Written Evidence submitted by Lockheed Martin UK

1. Lockheed Martin UK (LMUK) is a wholly-owned subsidiary of Lockheed Martin Corporation, employing approximately 1,800 people. Lockheed Martin spends on average £1.6 billion each year in the UK, supporting over 1,000 British companies (80 per cent of which are SMEs), and 20,000 jobs in the supply chain. It provides a wide range of capabilities to the U.S., UK, other NATO members, and allies in the Indo-Pacific. These capabilities support sovereign requirements, as well as bilateral and multilateral defence relationships and missions.

What benefits does the UK bring to the UK/US relationship and the NATO Alliance? What should the UK focus on providing in the near future?

2. The Ministry of Defence (MoD) has current or planned capabilities that provide benefit to, and influence within, the UK/U.S. relationship and the NATO Alliance.

3. Ballistic Missile Defence (BMD) Ground Radar. NATO has recognised the importance of ballistic missile defence for over a decade.[1] Its BMD System (BMDS) is based on 'voluntary national contributions' from Member States. Currently, the U.S. provides almost all assets for the NATO BMDS as part of its European Phased Adaptive Approach (EPAA), and is the only Member State that provides assets for upper tier BMD. The U.S.' 2019 *Missile Defense Review* noted the growing complexity of missile threats.[2] It prioritised '*cooperative relations with allies and partners to reinforce and advance missile defense architectures*, including collaboration on missile defence programmes, improved interoperability, and greater burden sharing through investments by allies in sensors and interceptors.[3] NATO similarly encourages greater national contributions.

4. Since the 2015 Strategic Defence and Security Review (SDSR), the MoD has committed to a BMD Ground Radar. This would address gaps in the NATO BMDS, which is dependent on U.S. Navy Aegis destroyers in the region, and the forward-based AN/TPY-2 radar in Turkey (which has inherent limitations in relation to field of view, range, and other attributes). In its *Missile Defense Review*, the U.S. specifically noted the UK's commitment to a BMD Ground Radar.[4] The UK would be the first nation other than the U.S. to contribute to NATO's upper tier BMD. The capability would also perform Space Domain Awareness, Cruise Missile Defence, Hypersonic Defence, and other missions.

5. Carrier Strike. The Defence Command Paper says a Carrier Strike Group (CSG) *'will be permanently available to NATO, an embodiment of our unwavering commitment to the defence and deterrence of the Euro-Atlantic area'*.[5] A UK-U.S. Statement of Intent has enabled interoperability between allies.[6] This includes the joint embarkation and

[1] See NATO's Lisbon Summit Declaration dated 20 November 2010, which noted '*the threat to NATO European populations, territory and forces posed by the proliferation of ballistic missiles is increasing. As missile defence forms part of a broader response to counter this threat, we have decided that the Alliance will develop a missile defence capability to pursue its core task of collective defence. The aim of a NATO missile defence capability is to provide full coverage and protection for all NATO European populations, territory and forces against the increasing threats posed by the proliferation of ballistic missiles, based on the principles of the indivisibility of Allied security and NATO solidarity, equitable sharing of risks and burdens…*' (para. 36). NATO has reinforced the increasing threat posed by the proliferation of ballistic and other missiles, the need for full coverage and protection, and the importance of voluntary national contributions in subsequent summits (see Summit Declarations from Chicago 2012 (para. 58-61), Wales 2014 (para. 54-58), Warsaw 2016 (para. 55-58), and Brussels 2018 (para. 37-39)).
[2] U.S. Department of Defense, *2019 Missile Defense Review, Office of the Secretary of Defense*, pp. III-IV.
[3] U.S. Department of Defense, *2019 Missile Defense Review*, p. 66.
[4] U.S. Department of Defense, *2019 Missile Defense Review*, p. 66.
[5] Ministry of Defence, *Defence in a competitive age*, CP 411, March 2021, p. 14.
[6] See *Statement of Intent by the Department of Defense of the United States of America and the Ministry of Defence of the United Kingdom of Great Britain and Northern Ireland regarding Enhanced Cooperation on Carrier Operations and Maritime Power Projection*, 5 January 2012. The Statement of Intent, which was due to expire in January 2022, has been extended by an additional year.

operation of F-35 aircraft, and integration of allied ships into the CSG. However, see paragraph 17(b) for risks related to Carrier Strike capability.

