Chief of the Air Staff – Defence and Security Equipment International speech

At DSEI in 2019, I talked about the importance of adapting at pace to meet the threats of the future. That's as relevant today as it was then; the key difference now is that my aspirations are supported by a mandate from government and a £24.1bn increase in Defence spending over the next 4 years. For the Royal Air Force, this offers a once-in-a-generation opportunity to build an air and space force fit for the future, able and ready to act decisively on a global stage, protecting our nation.

To achieve this, it falls to me to implement and deliver the Government's intent at pace: to transform many areas of our business, to overhaul our culture, to drive forward cutting-edge equipment programmes, and to make tough calls to retire equipment that has increasingly limited utility in a modern battlespace.

I need not labour the point to this audience but the revolutionary nature of air and space technology has always been about cooperation across government, industry, academia and the entire Defence and Security supply chain. Today, in this hyper-connected world, that collaboration has never been more important, enabling us to think innovatively, disrupt accepted norms and find novel ways to transform what we do.

The Royal Air Force has a unique relationship with our world-class aerospace and tech industries, reflecting your vital role in our security and prosperity. The combat air sector, for example, employs 46,000 highly skilled people, has a turnover of £6bn each year and makes up 85% of UK Defence exports. I want to take that relationship to a new level, building on those established partnerships as well as harnessing the innovation and agility of the UK's small and medium enterprises and the cutting-edge technologies they create.

The Defence and Security Industrial Strategy is the basis for that new level of partnership with industry. It will ensure we have competitive, innovative and world-class defence and security industries that underpin national security now and into the future. It sets the foundations for reform of our acquisition and procurement policies, strengthening sovereign industry productivity and resilience, driving technology pull-through, and cohering our approach to international cooperation, exports and foreign investment.

Above all, I want to tap our shared collaborative energy, to innovate faster and to make the technological leaps the strategic context demands.

I have said before that the Royal Air Force was the 20th century's original tech start-up. Our founders in 1918 were innovators and disrupters who had discovered this amazing new technology, understood its limitless potential,

and had to rebel against the organisations they were part of at that time – the British Army and the Royal Navy – to properly harness that technology. That innovative and disruptive gene is still part of our Royal Air Force DNA, and it has been throughout our history, not least in 1940.

I couldn't stand on a stage today and not mention that 15 September is Battle of Britain Day. The Battle of Britain was one of the most decisive battles of World War II, Hitler's first strategic defeat, and the first decisive battle in history fought entirely in the air. Whilst we focus rightly on the bravery and skill of Churchill's immortal few, the Battle was a collective national effort across the population, from the thousands of people working in factories to supply the aircraft and equipment so desperately needed at the frontline, to scientists inventing the world's first radar network.

And this is where that innovative and disruptive RAF gene comes in because radar, like any technological innovation in isolation, is not enough. It's what you do with it that matters.

In 1940, the Royal Air Force fielded what was then a truly ground-breaking new technology. But the Germans had radar too. In working out how to employ this novel capability, the RAF had two options: focus on Radar's primary function – to detect enemy forces beyond visual range, or, consider why radar matters and how it might dovetail into a vision of a broader integrated detection, command and control system. The decision to think through the why and not just the what, was decisive. By contrast the Germans' early use of their technologically high-quality radars was relatively inept because the wider conceptual thought as to why radar was significant was missing; and the rest is history.

The technology alone was not enough; it's the culture of your organisation allows you to do with it that really makes the difference.

So, with that point in mind, over the next few minutes, I'm going to give you a taste of some of our current equipment programmes and where we owe it to our successors to be as innovative and disruptive as our forebears were in 1918 or 1940, or throughout our history.

I'm going to start with Air Mobility and I'm going to start that by expressing my utmost admiration for what our Air Mobility Force achieved to extract over 15,000 people from Kabul last month. Aircrew, groundcrew, movements support, industry and of course the cordon and process established on the ground by 16 Brigade, the Joint Force Headquarters, Government colleagues and our international allies.

