that maintains its technological lead for long enough to hold back The PLN before 2025?" The equation of the naval balance of power will be one of quality versus quantity, much as it was in the Cold War. With China's massive manufacturing power this will require a considerable technological advantage to be maintained by the USN over the PLN.

1. AIRCRAFT CARRIERS

Carriers have been the capital ships of the oceans since 1939, especially in the vast Pacific Ocean which will potentially be the combat theatre of any US-Chinese conflict. Today America's carrier power is overwhelming; however, these ships are massive targets and far from stealthy in design. Only the two new British carriers have been designed with stealth as a primary consideration. A further extension of the stealth carrier concept is the Japanese stealth Amagi design which hints at the next stage of carrier design.

Despite the accompanying escort warships being of a stealthy design, with a non-stealthy carrier at its centre, a modern USN carrier task force become an obvious target on radar. Thus, America's carriers need to incorporate stealth in their future designs. This transition to stealth carriers will give the PLN a chance to catch up with the USN carrier strength, much as the arrival of the Dreadnought class battleship allowed Germany to start from the same zero starting point as the Royal Navy after 1906. The key question is: "Will this carrier revolution arrive before the 2025 peak or is it further into the future?" The risk is that it will arrive sooner than we think to upset the strategic balance. Carriers are useless without their planes, and in that regard, the arrival of the F35 will represent a significant increase in USN air combat power due to its stealthy nature and sensor system that can communicate with the fleet below. One other capability that can be expected to be seen shortly aboard the F35 is a powerful 25-Megawatt laser weapon that could revolutionise air combat. Notably, at present PLN fighter technology is inferior to the USN.

However, at the same time, the appearance of unmanned combat planes (UAVs) which will be only half the size of their manned equivalents may soon mean that carriers can be reduced in size and consequently, their massive 5000 strong complements could be minimised, lowering their vast running costs. This would allow double the number of carrier platforms for a similar price with the benefits of a wider dispersal of vessels and a reduction in the risk of losing a single massive carrier in one successful attack.

When both factors are taken into account, there is a high risk that the current USN carrier force may soon become obsolete. Thus, the development of the next generation of stealthy miniaturised UAV carriers could provide the PLN with a significant advantage over the USN who will be unable to build at the same rate as the Chinese shipyards.

2. SURFACE SHIPS

Carriers and amphibious forces need escort vessels to be protected against subsurface, surface and airborne threats. Without highly capable escorts a carrier is a sitting duck. In a world where missiles are becoming cheaper and more effective, the war of the future will see mass attacks that could overwhelm the art missile defences of the escorts of the high-value targets such as carriers and amphibious assault ships.

Unsurprisingly, it is the USN that is leading the world in laser technology and has now deployed its first weapon to the Gulf known as LAWS (Laser Weapon System). Such weapons rely on tracking the target and exposing the target to enough energy to destroy it then. Thus, lower powered lasers need more time on target to do the damage, while high-powered lasers need less time. Consequently, as the power output increases, the tracking time decreases and the ability to hit multiple targets in short time frames will give lasers the ability to combat mass missiles attacks, potentially making a warship or carrier group invulnerable to attack. This would be a massive revolution in military affairs (RIMA) that would at a stroke give the owners of such weapons impunity to attack, making Presidents Regan's Star Wars dream come true. Notably, the Chinese are also developing lasers that can at presently shoot down

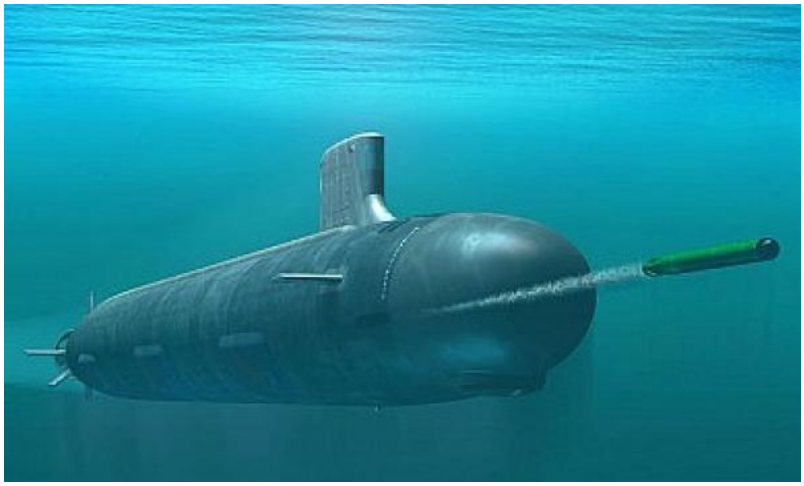
small slow moving drones rather than large fast moving hard targets. However, they will no doubt try to use cyber espionage to steal America's technological lead, and hopefully, the USN will do all it can to prevent the loss of its new RIMA.

Despite laser development costing billions, once deployed, they are very cheap to use at 0.60 cents a pulse. Furthermore, they remove the need for logistics to provide missiles to the front line and factories to build them. They also remove the warheads from the ships which cause secondary explosions when hit and which is the most devastating cause of ship destruction. Lasers are ideal for direct line of site targeting, but not effective in the long distance indirect fire mode. However, the new USN rail guns are ideally suited to such a purpose. Now enter the new Zumwalt-class destroyers that are based on new enhanced power generation technologies, and one can see the USN's vision: powerful point defence lasers making the ship all but invulnerable, rails guns to project power to 280 miles by indirect fire and radars that have the power to burn targets out of the skies. All on a platform that is invisible to radar. The result is a revolution in military affairs akin to the arrival of HMS Dreadnought in 1906.

