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'Dominant Air Power in the Information Age'

***The Comparative Advantage of Air and Space Power in
Future Conflict***

Thank you for the kind introduction. It's a pleasure to be invited to address this prestigious institute, and I'm grateful for the opportunity to use this influential forum to add constructively to the debate about the future of Defence both here in the UK but more widely as well.

This event is particularly timely, given the recent publication of the Green Paper and you won't be surprised to learn that I'm going to use its content and format to frame my remarks today. But right at the start, I'd like to make the assumption that you are familiar with the views put forward by my fellow service chiefs in recent weeks and, therefore, you will appreciate that what I am going to say is by its nature complementary not contradictory—although the latter might make good copy, it's not a particularly useful way forward when, as we sit here today our joint forces - air and land, made up of airmen and women, sailors and soldiers - are engaged in major fighting in support of Afghan and NATO operations in Afghanistan. Anyway, in reality, all 3 of us are in broad agreement about the vast majority of the challenges we face, although as you'd expect - and quite naturally – we sometimes differ in emphasis and our interpretation about the best ways of dealing with them. So instead, what I'd like to do this afternoon is to give you my professional view of how UK Defence can and must use the characteristics of air and space power,

to maximise the advantage that mastery of the third dimension, and optimisation of the fourth dimension, can give us to our inherent advantage in future conflict, of whatever nature. At the same time I intend to offer you perhaps some fresh ideas and alternatives about how air and space power can contribute to the UK's future defence and security needs in our uncertain and unpredictable world.

In particular, I'd offer 3 propositions. First and foremost, that air and space power isn't an optional luxury that can be added to an erstwhile military operation on the ground or at sea; rather, it provides the essential foundation for any sort of military endeavour. Air power is unique. It sets and shapes the critical conditions before and during operations on the ground or at sea. There are circumstances when air power alone has the capability to achieve the desired political or military effects, just as in the 1920s and 1990s/early 2000s. And consider those situations where the financial cost of deploying significant land forces or the risk to life is judged unacceptable or when time for action is short. In nearly all environments, not least on our current main effort in Afghanistan, airpower is an essential defining capability; so everybody has a stake in it or a dependency on it: from support for the strategic nuclear deterrent, through its critical combat ISTAR - Intelligence, Surveillance, Target Acquisition and Reconnaissance capability - and enabling roles in the air-land campaign in counter-insurgencies, to its leading part in major combat ops. My second proposition, and developing this theme, I would contend that air power is, and must be, our comparative advantage over potential opponents in future conflict. So success depends on our ability to exploit this critical advantage, through mastery of its capabilities by people who have the knowledge, professional expertise and competence to apply that advantage. Such mastery, as in any profession, requires years of training and practice and our advantage must not be squandered by non-experts who do not really understand the third dimension, or relative time and space advantage, that mastery of the air can deliver. And third and finally, my key message today is that we can do this most effectively by using air power to dominate the timely acquisition of the information, the knowledge of every aspect of the operational environment that is increasingly becoming the 'vital ground' in twenty-first century conflict.

But as a scene-setter, I'd like to begin by describing an age of austerity. The exchequer is bare, and the country is still shivering after the worst cold-

snap in recent memory. Some analysts would say that the strategic environment is as bleak as the weather and the financial climate, with an unstable world order; regular and irregular, state and non-state emerging threats to our values – and potentially our entire way of life – are becoming clearer by the day.

This might sound like 2010, but I paraphrase Lord Tedder, when in 1947 as Chief of the Air Staff, he assessed the situation in his valedictory lecture at Cambridge. He said then that:

We are shackled by the past and never has the future been more difficult to divine. What we must do is to quite ruthlessly discard ideas, traditions and methods which have not stood the test ... each of the fighting services must go for speed, mobility and economy, and develop the whole time with the other two members of the team in co-operation, not in competition.

As a prescription for what's necessary to develop a useful defence capability in an uncertain and financially constrained world, this sounds like good advice to me. The clarion call for inter-service co-operation also strikes a particular chord, as, after a good start a decade or so ago, I think the time is ripe for us to have a long, hard look at our joint institutions and processes again, to see where they need to be improved and reinvigorated. This is important, because as Lord Ashdown said at one of our joint staff courses last year, 'What you do best, you do together' – something we'd do well to remember in the febrile atmosphere of a general election and defence review.