It was the largest Royal Air Force airlift since Berlin in 1948. Up to 5 x C17, 3 x Voyager, 2 x A400M and 2 x C130J were involved on any day, and we flew 84 sorties out of Kabul, we supported people from 38 countries. We saw bravery, immense good judgement, professionalism and overwhelming compassion. As an Air Chief, I could not have been more proud of our Service and I am sure I speak for everyone in this room in saying that.

We right celebrate the role of our people on that mission, but the operation

confirmed too the adaptability of Voyager, the cavernous utility of the C17, it demonstrated yet again why Hercules has been our workhorse for over 50 years, and it was our first real taste of the remarkable operational utility of the A400M Atlas.

The Integrated Review recognised the potential of the Atlas and week by week we are expanding its operational clearances ready to take the load, literally, from 2023.

Disaster relief operations in the Caribbean, Indonesia and Mozambique have already shown us that each Atlas can take the equivalent of three Hercules freight loads into harm's way. Atlas is already capable of airdropping more stores by weight than any RAF air transport aircraft that preceded it. We have cleared Atlas to operate from unprepared strips such as beaches and desert; and this week it has been conducting its first Air to Air Refueling sorties, with the RAF's Voyager tankers, further extending its already eyecatching reach.

As we expand Atlas's operating envelope, the temptation would be to read across tactics and procedures directly from the Hercules. To do that would be an error and a failure to capitalize on everything this remarkable aircraft offers; its performance and capability demands an entirely different approach. The technology alone is not enough, it's what the culture of your organisation allows you to do with it that really makes the difference.

During the Kabul evacuation, we had tremendous availability and reliability across all our platforms, not least the C17s. Our 8 aircraft have been in service with the RAF for 20 years this year, and I'm delighted we've just announced another £324 million upgrade programme, enhancing its communications, cockpit displays and parachute delivery systems. That will also mean an additional 50 jobs at RAF Brize Norton and, above all, a massive vote of confidence that our strategic airlifter will be in service for many more years to come.

Our approach to this year's Integrated Review was about the threat, the utility of air and space power, and about technological innovation. In those terms, we would all recognise the strategic significance of the £2bn investment over the next four years in the Future Combat Air System that will begin to replace Typhoon from the late 2030s. We're taking a revolutionary approach, looking at a game-changing mix of swarming drones, and mixed formations of uncrewed combat aircraft as well as next-generation piloted aircraft like Tempest.

Tempest is not just hardware. It is about the weapons, the sensors, its battlespace connectivity, and how information is moved around its network. Tempest will exploit our world class industrial base, pairing our brightest minds with game-changing digital ways of working. Our investment will create thousands of new opportunities for highly skilled work, including 2,500 apprenticeships in the UK over the next five years as we seek to recruit the best young talent for a 'Generation Tempest' workforce. We will only succeed, however, if we break from the industrial age spiral of ever greater complexity, cost and time. It will require innovation and disruption across

the enterprise, design cycles in hours not weeks, and in-Service spiral development. We can do all this, but only if the culture of our respective organisations, and our enterprise as a whole, allows us too.

Project Mosquito, our autonomous combat aircraft has continued to advance at pace, building on the £30m contract awarded to the Spirit Aerospace-led Team Mosquito to design and manufacture a demonstrator that could form part of the Combat Air force mix. In collaboration with the RAF Rapid Capabilities Office and Dstl, as well as Northrop Grumman UK and Intrepid Minds, Team Mosquito are working hard to meet our objectives of proving dramatic cost and timescale reductions using enhanced digital design and pioneering manufacturing technologies. The physical models now on display in the RAF Zone are representative and reflect the developing maturity of the design. They are displayed in scale matching the Tempest model, representing a potential four-ship of the future.