In addition, the miniaturisation of UCAV-Ns (Naval Unmanned Combat Air Vehicles) will result in a time when surface ships will be able to extend their sensor and attack range far beyond their current horizons. As a clear example of this trend, the MQ-8 Fire Scout unmanned helicopter is currently deployed by the U.S. Navy to improve sensor capabilities.

In the future mother ships will deploy small and very fast drone fleets that will give surface fleets a swarming capability that will overcome an enemy. UAVs (Unmanned Aerial Vehicles) also have the potential to draw away incoming missiles from their mother ships using radar and infrared decoys. Meanwhile, a new generation of subsurface guard drones will give protection against their traditional Nemesis, the submarine and mine. Overall, it would seem that the USN has the advantages in this sphere of combat and will continue to do so into the 2025 peak.

3. SUBSURFACE WARFARE

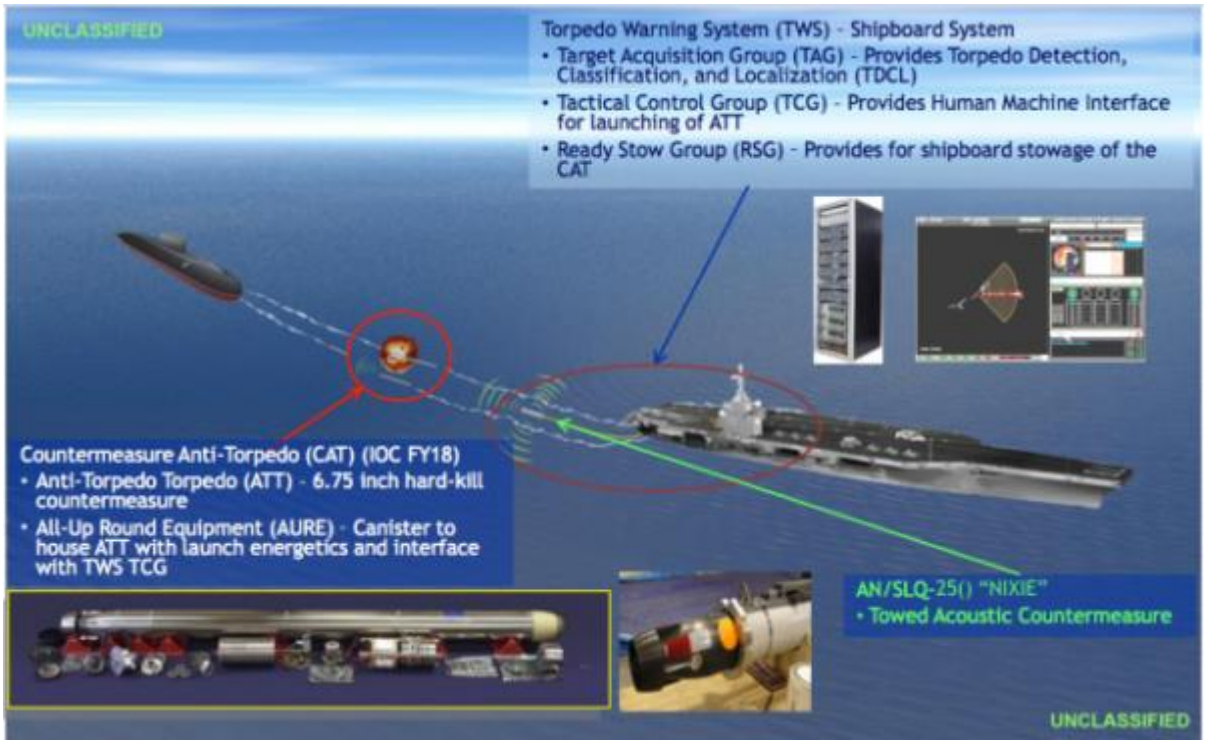


Britain and America have since 1945 produced the most effective nuclear attack submarines. The Royal Navy's Astute class subs are said to be the best in the world, followed closely by the USN's Virginia class. These subs could be an essential component, like the previous generation of U-boats, in constricting Chinese trade and hence its global aspirations. Thus, it is no surprise that the USN recently announced a deal with Huntington Ingalls and General Dynamics to build a further 10 Virginia-class nuclear attack subs at the cost of $1,8m each (just less than a B-2). The capabilities of this class will extend to hunting enemy subs and shipping, land attacks and Special Forces operations. This new order will ensure that new capable SSNs will grow the current fleet, but more importantly the continuity of America's sub building capabilities for the foreseeable future. A critical point, as only China has maintained a long-term and continuous production of submarines so vital that core skills essential for success will be maintained. This means that the USN will deploy 17 news SSNs in the next 12 years. However, it remains doubtful that this will be enough to counter the PLN expansion and its concentration in the South China Sea and along China's critical trade routes.