6. Combat Air – F-35. Integrated Air Defence Systems (IADS) enable Anti-Access/Area Denial (A2/AD) environments. For Russia, IADS '*helps an otherwise strategically outmatched military power to project a credible military threat to NATO's Eastern flank'*.[7] For China, IADS limits U.S. and other allies' military freedom of action in the Pacific.[8] In addition, Russia and China use their long-range sensors and strike systems as an "enabling umbrella" for grey zone activities,[9] and the global proliferation of their systems presents challenges beyond peer or near-peer adversaries.

7. Air assets that can penetrate A2/AD environments for sustained periods will be required. They will be the "theatre entry requirement" for operations. Analysts have noted that:-

> *'having answers to the Russian IADS is, therefore, a central part of any militarily coherent plan for the defence of Eastern European members…the threat to the credibility of NATO's collective defence capabilities in Eastern Europe is sufficiently severe that European NATO members should take urgent steps to improve the quantity and readiness of the force elements within their national air forces optimised for this crucial mission'.*[10]

   A similar requirement is evident in the Indo-Pacific region.

8. The Joint Air Power Competence Centre (JAPCC), a NATO Centre of Excellence sponsored by 16 Member States, has described the F-35 as the *'backbone of next generation NATO operations'*.[11] The F-35 will provide capabilities *that 'are currently uniquely held by the U.S.'*, including the ability to penetrate advanced enemy IADS, and undertake indigenous 'high gain' Electronic Attack missions.[12] It will also enable Multi-Domain Integration (MDI).

9. By 2035, more than 500 F-35s will be stationed in Europe across NATO member bases.[13] In the Indo-Pacific region, there will be a permanent presence of over 300 F-35s by 2035. The UK has an F-35 Programme of Record (POR) of 138 aircraft that will contribute, but see paragraph 17(b) for information about risks.

10. Deep Fires. The UK and its allies recognise their shortfall in land-based Deep Fires: the capabilities lack mass and are outmatched by foreign systems. For example, Russia's BM-30 and 9A52-4 Tornado missile launchers, and SS-21 and SS-26 short-range and tactical ballistic missiles, have greater range and provide area attack capabilities.

11. The MoD has therefore prioritised surface-to-surface capabilities with greater range. The British Army's Deep Fires Programme is recapitalising the M270 Multiple Launch Rocket System (MLRS). This will maintain commonality with the U.S. and other NATO allies out to 2050. The upgraded MLRS will also facilitate next-generation, longer-range munitions. The British Army has signed a Memorandum of Understanding (MOU) for the

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[7] Justin Bronk, *Modern Russian and Chinese Integrated Air Defence Systems: The Nature of the Threat, Growth Trajectory and Western Options*, Occasional Paper, Royal United Services Institute (RUSI), January 2020, p. 20.
[8] Bronk, *Modern Russian and Chinese Integrated Air Defence Systems*, p. 22.
[9] Bryan Clark *et al*., *Winning in the Gray Zone: Using Electromagnetic Warfare to Regain Escalation Dominance*, Center for Strategic and Budgetary Assessments (CSBA), 2017, p. 4. See also pages 3 and 7 for illustrative laydowns of Russian and Chinese long-range sensor and weapons networks.
[10] Bronk, *Modern Russian and Chinese Integrated Air Defence Systems*, pp. 31 & 32.
[11] See Joint Air Power Competency Centre (JAPCC) Editorial Board, 'F-35, The Backbone of Next Generation NATO Operations', *Transforming Joint Air Power: The Journal of the JAPCC*, Edition 18, 2013, pp. 74-78.
[12] JAPCC, 'F-35, The Backbone of Next Generation NATO Operations'.
[13] See https://www.military.com/daily-news/2021/06/10/there-will-be-450-f-35s-europe-2030-nato-commander-says.html.

Extended Range Guided Multiple Launch Rocket System (GMLRS-ER), with plans for a stockpile purchase to follow. There is also an aspiration to develop UK payloads for integration onto GMLRS-ER. This would provide an area effect capability, as well as UK workshare and prosperity benefits if adopted by other GMLRS-ER users. In parallel, the British Army should join the U.S. and Australia in becoming an early signatory to the Precision Strike Missile (PrSM) MOU. PrSM would offer a significantly longer range deep fires capability (~499km), allowing it to outrange peer adversaries and break into A2/AD bubbles. Early signing of the MOU would allow the UK to shape the spiral development and technical roadmap of PrSM, as well as secure UK workshare.