Tedder's remarks also demonstrate that as Mark Twain famously observed, while history may not repeat itself, 'it sure as hell rhymes'. Arguably, Defence is at an equally defining moment today, where we'll also have to decide what hasn't 'stood the test', and determine how we can develop the sort of agility and economy envisaged by Tedder.

The recent Green Paper doesn't provide the answers of course, but it sets out the issues that should be addressed by a defence review. Here, I'm conscious of Voltaire's remark about the Holy Roman Empire, when he pointed out that its most significant features were that it was neither holy, nor Roman.

[pause] Similarly, I think we all realise that the coming Strategic Defence Review must consider the widest definition of 'Strategic'. It'll have to be conducted whilst we are in contact with the enemy and delivering success in Afghanistan in the short term - an important point and one we must not, not any of us forget in what we say. But critically, at the same time, in the Defence review, we must address the longer-term challenges associated with a genuinely strategic review, looking out to a 10-15 year horizon and not just 10 to 15 months.

This distinction is important. It's absolutely true that Afghanistan remains defence's main effort and the focus for our thinking. This is the war we're fighting now, and a war that we must win: we must do whatever's necessary to bring it to a successful conclusion. This is why the short-term reprioritisation of the defence programme announced in December was fully supported by all 3 service chiefs. As an airman, I welcome the capability uplift that was announced. Equipment like the extra Chinook helicopters, the additional C-17 strategic transport, more Reaper remotely piloted aircraft systems and enhanced defensive aids for our tactical airlift will all significantly improve our in-theatre capabilities.

But we must also be quite clear that this package of measures is required for the specifics of the campaign we're involved in now, and for the particular way we're fighting it – in Afghanistan, we are where we are. But in contrast, a *Strategic Defence Review* will shape our future structure and determine the equipment programme, with implications that will resonate for at least the next 2 decades. So for the sake of our future security, as CDS recently observed, Afghanistan must serve as a *prism* to view the future, not as a *prison* for our

thinking.¹ A bespoke counter-insurgency force with niche capabilities won't provide policy-makers or political decision takers with a flexible military lever of power for the mid to long-term; it will limit choices and reduce our options for the future employment of force whether that force be committed to fighting or flying coercive or preventative missions over an area of concern or the deployment of a credible carrier-strike capability to demonstrate our ability to act if required . Even if we're faced with conflicts that are similar in character to Afghanistan in the future – and as the Green Paper makes clear, this isn't certain – we cannot assume there'll be the political or popular appetite to fight them in the same way again,

So we need to think very carefully about whether our 'Afghanistan' era force structure is a model for the future. Do we want – and need – to put all our eggs into this particular basket? Where would we fight a major, low-tech counter-insurgency again? What is inescapable is that wherever possible, we need to acquire agile and adaptable capabilities that are appropriate for what we're doing now, but aren't so specialist that they don't have utility in other forms of warfare and do not limit our ability to conduct other critically important operations. In other words, we must develop for the future. not merely reinforce our capabilities to meet today's or yesterday's requirements.

And with the right sort of adaptable capabilities and an imaginative approach, I believe that in some circumstances we can limit our political liability and still meet policy objectives without the large scale commitment of 'boots on the ground'. I don't buy the argument that mass on the ground necessarily buys consent as in Rupert Smith's 'wars amongst the people', or is appropriate for all campaigns. There are few historical examples to support the case convincingly, and it has been suggested by some commentators that in Iraq for example there came a point when the presence of foreign forces amongst the people became part of the problem, rather than part of the solution. Unfortunately, it's only too easy for a foreign contingent to be portrayed as an alien and occupying force; it's much better for the majority of

¹ CDS, *RUSI Lecture*, 3 Dec 09.

'boots on the ground' to be indigenous, supported and assisted by appropriate and highly trained specialists and Special Operations Forces with access to the higher-tech capabilities – including air and space power – that are difficult for local security forces to acquire and operate.