In anticipation of the need for force multipliers the USN and DARPA (Defence Advanced Research Projects Agency) have been running a series of programs to deploy drone submarines that will in conjunction with manned SSNs significantly enhance its subsurface capabilities. These include robotic subs that can act as mobile SOSUS (Sound Surveillance System) arrays and mine hunters. Meanwhile, DARPA says it wants its new Hydra program to explore the feasibility of building underwater mother ship drones that could launch smaller drones into the air and be used in battle. Similarly, DARPA is working with Lockheed Martin to build drones, for use on land and in the air, that will transport equipment, cars, and even containers full of soldiers underwater.

Underwater weapons are another area of development that one must expect revolutions in military affairs (RIMAs) to appear. The Russians created an underwater super cavitation torpedo that could travel at speeds claimed to be 200 knots. The torpedo in effect flies in a gas bubble created by outward deflection of water. In addition, the Russians deployed a 50

knot Soviet Type 65 wake homing torpedo which we can assume has been made broadly available with the exported Kilo-class submarines to overcome western sound decoys by running up the wake of a ship or submarine by detecting the churned up water. This makes standard evasive manoeuvres ineffective. Thus, the USN is now developing anti-torpedo torpedoes to act like point-defence systems. The program is known as the Surface Ship Torpedo Defence (SSTD) program. The tests were conducted in May on board the USS George H.W. Bush (CVN-77) by pairing a Torpedo Warning System (TWS) towed behind the ship with a highly manoeuvrable Countermeasure Anti-Torpedo (CAT) that seeks and destroys the incoming enemy weapon.



Lastly, submarine hunting by another submarine is done at a very slow pace to prevent detection, and as such, it is one of the few theatres of war were slower is stealthier. Thus, it is not hard to imagine the development of a slow moving stealth torpedo that does not give any sign of its presence before hitting an enemy submarine thus allowing the attacking sub to melt away without being discovered. Naturally, like all stealth programs such a program, if it exists, will remain black for many years to come.

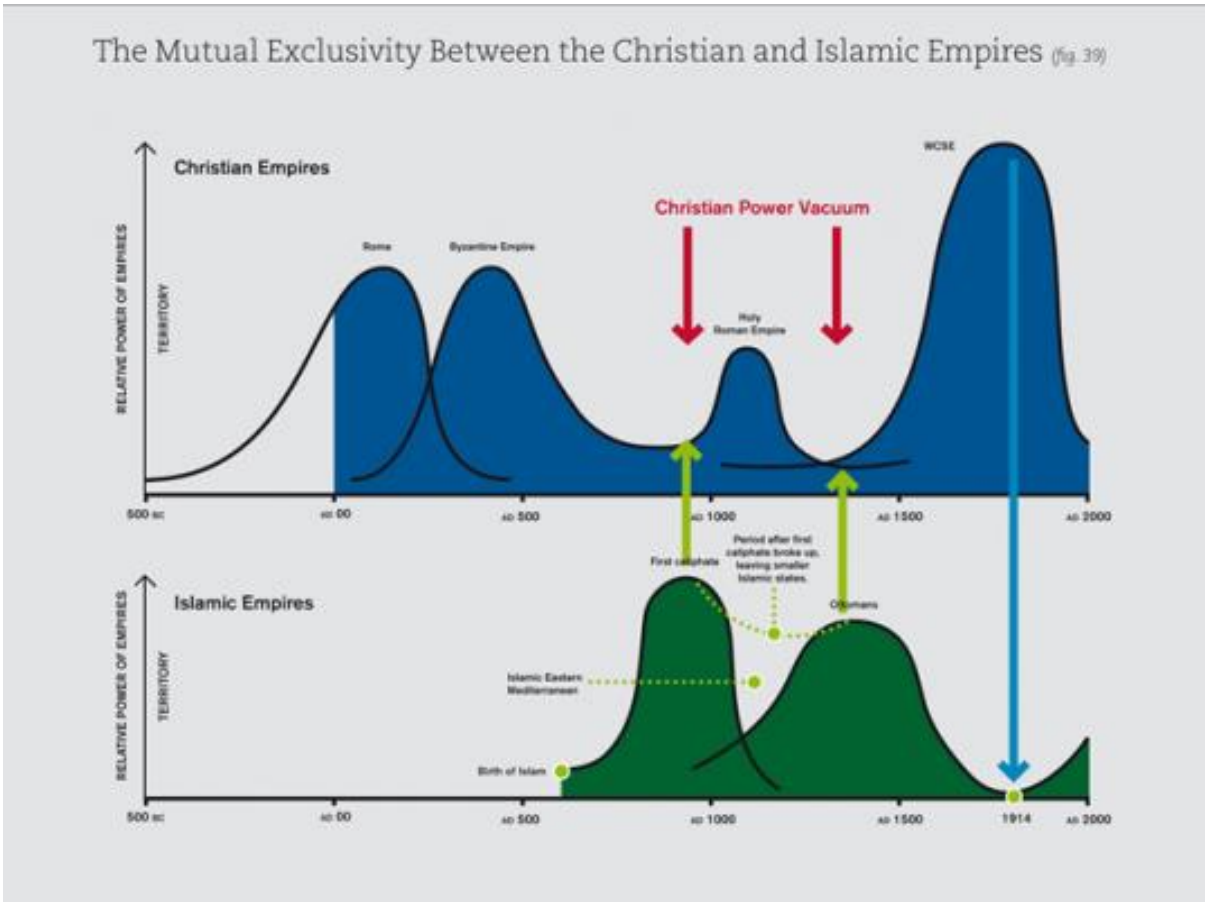
Any future world war between the Chinese (with possibly Russia as its ally) and an America led alliance (including Britain, India, Australia and South Korea) will be predominantly a maritime war with WW2's Pacific and Indian Ocean theatres as its closest historical model. During that conflict, it was the USN submarine force that destroyed Japan's maritime supply routes while simultaneously the surface fleet projected power in a long series of amphibious invasions that ultimately crushed Japan.