12. Nuclear Deterrent. The Continuous At-Sea Deterrent (CASD) supports both UK and NATO security. NATO has agreed that a credible nuclear capability remains essential.

13. Space. NATO recognises that space systems and services are critical for Position, Navigation and Timing (PNT), early warning, secure satellite communications, environmental monitoring to support mission planning, and intelligence, surveillance and reconnaissance (ISR). It also recognises space as a contested operational domain.

14. In relation to PNT, NATO uses GPS, as the only available system that meets its military requirements. The U.S. Government is considering how to improve the resilience and power of its GPS constellation. The UK's Space-Based PNT Programme (SBPP) could support this, by providing assets in different orbits as part of a resilient coalition architecture; satellites in the Geostationary Orbit (GEO) are likely to be most effective, compared to hosted payloads or satellites in Low Earth Orbit (LEO). SBPP should be confirmed as soon as possible, to improve both national and allied resilience.

15. For NATO's military satellite communications requirements, four Member States (including the UK) provide spare capacity from their satellite communications programmes under the NATO SATCOM Services 6th Generation (NSS6G) project.[14] As the UK recapitalises its military satellite communications constellation, it should procure the Skynet 6 Enduring Capability (SK6EC) in such a way that it enables effective international and industrial capability collaboration with key allies, and grows the capacity and resilience of the industrial base. Resilience and protection for SK6EC will be important, as threats and other risks in the space domain evolve. The MoD should develop a 'Theatre Entry Standard' in collaboration with the U.S. and others.

16. For ISR and environmental monitoring, the UK procures commercial data (which has limitations in supporting operational and tactical decision-making), and UK relies on the U.S.' 'National Technical Means' satellites. The MoD's commitment to developing its own ISR constellation, which could also add value to allies, is therefore welcome. The UK should also consider investing in an Earth Observation constellation.

How will the UK's journey to becoming an 'information-led' force impact its ability to operate and fight alongside a) the US and b) other NATO Allies both in terms of the UK's potential capability gaps during the transition and the potential impact on interoperability should individual Allies adopt such a transition at differing timescales?

17. The UK must maintain pace in the delivery of capabilities that are important for its own missions, and which will contribute to – and give it influence within – allied relationships and missions. For example:-

[14] The MOU for NSS6G operates from 2020 to 2034. NSS6G is coordinated by the NATO Communications and Information Agency (NCIA).

a. The MoD should explore opportunities to accelerate the delivery of a BMD Ground Radar;

b. The F-35B aircraft form a core element of CSG, but their delivery profile and number need to be clarified. The MoD has confirmed the procurement of 48 aircraft within its F-35 POR of 138 aircraft, of which 21 have been delivered. The delivery profile for the remainder of the 48 has markedly slowed due to financial pressures, which will delay the stand up of a second frontline squadron by at least three years. Once 48 aircraft are delivered, the MoD could routinely deploy 24 F-35B aircraft for CSG, whilst continuing to provide a training squadron. However, a fleet size of 48 leaves little resilience, and would not allow the UK to meet the full capacity of a single carrier (36 aircraft) without impacting training throughput. 70 to 80 F-35B aircraft will be required to deliver a credible and resilient CSG capability. 138 F-35s would be required to allow the UK to deliver CSG alongside other non-discretionary and contingent combat air tasks;

c. The British Army should become an early signatory to the PrSM MOU; and

d. Allies are increasingly concerned about the resilience of their space systems and services. Analysis shows that layered architectures, with assets in different orbits, are most effective in improving resilience. The UK has an opportunity to provide sovereign assets that form part of coalition architectures for military satellite communications and PNT. This would increase the UK's influence, by establishing it as critical contributing partner for the provision of resilient space capabilities. There is also scope for greater collaboration with some allies on space protection.

