

Written evidence submitted by BAE Systems plc

House of Commons Defence Committee Inquiry – Space Defence

Introduction

At BAE Systems, we help our customers to stay a step ahead when protecting people and national security, critical infrastructure and vital information. We provide some of the worlds most advanced, technology-led defence, aerospace and security solutions and employ a skilled workforce of 89,600 people in more than 40 countries.

From state of the art cyber threat detection to flight control systems that enable pilots to make better decisions, we never continually innovate to ensure that our customers maintain their advantage. This is a long-term commitment involving significant investments in skills. We also work closely with local partners to support economic development through the transfer of knowledge, skills and technology.

Space is vital to the defence and commercial sectors in the UK and we welcome the standing up of the UK Space Command as well as the commitment of the Government to deliver the National Space Strategy in the near future. A strong sovereign presence in Space, closely integrated with the UK's existing defence and security capability, where BAE Systems is playing a major role, is vital for the security of the nation and will deliver significant economic prosperity. At BAE Systems we have been delivering key technologies for decades helping the UK to securely communicate between Space and the ground including delivering secure telecoms command and control processors, space certified electronics, antennas and information assurance solutions. The European Space Agency (ESA) uses our secure space tracking and communications technology that was used to communicate with the recent Mars landing.

We're actively developing new, military-secure Software Defined Radios, which could be deployed on a constellation of satellites, ensuring security and resilience and providing intelligence to the battlefield. We're also investing in pseudo-satellite technology, PHASA-35, which has the potential to operationalise the stratosphere and provide a cost-effective alternative to conventional satellites or fall-back capabilities to enhance resilience.

We look forward to contributing to the continued strengthening of UK sovereign space capability through our existing capabilities as well as our active support for, and engagement with, SMEs.

BAE Systems has submitted responses to the questions below in order to support the House of Commons Defence Select Committee in its inquiry into Space Defence.

How should the UK Government seek to further develop its strategic relationships and interoperability with allies?

Similar to other areas of defence, we observe that collaborative programmes and exports provide a mechanism for the UK to advance its diplomatic, defence and economic relationships. The collaborative development of space capabilities with allies will deepen political relationships, grow military cooperation and interoperability, increase the volume of trade, share costs and push the productivity frontier. Increased volume will also support the growth and sustainment of domestic industrial capability.

The commercial space sector is already globally integrated, and naturally this will spill-over into defence. There is a role for the Ministry of Defence (MOD) to identify where it might intervene in the market to pursue collaborative arrangements which fit with the UK's strategic priorities, and to promote the development of national champions that can return export orders to the UK.

In addition to the UK's close relationship with the USA, we observe that Australia and Canada have similar ambitions for space and there are areas such as Intelligence, Surveillance and Reconnaissance (ISR) that present opportunities for a deeper partnership.

By mapping the strategic objectives of both the UK Government and international partners, gaps can be more easily identified, and areas of commonality and support can result in greater multi-national collaboration in the commercial and military domains. We would hope to see much of this come to light in the National Space Strategy, which will hopefully outline the strategic priorities of the UK to enable industry and Government to understand what sort of collaborations we should be negotiating with allies and export partners

Where can the UK most effectively develop and deploy its own sovereign defence capabilities, with particular regard to:

- **Space Situational Awareness**
- **PNT (Position, Navigation, Timing) services, in the context of the UK's exit from the EU's Galileo and EGNOS programmes**
- **Intelligence, Surveillance and Reconnaissance**
- **Communications**

Following the Integrated Review, we are aware that the MOD has communicated plans to develop capabilities in ISR and space situational awareness, and within the UK Space Agency and MOD there are active programmes in Positioning, Navigation and Timing (PNT)¹ and next generation secure communications.² These programmes are an opportunity to grow the UK's institutional role in space, more comparable to France, Germany and Italy, who are each reported to have higher funding for space programmes.³ These proposed developed capabilities will also ensure greater assurance for the UK in guaranteeing information flow and security under conditions of electronic warfare and cyber threats.

Today, certain industrial capabilities exist within the UK that can contribute to each of these programmes, and we assess there is an opportunity to build on these strengths directly in the space sector and by collaborating with adjacent sectors such as defence and aerospace. Any concrete indication that Government wants to use these programmes to stimulate the development of domestic industrial capabilities will provide the private sector with the confidence to invest in complementary skills, facilities and technology.

Procurement strategies should encourage innovation and enabling technologies that will build-in resilience and deliver choice (for example, orbit and platform agnostic). These programmes should also be considered as opportunities for international collaboration and exports, and to maximise social value. Identifying commercial spill over benefits from investment in critical defence and security capabilities will also be important to increase the direct economic return to the UK and reduce the cost of the initial capability.

How vulnerable are our space assets to deliberate attack, both physical and otherwise, and what steps can be taken to improve their resilience (with regard both to defence capabilities and other critical national infrastructure)?