Similarly, it will be America and its ally submarines that have the potential to squeeze China's maritime supply routes in the event of war or the build-up to conflict. In addition, unlike World War 2 submarines, modern hunter-killers are also the best weapon to hunt and destroy enemy subs.

Thus, it would appear that one of the most decisive weapons' platforms capable of deterring Chinese aggression will continue to be the submarine platforms of America and its allies. Hence, important is not only the continuance of a technological advantage but also numbers to ensure the US advantage in undersea warfare. An advantage that has been held since 1945, and that we hope will continue well into the 2025 commodity cycle peak, when the risk of another global conflict will be at its highest in 108 years.

APPENDIX 2: THE CLASH OF CHRISTIAN AND ISLAMIC CULTURES IN THE 20TH CENTURY

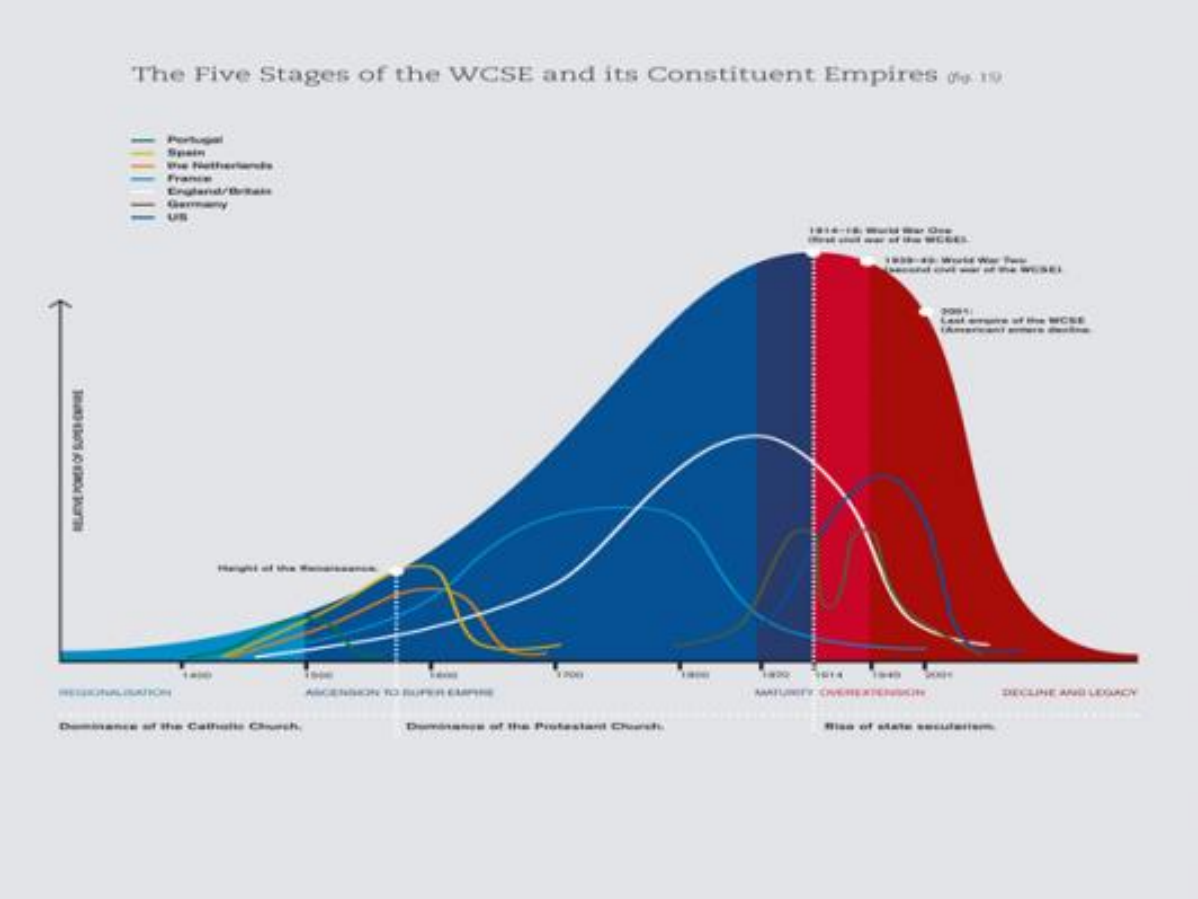
1. THE INCLUSIVE REGIONS OF CHRISTIANITY AND ISLAM



To better understand the current situation in the Middle East, one has to understand the 1500 years since the appearance of Islam and its interaction with the older Christian Religion. Both Islam and Christianity are what Breaking the Code of History (BTCH) defines as inclusive religions, i.e. beliefs that one can join by choice, rather than exclusive religions that are only conferred by birthright. As such, historically they were both able to spread their message and expand their influence across the Mediterranean, independent of demographic expansion by displacing other religions. In this way, they became the foundations of two great empire cycles that have risen and fallen with mutual exclusivity. The mutual exclusivity derives from the fact that they both shared the Mediterranean basin as their home, so when one has been strong, the other has been weak with a synchronicity that has lasted for 1500 years.