This is a game-changing project, in every sense, and it is going really well. So much so, that I'm confident enough to announce that we will see the Mosquito demonstrator flying in UK airspace by the end of 2023, perhaps even for DSEI 23. In July I shared some of the tremendous success of Project Alvina and our Experimental Swarming Drone Squadron, 216 (X) Sqn. I revealed my intent to declare it operational with multiple fielded squadrons whose initial mission will be to confuse and overwhelm enemy air-defence systems.

Our future fleet of drones will be agile in design and rapid in manufacture. The operational swarms are likely to be a mix of drones of different sizes, range and endurance, each carrying a variety of bespoke payloads including electronic attack and more.

The latest ALVINA trial was conducted in August testing additional payloads and communications systems on multiple platforms; we've flown swarms of over 20 drones to eye-catching effect, with the next trial in October as development continues at pace. This project is innovative and disruptive in the finest traditions of the Royal Air Force, and with enormous potential. If you want a taste of that, do visit the RAF stand where some of our swarming concept drones are on display.

Some of you will have seen that the Secretary of State and I were at RAF Waddington last week, to view the SkyGuardian Protector prototype and announce a £94 million investment in the station infrastructure in readiness for Protector's arrival.

This programme represents the very best of the UK's agile approach to defence procurement. The collaboration between the RAF, General Atomics and 12 UK industry partners will see £400m re-invested into the UK economy with the potential to rise to £1Bn. UK industry has contributed to every part of the aircraft system, from computer modules to engine development, the tail, weapons and logistical support.

Protector will enter RAF service in 2023 and be declared operational in 2024 as the successor to Reaper. We will have two squadrons, and we have already declared the first squadron will be 31 Squadron. I am delighted to announce

that the second Protector squadron will indeed be 13 Squadron, a fitting allocation for a historic squadron, long associated with the RPAS role.

Protector represents a giant leap forward in technology and aircraft performance over its predecessor Reaper. Equipped with cutting-edge sensors, automatic take-off, landing and flight modes, and UK weapons, Protector can fly further for longer, from many more places around the world, with a much wider range of potential missions from flood monitoring, to maritime patrol, to strikes on violent extremists who would do us harm. This aircraft will enable our Government to act on a world stage within hours, at range, and precisely.

Just as with Atlas, if we treat Protector merely as an upgrade to Reaper and simply read across tactics and procedures, we will have failed to capitalize on what this remarkable platform offers. The technology alone is not enough remember, it's what you do with it that matters.

Belgium and Australia are already signed up to the programme and up to 30 other air forces have expressed interest. There is enormous potential for like-minded allies to train together, and pool development and sustainment costs. And there is enormous potential for the UK and the Royal Air Force to be at the vanguard of this international programme, which is what that investment at Waddington will enable.

In our next-generation Air Force, we are going to rely ever more on synthetic training and force generation, freeing up live flying for real world operations, and in secure synthetic environments practicing tactics and using classified equipment that we do not want to share with a potential adversary.

While at Waddington, we were also able to show the Secretary of State our new Gladiator distributed simulation system, part of the cross-domain Defence Operational Training Capability or DOTC as you may have heard it called. I anticipate declaring IOC early next year on this state of the art facility and network. With highly classified, ultra-realistic simulation supported by an expert workforce at RAF Waddington, Gladiator will link a network of advanced flight and mission simulators at our air and naval bases and barracks across the UK and we are already investing an additional £40M to introduce the next tranche of platforms to join Gladiator, including Protector and Type 45 Destroyers, as well as artificial intelligence applications and our NEXUS Combat Cloud.

Since I last spoke at DSEI, we have conceived, developed and delivered UK Space Command at RAF High Wycombe on behalf of all of the UK Ministry of Defence. I have spoken on many occasions about the criticality of the Space Domain to national security and to the functioning of our society, as well as its vital contribution to operations in all domains. Our rapid establishment of UK Space Command reflects that overwhelming imperative.