¹ <https://www.gov.uk/guidance/space-based-pnt-programme>

² <https://www.gov.uk/guidance/skynet-enduring-capability-skec-programme>

³ <https://fortune.com/longform/space-program-spending-by-country/>

As a defence, security and aerospace technology company, we are alert to the proliferation of threats to the UK's military, civil and commercial space assets, both physically and electronically. The breadth and depth of our dependency on Positioning, Navigation and Timing (PNT) is increasingly understood, as is the utility of satellite communications to our economic output. However, it is reported that 90% of the UK's satellite data is transmitted through foreign-owned satellites.⁴ Our dependencies on both UK and foreign-owned space assets are increasingly vulnerable to interception, disruption or denial.⁵ This is recognised in the Integrated Review as a security and economic threat.

Sovereignty and resilience should therefore be promoted as central tenets of the National Space Strategy, and the subsequent Defence Space Strategy. This means increasing situational awareness, more sophisticated and diverse communications, more integrated sensors and data analysis, higher levels of encryption, more redundancy, increasing physical resilience of spacecraft, and secure ground stations. It also means developing and sustaining domestic industrial capability in these areas, allowing the UK to assert appropriate sovereignty, and to act independently to protect and defend its interests when needed. The UK could also increase resilience by investing in alternative fall-back capabilities such as ensuring PNT in a satellite denied environment, which will reduce our vulnerability and thus the attractiveness of these potential targets to adversaries.

UK Government, along with industry, should also consider how it will deal with any physical assets that are launched into space, such as issues of maintenance, and space debris.

How can defence industrial policy ensure that investment and innovation in the private space sector is harnessed to align with the UK's defence requirements?

The UK can benefit from a diverse and vibrant defence space industry, where investment is complementary to the needs of defence. This policy area should not be incumbent on one Government department to deliver upon; rather a multi-departmental approach to space should be encouraged, as any technologies or research developed in the defence sector will often make their way into the commercial domain. The MOD specifically, with its position, can create the conditions for this through:

- Senior political advocacy and visible departmental leadership;
- A clear definition of the industrial capability that the UK seeks to develop on-shore;
- Transparent long-term capability plans, programmes, and funding profiles;
- Ongoing dialogue on policy and technology, and a supportive regulatory framework;
- Continuing with innovative forums to develop ideas and pitch investment opportunities.

Investors and new entrants would also welcome a signal from the MOD that they will inject competition and choice to diversify the industrial base. This will also help facilitate ongoing growth in the Small and Medium-Sized Enterprise (SME) base, which through our work with MOD DSTL on the Serapis Research and Development (R&D) framework, we know is a vital source of innovation.

There is a need for certainty and clarity around which sovereign capabilities ought to be retained, and developed domestically, and those which Government would be happy to partner with other countries on. This will give industry a clear framework around which to invest.

We need to encourage a complete industrial ecosystem in the sector – the SME community is growing but it also needs the large companies who can develop capabilities at scale.

⁴ Securing Our Future In Space, UK Space, December 2020

⁵ The Normalisation of Anti-Satellite Capabilities, Air & Space Power Review, Vol 22, Royal Air Force, Summer 2019

Finally, a framework similar to the National Value Framework as seen in the Combat Air Strategy would harness and recognise the economic opportunities in the sector, and acknowledge the opportunities for broader exploitation of MOD investment in space. We have seen in the Combat Air Sector how a clear strategy, backed by investment from the MoD, has encouraged significant investment from UK industry, delivered a resurgence to the sovereign capabilities in the UK, and made the UK an attractive partner for other nations.

Have recent machinery of government changes ensured a joined-up and coherent approach to defence space policy both across Whitehall and within the MoD? What further improvements could be made?

Following the space landscape review, increased Government coherence is welcome and we applaud the early work of the Space Directorates in the MOD and BEIS. Clear interfaces for industry are essential and welcome, and we hope that the MOD and the UK Space Agency continue in this trajectory and maximise their dialogue with industry when developing acquisition strategies and business cases.

There is an opportunity for the Government to express clarity on the desired role for OneWeb. If the public shareholding is being used to direct the development of capabilities in certain areas of defence, this should be transparent to the rest of the private sector to avoid overlap.

What should be the priorities of the new Space Command, and how will its structures facilitate integration across all military domains and co-operation with commercial space operations?

Given the nature of Space Command, we see this is an opportunity for all UK defence spending on space to be housed in one place, thereby providing better value and synergy across requirements. Space Command should also deliver a clear route map to capability which will encourage synergy across the defence and commercial sectors, by providing:

- Clarity on intentions to develop *offensive* space capability (currently, the plan is purely defensive);
- Priorities for defence innovation versus commercial capability pull through;
- Clarity on areas of collaboration with international partners and existing areas of UK industry;
- A more commercially minded approach reflecting the overlap between commercial and security demands on Space
- How they intend to work with the growing community of SMEs around the country.

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