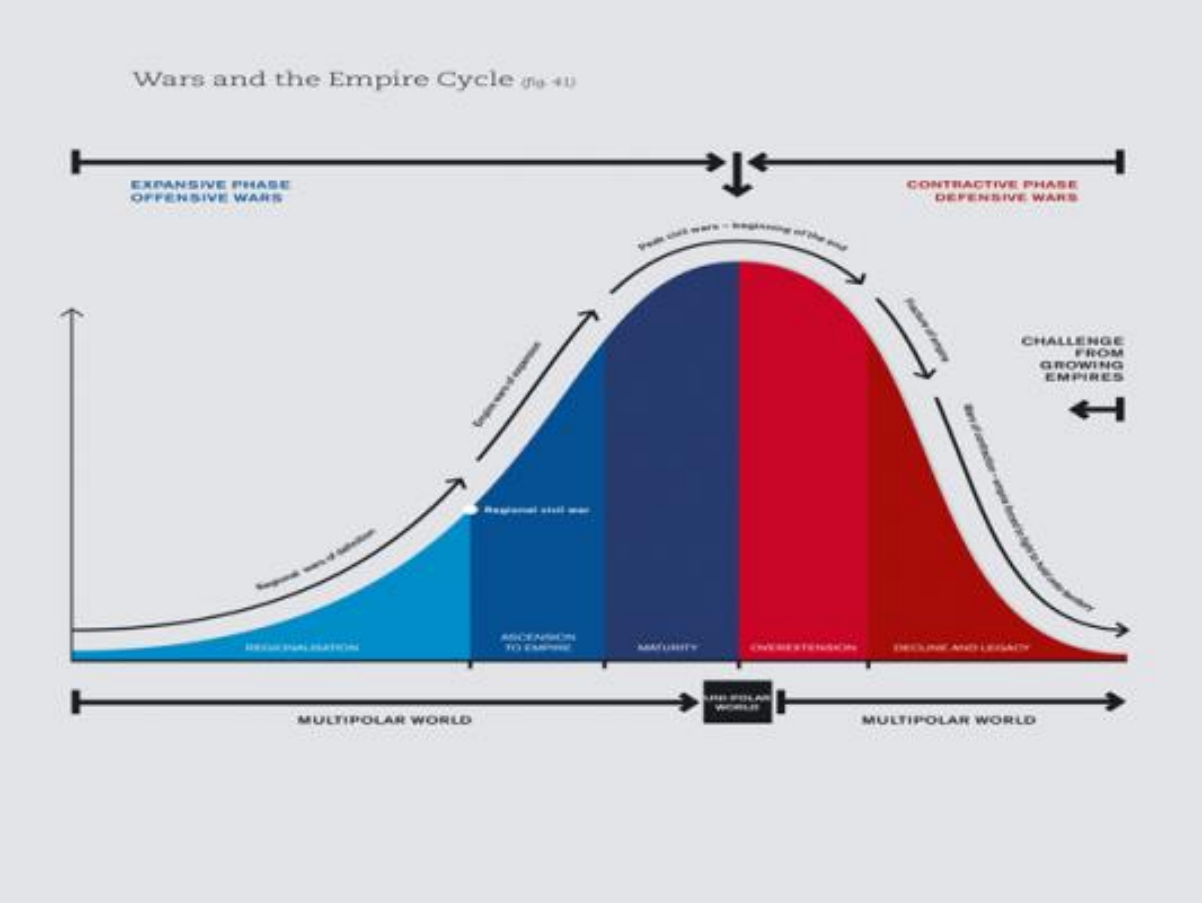
Today, after many centuries of global dominance by the Western Christian Super Empire (WCSE), America, the last of a great series of empires is in decline, and once more

synchronous to that process the Islamic world is in ascension. Hence, the wars in the Middle East and the terrorism in the West are not about a few violent radicals, but part of a much more profound clash of civilisations that has spanned centuries. The timing of such power shifts seems always driven by the decline of the dominant empire that creates a power vacuum into which other young and aspiring Empires seek to expand. Thus it is America's decline as the last of the Western Christian Empires that is dictating the rate of expansion and change in the Middles East, allowing the region to follow its own expanding cycle.



The implications of this long-term power shift are that time not on the side of the West in its struggle against Jihads' terrorism and that the West faces a multi-decade challenge that requires both short-term risk mitigation and long-term solutions focussed on the integration of its Islamic population.

2. THE ARAB SPRING



This is a somewhat misleading description of current events, which seemingly only has meaning in the Chinese culture where they view spring as a time when energy rises, which has certainly been the case. However, the key questions are: where does this energy derive from? And where will it lead the Middle East in the decade ahead? Most importantly, what strategy should the West follow to maximise its own outcomes?