18. Following the decisions in the Defence Command Paper to retire the C-130 fleet and cancel the Warrior Capability Sustainment Programme (WCSP), the UK will need to consider:-

a. Whether it has a suitable force mix for air transport and tactical air mobility missions that avoids capability gaps and capacity shortfalls, meeting national and allied requirements. Lessons could be learnt from Operation Pitting. NATO's Airlift Management Program (NAMP), and associated Strategic Airlift Capability (SAC) fleet that is used by 10 Member States and two Partnership for Peace (PfP) countries, arguably needs greater capacity; and

b. How to contribute to NATO's conventional deterrent, including as part of Enhanced Force Presence (eFP). Previous analysis confirmed the deterrent effect of forward-deployed armour compared to other capabilities,[15] and therefore the importance of the Army's armoured infantry modernisation in underpinning a credible conventional deterrent by NATO.

19. As the MoD pursues MDI, it has an opportunity to be the "golden thread" between similar allied initiatives, including the U.S.' concepts of Joint All-Domain Operations (JADO)/Joint All-Domain Command and Control (JADC2), and NATO's related architectural work. It should become involved in international collaborative programmes to shape this.

[15] See Bryan Frederick *et al*., *Understanding the Deterrent Impact of U.S. Overseas Forces*, RAND Corporation, February 2020. RAND defined heavy ground forces as '*armored, mechanized, artillery, and combat aviation units*'. See also Keir Giles, *Russia's 'New' Tools for Confronting the West: Continuity and Innovation in Moscow's Exercise of Power*, Chatham House Research Paper, March 2016, p. 68, and www.realcleardefense.com/articles/2019/09/03/the_positive_impact_of_natos_enhanced_forward_presence_114713.html

What impact will the Government's commitment to retaining onshore capabilities have on MOD's ability to purchase equipment from companies based outside the UK?

20. The Defence and Security Industrial (DSIS) says the MoD *'will sustain and grow onshore industrial capability and skills for the future in those areas most critical to defence and security'*.[16] This can involve strategic partnerships, including onshore investment and manufacturing by overseas headquartered companies.[17] DSIS goes on to say that *'operational independence is not the same as 'procurement independence' – or total reliance on national supply of all elements'*,[18] and the UK *'cannot and should not attempt to actively maintain industrial capability across all markets and capability areas'*.[19]

21. Lockheed Martin understands the UK's requirement to retain 'Strategic Capabilities' onshore, and to grow and maintain aspects of onshore industrial capability that enable 'Operational Independence' in other capability segments. It has a track record of this, as demonstrated by:-

    a. Its work in support of CASD, including a Modern Apprenticeship Scheme and comprehensive training plan to generate technicians and engineers for the Strategic Weapons System;

    b. Delivery of the Merlin Capability Sustainment Programme (MCSP) for anti-submarine and anti-surface warfare;

    c. The F-35 Programme, through which there has been £3.3 billion of knowledge transfer, £29.7 million of training and technical assistance (including in digital manufacturing and 'stealth' technologies), and a capital investment programme in the UK worth £601.8 million. Coupled with the Programme's £40.6 billion contribution to the economy by 2038, the F-35 is sustaining the UK's Combat Air Sector, providing the UK with onshore infrastructure, skills, and the ability to invest in Research & Development; and

    d. Its Special Projects work.

22. As the MoD undertakes detailed Capability Segment analysis to inform procurement options in line with DSIS, it should engage in a structured way with industry.

23. In some areas, the UK's industrial base has atrophied over many years – notably in aspects of radar, complex and disruptive weapons, and space. The UK has the opportunity to leverage the capability development undertaken by allies, coupled with knowledge and technology transfer, onshore training, and collaborative R&D, to give it access to advanced technologies, whilst maintaining operational independence and re-growing onshore industrial capability. Moreover, MoD requirements are unlikely by themselves to sustain long-term industrial capability. Satellite manufacturing is an example. The MoD therefore needs to engage with industry to understand longer-term demand from allies and other markets; those wider requirements will sustain a manufacturing base that can also meet long-term defence needs.

24. Finally, as the MoD implements DSIS and develops MDI, its approach should not hinder interoperability/interchangeability with allies. DSIS says the MoD will consider more systematically how to co-develop and collaborate on capabilities with international

[16] HM Government, *Defence and Security Industrial Strategy: A strategic approach to the UK's defence and security industrial sectors*, CP 410, March 2021, p. 14
[17] HM Government, *Defence and Security Industrial Strategy*, p. 4.
[18] HM Government, *Defence and Security Industrial Strategy*, p. 21
[19] HM Government, *Defence and Security Industrial Strategy*, p. 14

partners. A key lesson is that early engagement results in greater UK influence over specifications, and workshare.