The real lesson of our recent experiences in Iraq and Afghanistan is not that we need to prepare ourselves to do the same thing again in the same way, but with greater numbers, rather that we need to look to develop real alternatives which maximise our technological, especially our third and fourth dimensional, advantage, and that give politicians and commanders smarter ways and options to achieve our objectives. We must look to harness all of the available levers of power - military and non-military - to resolve crises and secure our national interests, while limiting our own risks and liability. This means exploiting the areas where we have a comparative advantage; relegating large-scale counter-insurgency operations to be the last resort, not the only option open to us, because of the way we've structured our capabilities.

I'd like to develop this idea by demonstrating where I believe air power provides a comparative advantage in relation to the capabilities of potential adversaries. The Green Paper draws heavily on the excellent work of the Development, Concepts and Doctrine Centre on the *Future Character of Conflict*. It predicts that the future battle-space will be *congested*, with forces drawn into densely populated areas; *cluttered*, where targets will be difficult to distinguish; *contested*, where access will be disputed and we'll have to fight for the freedom to manoeuvre; and *connected*, through the media and cyber-space, and where critical nodes of communication and virtual networks will provide essential capabilities, but will also represent critical vulnerabilities.

To me, there are 2 real implications of this analysis: first, the enduring importance of Control of the Air, to guarantee access to contested theatres of operation and the freedom to manoeuvre when we get there; and second, endorsement of the strategy that we've adopted in the RAF to put combat ISTAR at the heart of our activities. This has involved switching the focus of

our combat air elements from a pure kinetic focus to the delivery of an adaptable, multi-role, 'Combat-ISTAR' capability. This multi-role aircraft based capability gives maximum agility and underpins the intelligence-led operations that will take centre-stage in future complex and ambiguous battle-space with a range of kinetic effects from 'shows of presence' through demonstration of capability to swift, discriminatory and assured precise attacks on critical targets. *[pause]*

I'll deal with each of these themes in turn.

In terms of Control of the Air, our asymmetric advantage is all about domination of the third and fourth dimensions – we and increasingly all military forces simply couldn't operate without access to air and space based capabilities, and this dependency will only increase in the future. If you dispute this bald assertion, just consider what a day without air and space capabilities would look like: both for our armed forces on operations, but more broadly, for the security of the whole nation. Our military systems – including secure communications and targeting - all rely on the precision navigation and timing function provided by space, as do all nine elements of our critical national infrastructure; for example, you can't even withdraw cash from an ATM without the time signal from GPS. And just look at what the RAF contributes in Afghanistan every day: air mobility and resupply; aero-medical evacuation; over-the-horizon fire-support provided by manned and remotely piloted, on-call, combat air assets; a whole constellation of ISTAR capability, from space to SIGINT; and the list goes on. This is why it's wrong to think of Afghanistan as a low-tech or purely land operation; in reality, it's an integrated air-land partnership, where the land component provides most, but not all, of the manpower and presence on the ground, and air power the critical enabling effects: situational awareness, vital mobility and, when necessary, decisive and precise firepower.

In a sense, as airmen we've been victims of our own success, because all too often, control of the air is now considered as a 'free good' that doesn't require any investment. This is a really dangerous assumption, because

control of the air is non-discretionary; ultimately, it's the cheque written by the nation, and we, the RAF, have to retain the ability to cash it. Although we can secure control of the air in partnership with our allies, especially on expeditionary operations, there are many such aspects where we have to retain national capabilities, because we simply can't presume that access to the air and space will be provided by right as part of the 'global commons'.

One of the most vivid direct threats to national security is a 9/11-style event, with a hijacked airliner being used as a suicide bomb, but with the 2012 Olympics approaching, it is not the only one. The RAF's most important and enduring duty – notwithstanding current operations in Afghanistan – remains the control of the air above the UK, to ensure that the country is as safe as practicable from aerial attack. We retain Tornado and Typhoon fighters on quick reaction alert to counter this threat, ready to scramble within minutes, and with the speed and capability to quickly respond wherever required. Some might unwisely question the requirement for such capability and readiness in the 21st century; but they may be surprised at the number of times our fighters are called to alert, and indeed scrambled, to check-out aircraft be they civilian or Russian that enter the UK's airspace without proper authorisation or identification. The fighter aircraft are supported by a team of military and civilian personnel that operate a network of air defence and air traffic control radars and provide air surveillance information as well as the command and control of any scrambled fighters. The RAF's air defence capability to detect and deter aircraft approaching UK airspace is just one layer of a multi-layered approach that the UK Government takes to protect UK and NATO-monitored airspace.