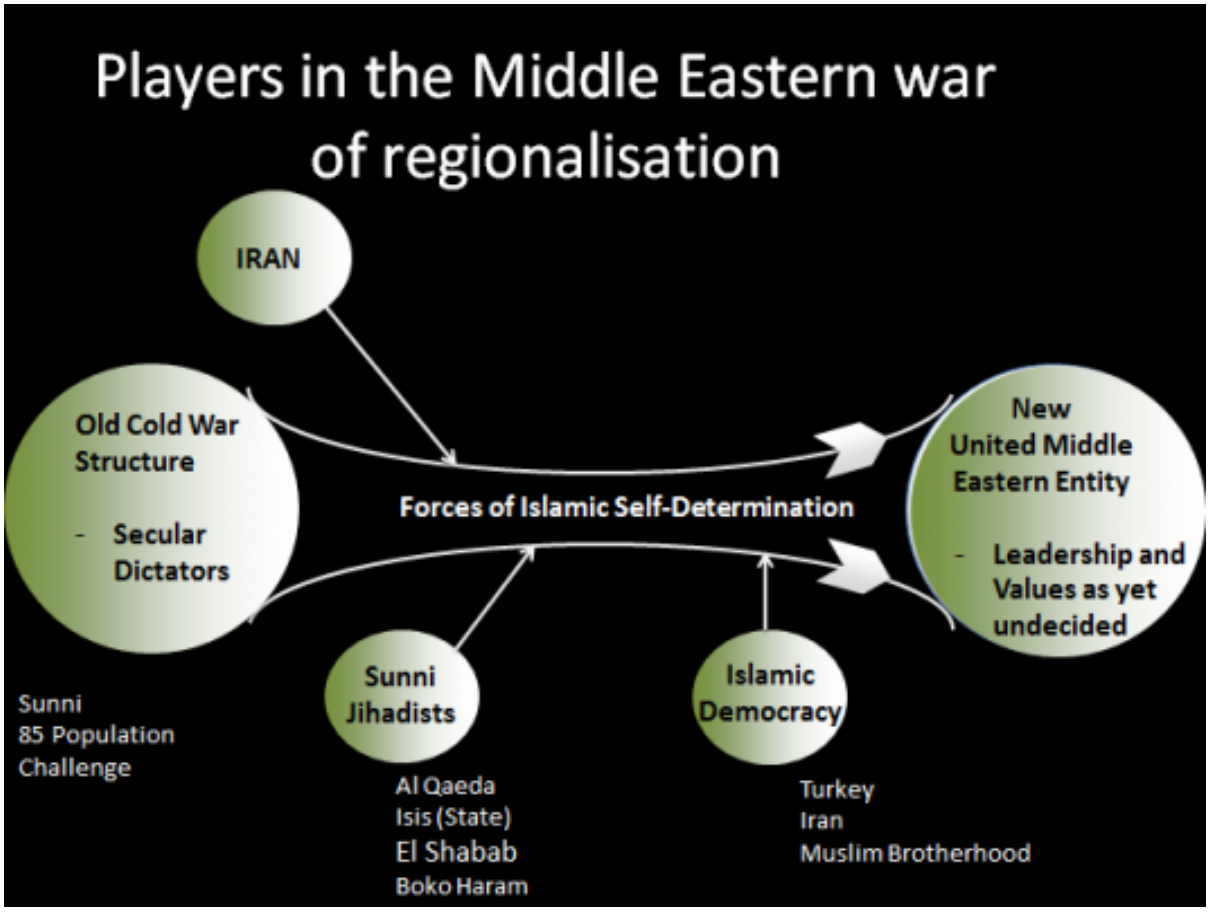
Using traditional geopolitical analysis, it appears that the region continues to devolve into the quagmire of war with multiple actors and an uncertain outcome. However, if we stand back and view the region using the perspective of Breaking the Code of History and the Five Stages of Empire Model, then the current situation and future prognosis become much clearer.

Rather than the term Arab Spring, a more accurate term would be the Regional Civil War of the Islamic Middle East, in which the Islamic system is identified as being in a similar phase of its cycle to that of the Western Christian Super Empire in its late stage of regionalisation. In the majority of systems, the end stage of regionalisation has been marked by a massive youthful demographic bulge that seeks the most effective and broadly representative values and leadership. The English Civil War 1642-51, the American Civil War 1861-65 and the

Chinese Civil War 1927-50 were clear examples of this process, and, in each case, the challenger to the incumbent powerbase represented a much broader enfranchisement of the general population. As a result, its power ultimately prevailed, and the new militarised polarised society then marched out into the world on its path to empire.

The energy of such a civil war questions all aspects of a society's internal working and leadership of the challenging system (i.e. in Britain, Cromwell was not the initial leader of the Roundheads but rose to power over the course of the two phases of the English Civil War.) This is paralleled by the sub-civil war within the Sunni powers that has created the wave of civil unrest in Egypt and Libya and now also evident in Syria. These revolutions represent the sweeping aside of old regimes with centralised leadership and narrow power bases that were linked to the Western construct. Their replacement will be a leadership that characterises a new Sunni Islamic identity and pride in a Darwinian process that is sweeping through the region.

3. Players in the Middle Eastern war of regionalisation



This regional civil war has been going on for longer than we realise. However, it has only come to our notice more recently since its expansion has threatened the West coincidental with the end of the Cold War. The conflict has gone through 2 stages.

Stage 1: The Iranian Revolution and Challenge

The Shia's of Iran rose up against Western control and created an Islamic Shia state. Once consolidated, they then went to war with Sunni Iraq which commenced Iran's bid for regional control. However, with only 15% of the region's population, to be successful, they had to win relatively quickly before the more numerous Sunni population mobilised. Thus, the Shias have lost their first-mover advantage and are now effectively on the defensive surrounded by more numerous and motivated Sunnis. Hence, their pact with the US and continued need for developing nuclear weapons to ensure their survival.