How can NATO effectively foster technological cooperation among Allies and how best can the UK engage in that process? What role will NATO common standards and the new Defence Innovation Accelerator for the North Atlantic (DIANA) play?

25. Various bilateral and multilateral initiatives are being developed to ensure NATO Member States retain a technological edge. These include the UK.-U.S. Next Generation Capability Cooperation (NGCC) initiative, the UK-U.S. Technology Partnership (announced during the G7), the 'Think NATO' initiative, and DIANA. There is likely to be overlap between the scope of these initiatives. Given the scale of investment required to maintain an edge in these areas, and the need to field capabilities rapidly, it will be important for countries to collaborate by drawing on respective strengths from their industrial and academic bases, rather than competing on end-to-end technology development. As these bilateral and multilateral initiatives are developed, industry and academia should therefore be engaged in a structured way to help determine their scope and optimal delivery mechanisms. Furthermore, it will be important for allies to develop similar concepts of use/operation, adopt common approaches to command and control, and adopt compatible architectures and standards (including for data), to enable interoperability and interchangeability.

26. The UK has a Defence and Security Accelerator (DASA). It also has a National Security Strategic Investment Fund (NSSIF), in which Lockheed Martin is a co-investor. The UK can share lessons from DASA and NSSIF with NATO. The initiatives also provide a strong basis for the UK to adopt a leadership role in DIANA. Pull-through of commercial technologies and business models into defence remains challenging; Primes have a key role to play in this respect by enabling effective domain application and systems integration.

27. The UK and allies should consider their approach to "foundational technologies" that underpin all other capabilities, such as semiconductors, micro- and nano-electronics. Developing long-term, assured supplies of those component technologies will be increasingly important. The scale of investment required will mean that allied collaboration, and new models for public-private cooperation, are essential.

Will NATO's newfound interest in the Indo-Pacific complement the UK's 'tilt'? If so, what should the UK be doing bilaterally with partners and where in NATO should it focus its efforts?

28. The Integrated Review committed to deepening and expanding the UK's defence industrial relationships and capability collaboration in the Indo-Pacific, bilaterally and through the Five Powers Defence Arrangements (FPDA) and Association of Southeast Asian Nations (ASEAN). CSG21 started to demonstrate the UK's 'tilt' to the Indo-Pacific, including through joint exercises. The 'AUKUS' trilateral defence partnership has also been announced,[20] and the UK and Japan are negotiating a Reciprocal Access Agreement (RAA) on defence. There will be overlap between these and other allied initiatives in the Indo-Pacific, particularly as NATO's 2030 'reflection process' recommended that the Alliance deepen consultation and cooperation with Indo-Pacific partners in relation to information sharing, technological cooperation, and pooling of R&D.[21]

[20] Initially focused on nuclear powered submarines, and growing to cover artificial intelligence, cyber, quantum computing, undersea, and potentially other areas such as long-range strike.
[21] See *NATO 2030: United for a New Era – Analysis and Recommendations of the Reflection Group Appointed by the NATO Secretary General*, 25 November 2020, para. 14-15.

29. Further analysis should be undertaken of what the UK's 'tilt' to the Indo-Pacific should mean for force structure, systems and architectures that enable interoperability/interchangeability, and the role of industry in supporting the tilt. Addressing risks in the European and Indo-Pacific regions will require capabilities with similar characteristics. Similar requirements have emerged in both regions for Combat Air (in relation to the F-35, the Commander of United States Pacific Air Forces has said *'too many people miss the strategic impact of having allies operate the same aircraft'*),[22] future cruise and anti-ship weapons, long-range precision strike, long-range and discriminating sensors, common command and control backbones, and resilient space systems. This commonality of requirements presents opportunities for collaborative capability development, burden sharing, and distributed operations. The U.S., UK, and Australia already have – or are planning – common capabilities in Combat Air, Deep Fires, and future cruise/anti-ship weapons, as well as the areas included in AUKUS. This could provide a "critical mass" that enhances the UK's ability to influence wider NATO and Indo-Pacific requirements. NATO's pedigree in developing common standards and concepts of operation/use, and in facilitating wargaming and experimentation, could help enable interoperability/interchangeability.

[22] See https://www.airforcemag.com/wilsbach-to-allies-learn-from-usafs-mistakes-fly-your-f-35-like-an-f-35/.