You will have read reports at the weekend about the increasingly tense situation around the Falkland Islands as the competitive desire to extract natural resources intensifies. Against this background, you will hardly need me to remind you how our own surface forces are vulnerable to potentially debilitating attack without control of the air. The disaster at Bluff Cove in the Falklands War, with the subsequent loss of *Sir Galahad*, is a stark reminder of

the consequences of the failure to gain control of the air. Even if our opponents lack their own aircraft, they'll still contest control of the air, because they recognise its importance. They may use sophisticated air defence systems, like the Serbs did in the nineties and the Iraqis in 2003; or small arms and ground fire, like the Taliban use today. But we must not get fixed. In the future our adversaries may use cyber attack against our networked systems; indeed our national computer systems are under constant and intensifying attacks today. But our current enemies are already using effective information operations and propaganda (via the cyber-net) about civilian casualties to try and influence our public's opinion and thus constrain our activities – in short, they'll use every possible means at their disposal to try to deny our freedom to use air and space power as we choose, because they understand that, if and when it is used effectively, it's our comparative advantage.

This brings me to the paradigm-shift that we've implemented in the RAF to establish Combat-ISTAR as a core competency. We know our future adversaries – both state and non-state - will be highly agile and have access to and the use of sophisticated capabilities. In this sort of environment, information is critical, 'time is a weapon', and we need to use air power's ability to exploit the fourth dimension to take advantage of fleeting opportunities as they arise. Our own strategic analysis completed in the last few months has indicated that we needed a conceptual change in direction, switching the emphasis from pure precision attack – which we've successfully honed into a highly effective capability over the last couple of decades - to focus more acutely on exploiting the information space, whilst retaining the ability to act immediately thus generating the tempo required for success. This is the heart of the airpower Combat-ISTAR concept, and its importance is reinforced by air power's unique interaction with a wide range of other users. Everybody has a reliance on air and space power: not just the other 2 services, but also our multinational partners, other government departments, and the non-government organisations and agencies we work with on operations. Unsurprisingly, while some of these 'customers' of air power need the assurance of precise and proportionate firepower, or access to air lift and

mobility, what's common to all of them is a thirst for the insight provided by the ISTAR produced by air and space.

Accurate and timely information has always been critical to the military, but its importance is increasing as societies become more networked. This is intimately linked to developments in space and cyber-space; as we saw in the conflict in Gaza in early-2009, operations on the ground were paralleled by operations in cyber-space and an info ops campaign that was fought across the internet: the Israeli Air Force downloaded sensor imagery onto 'youtube', 'tweets' warned of rocket attacks and the 'help-us-win.com' blog was used to mobilise public support. The exponential growth in the availability of information means that we must understand how to deliver and protect our national interests in the cyber domain, and although this is clearly a cross-government issue, Defence has a legitimate interest in the development of offensive and defensive cyber capabilities. This requires a cadre of people who can understand and manage the modern networked environment, and are comfortable with the concept of information as a capability in its own right. Here, the organizational culture of the RAF is a real strength. We have a tradition of networking, driven by the particular requirement of air operations for timely information, which runs from Fighter Command's air defence system in the Battle of Britain so critical 70 years ago this year, to the efforts being made to create the best possible intelligence picture to counter IEDs in Afghanistan today.