To protect and defend our interests in Space, we must continue to build our understanding of this increasingly contested and congested domain, and our ability to protect and defend our interests there. The UK Integrated Review allocated an additional £1.4Bn in defence Space funding over the next ten

years on top of the £5Bn we are spending on our Skynet communications programme. That spend will will enable us to develop UK Space Command, enhance our space domain awareness, develop a sovereign multi-spectral ISR constellation and create a training capability for our Defence space specialists.

The multi-spectral Space ISR programme, called programme ISTARI, will bring together existing Defence space-based ISR R&D projects such as our CARBONITE satellite to produce a set of sensors that not only meets the UK's requirements but also supports those of our allies. This will deliver intelligence to the tactical warfighter or strategic decision-maker at the speed of relevance.

In parallel, we are exploring partnership options with the US on the Deep Space Advanced Radar Capability which will enable us to monitor our critical platforms in space, all the way out to the geostationary orbits, 22,000 miles away.

As with everything else I've highlighted today, this has to be much more than just an equipment programme. Space has always been a collaborative enterprise between government and the private sector, international allies, and Defence, scientific and commercial interests. That is the approach we have taken as we establish UK Space Command and tap into the UK's thriving Space industry to maximise innovation and rapid capability development. UK Space Command has already embedded UK Space Agency staff alongside commercial partners within the Space Operations Centre, and we offer a vital link to enhance Space Domain Awareness for all space users as we track, catalogue and monitor potential Space collisions 24/7 365.

Space is of rapidly escalating importance, and so is climate change.

Climate change is a transnational challenge that threatens global resilience and our shared security and prosperity. Significant action to decarbonise the global economy is required urgently to prevent climate change from accelerating rapidly and possibly irreversibly. We know that collectively our armed forces are responsible for a high proportion of UK Government emissions and, within that, Air and Space activity represents a significant element. My carbon problem, is the Ministry of Defence's carbon problem, which is the UK Government's problem.

I am determined to tackle this head on and so have set the Royal Air Force the ambitious challenge to be Net Zero by 2040. The changes required will be far-reaching and have to address all aspects of what we do, including our expectations of you our industry partners and supply chain too. It will mean changes to how we are structured, operate and equip ourselves and lead us to synthetic aviation fuels, and alternative aircraft propulsion.

I have already initiated work to get our air platforms 100% synthetic aviation fuel ready, and I am determined we will have our first zero emission aircraft operational by the end of this decade. Much of this will be done on the back of what the commercial aviation sector is doing, and the UK has taken a world leading position in that regard. A large part of this is about

commercialising sustainable aviation fuel production and making sure that it’s cost-effectively widely and available, because our RAF platforms are already able to operate on 50:50 blend today, and we would if an assured supply was there.

I am conscious this is not something the Royal Air Force can achieve in isolation and we have to take this journey in partnership with industry, drawing on the power of our collective resources and growing expertise to address this pressing challenge. The imperative is clear: our political leaders and public increasingly demand it of us, and I am sure it is the same in industry as it is in the RAF, that a new generation of employees demands it of their leaders.

To conclude, whether it is radar in 1940, net-zero emissions, space, Atlas, Protector or Tempest, the technology alone is not enough; it’s what the culture of your organisation allows you to do with it that really makes the difference. And that, of course is about our people. Whilst our aircraft, equipment and technology are essential to what we do it is the enduring quality and talent of our people that give the Royal Air Force its innovative, disruptive and decisive edge. That was as true at our foundation in 1918, as it was in the Battle of Britain, as it was in Kabul last month, as it will be long into the future. There can be no higher priority than ensuring we can continue to attract, recruit and sustain the highly skilled and diverse workforce we need from across every part of the UK population. Not only is this the right thing to do at a personal level, our future success as an Air Force depends on it because that innovative and disruptive talent is needed now more than ever in the face of an extraordinary rate of technological change, supercharged by leaps in digital and quantum technology. That, I would offer, is one of the most profound challenges of the age for us as air and space leaders, whether in Defence or in our aerospace and tech industries, and it falls to us now to set those conditions for future success.

Thank you