Stage 2: Mobilisation of the Sunni population

The Vanguard was the rise of the Jihadists, who were then followed by the second phase of broad-based mobilisation against narrow dictatorships. These revolutions washed away the old cold war dictatorships and sought to replace them with a new mechanism of leadership consistent with the process of a regional civil war.

With 85% of the region's population, it is inevitable that at the end of the regional civil war Middle Eastern power will be consolidated by the Sunnis and not the Shia's, much as once happened with the first caliphate, 100 years into its lifespan. Thus, the outcome of this regional civil war process will ultimately be the Islamic Middle East, governed by a single new Sunni regime. The Sunni leadership challenge falls into two categories: The Jihadists and the Islamic democratic nations.

3.1. The Jihadists

The Jihadists first appeared back in 1923 in the form of the Muslim Brotherhood (who have now rejected violence). Today, we are aware of the most prominent of these groups as Al Qaeda, the Taliban, ISIS, and Boko Haram. Though there are many smaller groups that are less well-known, collectively, they represent an extreme religious group that can mobilise and polarise the youth in the region to fight with little fear of death. But how is that possible?

One of the key patterns that can be noted in past regional civil wars is that the side that wins always has an ideology that is perceived to provide the greatest enfranchisement for the majority. This simple observation excluded the Catholic monarchy in the English Civil War, the plantation-driven South in the American Civil War and the Chinese nationalists in their civil war.

Similarly, the Jihadists provide enfranchisement for the lowest of their fighters in their connection to God, by giving them cause so righteous in their own minds that their lives are of little consequence. Before Western readers recoil in shock at this prognosis, we should remember that it was Protestant fundamentalism that won the English Civil War, an abiding belief in democracy and freedom that won the American civil war, and Chinese communism with its concept of equality that won their struggle.

Quite simply, Islamic fundamentalism, much as it did when the followers of Muhammad swept out of the desert in the 7th century, has the ability to unite more disenfranchised followers than any other belief system currently in the Middle East. Its success is just a question of organisation, effective leadership and lack of opposition. As so often seen in history before, challengers to established systems and empires are always perceived as the barbarians. In reality, due to the very nature of the relative position on the empire curve of the challenger and the hegemon, the capability gap is always much smaller than appreciated. Take the ISIS for example. It has fought Hamas in Syria and is gaining ground. Notably, Hamas is an Iranian-trained group who were able to give the Israeli army a tough time in Lebanon. Thus, we must conclude that the ISIS should not be underestimated as an organisation that comprises a strategic vision, significant financial resources, and battle-hardened forces.

For years, the West underestimated the organisational capability of Al-Qaeda, and now it seems shocked that the ISIS is so well organised and funded? In addition, the ISIS has now absorbed the resources of the Iraqi army it has vanquished and has created the first Jihadists state. An achievement that neither the Taliban nor Al-Qaeda has ever matched.

Our conclusion is that without effective western intervention, ISIS are the most likely entity that will ultimately dominate the Jihadist group, and that will in all probability not only unite Syria and Iraq into a caliphate but also will expand across the region. However, if by any chance this prognosis is wrong, then just as the ISIS sprung from Al-Qaeda, we should expect another Islamic Sunni offshoot to take its place until eventually all the others combatants are

worn down, and there is only one winner. That caveat aside, it is important to remember that the expansionary process at this stage of empire is not linear, and thus, we should not be surprised at the speed of ISIS' success and consequential expansion at this stage for the war, i.e. it is highly possible that their success continues at the current stunning pace, rapidly upturning the current Middle Eastern order.

3.2. Islamic Democratic Nations

This group may yet play a critical role in the resolution of the regional civil war. Turkey is the prime example and in anticipation of its desire to lead the region it has been transforming itself from a secular democratic society based on the Western model into an Islamic democracy under President Erdogan. Thus in time, Turkey's democracy will become more similar to Iran's which, although they have been in direct competition in the past, might bring the two nations together in an alliance against the Jihadists in the region. A potential third element to this alliance could come from the Muslim Brotherhood of Egypt who has renounced violence and seek to gain power politically through democratic means. Although Saudi Arabia opposes this group for fear of promoting democracy on its own doorstep, the US has become a supporter of the group which is a positive step forward.

However, the West should temper its expectations that Western democracy might be cloned in the Middle East as it is inevitable that Islamic democracy will appear to be very different

from Western democracy with its religious overtones. If this Islamic Democratic ideology group win the regional civil war, it will in all probability result in the formation of the Middle Eastern Union.

APPENDIX 3: THE ENGINE FOR CIVIL WARS OF REGIONALISATION

According to the BTCH five stages of Empire model, at the end of the first stage which is regionalisation, a nation or region passes through the Darwinian fire of a regional civil war. To the observer, this may look like a chaotic process, but in reality, this is just another example of natural selection at work within the human social structure. Essentially, such civil wars are about the selection of the most effective leadership that enfranchises and empowers the broadest segment of society, allowing the nation or region to ultimately grow and expand beyond its borders to become an Empire.