Space is similarly vital to both military operations and wider society. Inevitably, resource constraints may mean that we'll have to continue to rely on alliances and partnerships for access to space, leveraged through influence and specialist knowledge. The RAF has forged important relationships with the US and has developed the British Military Space Operations Coordination Centre to enable all 3 services to understand and exploit space power more effectively. Equally, it is the RAF which provides the core of the management of the MOD's SKYNET satellite constellation enabling strategic comms across the globe. However, the extent to which the UK relies almost entirely on third party capabilities is a potential cause for concern. Arguably, we should cast

the net more widely in looking for partners, and also monitor the technological developments that may offer affordable space capabilities; advances in miniaturization and lean manufacturing techniques have already enabled UK companies to develop 'small satellites' at an attractive opportunity cost. What is certain is that space is becoming a contested domain, and we must develop a concept of operations that acknowledges this. The extent to which the UK ultimately invests in space capabilities depends on our understanding of the requirements and affordability of potential solutions; within the defence sector, the necessary expertise to do this lies with the RAF's space specialists. Whatever the analysis. It is clear that we cannot ignore this vital part of the battlespace and its potential to give us that all important comparative advantage.

To maximise all of these capabilities – Combat-ISTAR, space and cyber - together coherently, a robust structure is required. Please forgive me for drifting even further into the wonderful world of military acronyms, but what's needed is a robust and effective C4ISTAR organisation: that is Command, Control, Communications, Computing, and ISTAR. Clearly, this needs to be joint, because the Information Domain is inherently joint, and it also needs to be linked to the other government agencies involved in the space and cyber domains. As I've explained, the RAF is well-suited to take leadership in this area: because of the expertise and capabilities air and space power brings to the table; and because as airmen, the traditions of networked operations and managing information are embedded in our DNA.

We're already taking this forward in our strategy work on Combat-ISTAR, space and cyber. In the shorter term, RAF 2 Group is leading in developing more coherence across the ISTAR sector on current operations, and we're seeing the fruits of this work in operational practice. In Afghanistan, highly effective networks have been developed. Strategic, wide-area search capabilities, like ASTOR or Nimrod R1, are being used routinely to cue Combat-ISTAR platforms, like the Reaper remotely piloted aircraft system with its high-resolution but narrow field-of-view sensors, onto targets of interest. This in many ways demonstrates the seamless integration of air, space and

cyber power that I've been talking about; Reaper is only the 200-mile physical capability at the end of an 18,000-mile space and cyber link stretching back to the Continental USA and forwards to analysis units here in the UK.

To my mind, the real implication of the Green Paper's analysis of the future character of conflict is that our success in combat will depend on accurate and timely information, underpinned by the agility delivered through highly reactive, flexible and adaptable capabilities. Air power enabled Combat-ISTAR is central to this capability; and the shift in mind-set we've made to accommodate it has profound implications. An asset such as the Joint Strike Fighter, for example, should be regarded primarily as a hugely capable comprehensive ISTAR hub sitting at the centre of a C4ISTAR network, but providing the option to deliver near real-time kinetic effects through its organic Control of the Air and Attack capabilities.

This obviously chimes with the Green Paper's emphasis on adaptability and versatility. Of course, by its very nature, air power has always provided flexibility and agility in spades: it can be easily scaled, and it can deliver a range of effects across theatres and between theatres: often on the same sortie. I don't want to talk in too much detail about kit, because air power is about capabilities, not just the platforms that deliver key parts of those capabilities. But I do want to give you a feel for the versatile and scaleable options that air capabilities can provide. Let's look at Tornado operations over the last 20 years to demonstrate the flexible options that a combat air capability offers; not just to defence, but to meet the UK's security needs more broadly. Again, this is an example only, and it's the capability that's important, not the platform – other current or planned combat air assets, like Typhoon and the Joint Strike Fighter, and remotely piloted aircraft systems such as Reaper, will provide the critical flexibility in the future, as part of a sensible, adaptable, Combat-ISTAR capability-mix.

The Tornado was designed as a Cold War bomber and it wasn't cheap: the unit price was £20 million in the 80s. But that investment in technology bought the capability that's underwritten the Tornado's unprecedented ubiquity

across the whole spectrum of conflict for nearly 30 years. The Tornado exemplifies what Joseph Nye calls 'smart power'. On the one hand, it's enabled us to provide soft power or 'influence' effects, supporting foreign policy objectives by threatening, persuading and cajoling without recourse to physical force. But on the other hand, when necessary, it's been capable of delivering hard-edged force to destroy, deny and coerce. This is important, because soft or perhaps better defined as influence power only works if it's backed by hard power. The demonstrable and credible comprehensive capability that combat air elements, such as the Tornado, provide buys us influence – both with potential enemies, as a tool of conventional deterrence, and with our friends, partners and allies, who respect the significance of the contribution that we're able to make.