To better understand the nature of such a regional civil war, we can study the one currently underway across the Middles East. Most importantly, we need to comprehend the force that drives this process. Quite simply, the forces of change derive from expansive demographics, as regionalisation is driven by an expanding population which near the end of the stage creates a large demographic bulge comprised of young people in the teenage to mid-twenties. However, as this young group expands rapidly, the economy is unable to grow at the same rate and unemployment and disenfranchisement become widely spread. The result is a youthful group, which instead of seeing a prosperous future feels depressed at what lies ahead.

Faced with a metaphoric brick wall and a consequential low sense of self-esteem and depression, these youngsters then become vulnerable to new ideas that will give them a sense of value, purpose and the promise of glory and salvation, enhanced by the believe that such a course will provide a brighter future. Recruiters will look for signs of despair in

candidates at their lowest ebb and under financial pressure. Part of their toolkit of persuasion and grooming is the use of the emotions of envy and resentment to justify violent actions.

When faced with poverty and hardship, these youngsters are also prepared to risk their lives more readily than those who perceive a comfortable future ahead of them. To the latter sector of society (both within the region and on the outside), the actions of the young militants seem inexplicable, and yet they are following an inevitable logic. When the promise of an afterlife is added by employing the religious meme of Islam as used by ISIL and other fundamentalist groups, death will appear to be but a transformation to a better life, if one acts for the collective cause. In this perspective, suicide bombing has an inevitable logic that is reinforced by strong collective expectations that override individual survival instincts. These suicide soldiers are far from unique in regional civil wars, so they are not just confined to the current Islamic civil war.

This powerful social process explains why a young Tunisian, from a good moderate family, but feeling down and depressed, was successfully targeted by ISIL recruiters and ultimately committed to what we in the West perceive as the most horrendous act of terrorism. However, terrorism is not the correct description. Instead, it is quite simply an act of war. This war is one where the radical forces of Islam are fighting both, the opponents in the Middle East and also the West, to gain the pole position as crusaders for Islamic beliefs. Successful attacks against the West have a logical reward: just like people switch side from supporting a losing football team to a winning one, so will the population move towards ISIL as it becomes more powerful with every successful attack.

Looking forward, there will come a time when the civil war of regionalisation across the Middle East has been won by one side, which I fear at present could be ISIL. Once they stop fighting themselves, they will inevitably as a combat-hardened militarised society expand outwards with great energy and thus will assault the West with a much higher intensity. With this almost inevitable prospect, should the West not realise that to win the peace it has to be more proactive and that it is entwined in a generational war with ISIL as but a manifestation of the Middle East's ascendancy. Most importantly, as we did with Al-Qaeda and the Taliban, before we seem to continue underestimate ISIL, thinking of it as a terrorist group rather than an aspiring nation will be our undoing as it will prevent us from applying maximum force to achieve a rapid collapse of ISIL.

The West's vulnerability has been compounded with the infusion of Islamic cultures within Western society, making the frontline very blurred. This vulnerability will only increase with time as the rate of population growth of the Islamic subset is faster than the native populations.

So what can nations like Britain and France who face a threat from both within and outside their boundaries do? The first step is to understand the process that drives the regional civil war in the Middle East, from every perspective: how it impacts on the young men within Islamic British society and how the path leads them to what we term radicalisation, but what is really an association with the rise to their homeland along the empire cycle.

Then, said the nation should enact measures that give the Islamic young people hope and a sense of collective national purpose by strengthening an all-inclusive national identity, so it can resist impingement from other value systems and effectively enhance the collective immune system. This need to create a collective identity that is broadly and strongly held and can resist other value systems would traditionally be described as nationalism or pride in one's nation. So, it seems time that Britain and France redefine and/or clarify their national secular values and expectations of their citizens.

As to how to defend against the generic external threat from what is essentially a new rising Islamic Empire, the population is too big to blanket with foreign aid, although the UK budget at 0.7% of GDP is not insignificant. Instead, perhaps we should target critical areas that the ISIL recruiters operate in and watch and counter their moves step by step. Then, where possible, we should degrade and slow down the expansion of ISIS wherever it appears with all means at our disposal, both conventional and unconventional. This essentially means a land war to deprive ISIL of its power base and the land it has taken and occupied. Only afterwards, we need to stay long enough for a democratic nation to become secure, rather than leaving the job half done as we did in recent years. Perhaps, even giving democratic nations like Turkey and Indonesia a major role in that process might make it not been seen as an 'East versus West' issue, but rather one of Islamic extremism versus Islamic democracy.

Most importantly, the West needs to recognise that we are at war and that despite the politicians' spin tactics it never stopped. Thus, Western nations must commit to a strong defence policy and to spend much more (at least double) to ensure that we demonstrate the intention and capability to defend ourselves. This would be a clear reversal of the current signals that we are sending out with defence cuts which have made us so weak and vulnerable compounded by past half-hearted military actions. This commitment alone will raise the sense of national pride and in so doing be a part of the process that raises the bar for radicalisation to take place.

Looking further afield the Middle East is certainly not the only threat that the West faces. Thus perhaps, it would pay our Western strategic planners to look at other areas in the world that are near the end of their regional phase of Empire and ask if they too might be at risk of a civil war. Even more relevant are nations that have been through their civil war and entered

the phase of expansion to Empire and that are busy converting demographic expansion into economic and military expansion. Any guesses who that might be?