Let me give you a few practical examples. In 1990, the Tornado was initially used as a deterrent, deploying to the Gulf within 72 hours of the invasion of Kuwait. This helped to prevent a further Iraqi incursion into Saudi Arabia, limiting the crisis and reassuring our regional allies in the Coalition that was forming. But when coercion was necessary, the Tornado Force played a key role in the highly successful air war that followed, setting the winning conditions for the 100-hour land operation that liberated Kuwait. Subsequently, the Tornado has been used on 2 other occasions in high-intensity, top-end warfighting: in the Iraq War of 2003, and in the Kosovo campaign in 1999.

In these last two examples, the point to note is that air power doesn't just provide a 'single-shot' capability to defence. Between 2006 and 2009, we found that it was very difficult to run major land commitments in both Afghanistan and Iraq concurrently. In contrast, air power gives decision-makers easily scaled, discrete and flexible options to generate influence on a much wider geographically spread and sustainable basis. So in 1999 while some Tornado squadrons were conducting intense operations in the Balkans, at the same time, and on another continent, other Tornados were being used in a so titled low intensity, air policing role, enforcing the no-fly zones over Iraq in an operation that lasted for nearly 12 years, flying over 300,000 missions in

conjunction with the US Air Force without a single casualty. The threat of air power was used to persuade and cajole, preventing Iraq from again becoming a regional aggressor and constraining Saddam Hussein's ability to oppress his own people – without the necessity for a presence on the ground of a large force, and so limiting our own political liability and financial costs considerably. And the flexibility of air power means that it can be quickly and easily scaled. So when necessary, and as demonstrated in December of the previous year, air policing – providing a deterrent presence and surveillance capability – can be converted into more aggressive air strikes on carefully selected targets, encouraging compliance or punishing transgressions.

I think it's now doubly important that we understand air power's ability to provide different options for creating influence, as we're effectively 'fixed' in Afghanistan, at least for the short to mid term. We'll have to look for alternatives to larger-scale land deployments if we want to influence any crises requiring a military response for at least the next 3 to 5 years; and we'll also need to maintain credible conventional capabilities to deter potential adversaries who might otherwise feel free to act, because they know the extent of our commitment in Afghanistan.

Carrier-strike obviously offers one such capability and, in principle, I support it as one of the clubs in the golf-bag of options available to us. Yes the opportunity cost may be high, but if this country wants to have the ability to demonstrate its will and capability to engage on a global-scale, then it is entirely arguable that we should have such force elements. Whilst the nature of carrier operations means that the effective range, payload and weight of effort of carrier-based aircraft is markedly reduced in comparison to land-based contemporaries, carrier aviation can be useful in key scenarios and it would give us options. Nevertheless, in our joint operational concept, Carrier Strike aircraft would be deployed to operating bases on land as soon as practicable, to maximise capabilities and minimise costs, in accordance with the principle enshrined in current defence policy that land-basing aircraft is preferable.

Finally, as you're aware, the Tornado is currently being used as our primary counter-insurgency, Combat-ISTAR platform in Afghanistan. The capability of the airframe means that it's been relatively easy to expand the weapon-load options, so that unique flexibility exists to make an appropriate, proportionate and discriminate response in any situation, while minimising the risk of collateral damage or civilian casualties. And a high resolution targeting pod has been added, so the Tornado can provide a genuine combat-ISTAR capability, data-linking video imagery to troops on the ground in real time and attacking a wide range of targets including high-speed mobile ones. Critically the ability to provide comprehensive photographic and Infra Red images of the whole Sangin valley in 45 minutes and employ its targeting sensors, launch precision dual-mode seeker Brimstone missiles, and use the internal cannon, all on the same sortie and over a very wide geographical area, demonstrates the value of genuine multirole Combat ISTAR aircraft.

This brief history of Tornado operations over 2 decades, in very different conflicts and very different circumstances, is the essence of the 'chameleon-like' adaptability that commentators like Michael Clarke demand of our armed forces. *And the Tornado's ubiquity illustrates the pitfalls of specialising too deeply in niche capabilities.* It has been argued in the media that turboprop light attack aircraft could be used to replace fast jets in our combat air inventory. But this would cost lives, because light aircraft just don't stack up, in terms of speed of response, flexibility, size of weapon-load carried and essential protection and adaptability that is required across the full or even most likely scenarios when compared to more adaptable aircraft such as the Tornado or Typhoon. We simply wouldn't be able to guarantee meeting the current standard for air support with a less capable aircraft: even if a fast jet is held at ground alert, it can be airborne from Kandahar and overhead Musa'Qala in half the time it would take the relatively slow, remotely piloted air vehicle or an attack helicopter already on station to fly from one end of the Sangin Valley to the other. And of course, Afghanistan isn't just about Helmand. The speed and reach of fast jets means that they're routinely employed across the entire country on every sortie, providing air support to other ISAF nations and Afghan security forces as well as to our own troops

wherever that support is most urgently needed at the time; in other words, fast jet based combat-ISTAR is not performance or technically limited to a small geographical region it is capable of being in many different locations, depending upon the priorities, on the same sortie. Such support for allies and partners would simply not be possible with bespoke capabilities capable only of local effect; and at the very least we'd lose significant influence and authority within the coalition as a result.

Finally, as I've explained, the niche COIN mission that the Tornado is currently filling in Afghanistan is just one of the roles it's been called on to perform. On every other occasion when it's been used over the last 25 years, a light attack aircraft couldn't have been employed, because it simply wouldn't have been able to survive in the face of even rudimentary air defence systems. Such aircraft are only practical in the most benign air environments, and even in future counter-insurgencies, their utility would be limited, as we can expect to face proxies with access to high-tech weaponry, including highly-capable, man-portable air defence missiles provided by sponsor states. The experience of the Soviet Air Force is instructive. Its low and slow aircraft and helicopters were quickly removed from Afghan skies in the 80s when the Taliban acquired Stinger missiles, and this could be said to have had a disastrous affect on the entire campaign; and they never did gain control of the air over Georgia despite their completely mis-matched size of military forces.

I'd like to make it quite clear again that I'm not arguing for high tech 'boys' toys': my concern is about capabilities, not simply the platforms that deliver them. We all know that tough choices will have to be made about our future force structure in the coming Defence Review, and one solution could be to go down the route of low capability, niche specialisation, optimising our force structure purely for the war we're fighting now. But I've explained the implications of this choice - we drastically reduce our options, increase risk, and commit ourselves to a future of low-tech warfare that may be neither desirable, nor politically or publicly acceptable. So ideally, we need to avoid simplistic, 'either-or' binary choices; real flexibility will be provided by a sensible capability-mix, giving us the combat power we need now in

Afghanistan, but future-proofed – as far as possible - by adaptability and judged by consideration of through-life capability and cost-effectiveness, not simply the spot purchase price.

I'll end where I began - with Lord Tedder. I hope I've made it clear that the sort of paradigm shift he advocated is already well underway in today's RAF, as we restructure ourselves into an agile and adaptable air power capability for the 21st century with Strategic and battlefield mobility and Combat-ISTAR at its heart. This process will accelerate as we get to grips with the implications of space and cyber-space, the 2 emerging domains identified in the Green Paper, and where the RAF is well-suited and prepared to be the lead Service for Defence. I'm convinced that this more holistic approach will give us the ability to exploit the comparative advantage that air and space power provides, so that we can get on the front foot in the information domain – and this is how we can achieve the 'speed, mobility and economy' that Tedder proposed so long ago. Just as importantly, properly applied by professionally trained and experienced air power practitioners who fundamentally understand the air and space environment, it will also provide genuine, enduring, policy options and real alternatives for our decision-makers. In a world 'beyond Afghanistan', I believe that it will be air power's ability to maximise its comparative advantage in the third and fourth dimensions and to dominate the information space that will underwrite its future utility as a useful, credible, viable and essential tool in both the influence and hard elements of national power.

Thank you for your attention – I look forward to taking your questions.