

Supplementary Written Evidence Submitted by Satellite Applications Catapult (SPA0086)

Authors: Dan Wicks, Cristian Rossi, Maral Bayaraa, Electra Panagoulia

We are a group of Earth observation experts engaged heavily in supporting the commercialisation of space technology in the UK and internationally, working across business, government & academia. This response represents a collective view on opportunities and challenges facing the EO sector with a set of recommendations to overcome notable blockers restricting the sector's growth, stifling its potential to underpin game changing economic, environmental and social goods both in the UK and globally.

Summary

Earth Observation (EO) provides spatial information with a vast potential to underpin UK delivery of priorities in climate & defence whilst supporting economic prosperity. The space sector has been identified as a key growth area for the UK, with the potential to generate employment and exports as reflected in ambitious Space Innovation and Growth Strategy targets. Our contribution to this inquiry aims to highlight the core requirements within the EO sector and demonstrate the ways in which these already align well with the wider technological and strategic commitments of Government as outlined in the UK Research and Development (R&D) roadmap¹, priorities of the Dept for DCMS² and the AI roadmap recommendations³. Such coordinated development is key to maximising the value of investment already being made across industry, academia and the public sector and avoid inefficient fragmentation of UK capabilities and communities. A wider UK Space strategy will help set priorities and a timeframe for the delivery of activities. Below is a summary of key recommendations:

- Ensure coherence between existing Research and Technology Organisations (RTOs) to act as a bridge between academia, industry and government
- Strengthen the role of EO in ambitious 'moonshot' programs aligned to central government priorities and subsequently identify key requirements for national EO data infrastructures
- Develop a coherent strategy to align public and private investment to amplify the benefit of existing space R&D investment, whilst increasing our space R&D investment in line with key competing economies
- Solidify market trust in the EO sector through benchmarking and certification processes
- Consolidate broader participation into international programs such as the European Space Agency (ESA) alongside national programs
- Support greater collaboration between industry and academia on the development of higher education courses that correspond to current and predicted skills needs

Innovation landscape

The UK demonstrates strong capabilities within manufacturing, data archiving, operational processing, scientific exploitation and value-added service development. The UK must, however, further develop these in a coordinated way to maximise the value of investment already being made. Therefore, there is a need to cement the capabilities and collaboration of the various Research and Technology Organisations (RTOs) such as the Catapult network, KTNs and the Alan Turing Institute. A strong mandate to establish collaborations between academia, industry and government should be at the heart of these organisations. Operating as neutral trusted entities, RTOs should work to unblock opportunities that will ultimately drive commercialisation, demonstrating a clear pathway to impact associated with investment. RTOs are a source not only of technical and scientific ideas leading to new products and services, but also of political and societal influence that strengthen the capacity of the

¹ <https://www.gov.uk/government/publications/uk-research-and-development-roadmap>

² <https://dcms.shorthandstories.com/Our-Ten-Tech-Priorities/index.html>

³ <https://www.gov.uk/government/publications/ai-roadmap>

UK to adapt to emerging technologies around the world and thus support continued innovation. Effective thought leadership is a key driver of change and fundamental for economic growth on the international stage.

Challenge-led innovation

We are seeing a step-change in EO globally that is radically altering the potential value of EO products and services (e.g., availability of EO data with spatial and temporal resolution high enough to satisfy industry requirements previously unmet, cloud enabled data storage and access, AI enabled analytics for extracting large scale insight). Therefore, the UK space sector needs to be proactive in anticipating and responding to these changes to ensure continued leadership and delivery of impact. Increasing international competition within the market, exaggerated by leaving the EU, the need to raise our game and avoid complacency is paramount. Although the rate of investment in space related R&D has seen a steady increase of 8.6% per annum since 2016/17 we remain significantly behind nations such as France and Germany who invest on a scale of billions of euros into national programmes.⁴

As recognised in the UK R&D roadmap, ambitious ‘moonshot’ programmes are key to developing the UK innovation ecosystem and offering the greatest long-term rewards. An example is the vision for a UK Digital Twin programme, strongly based on Artificial Intelligence (AI) research. Here, the temporal resolution and fine global coverage of EO data and analytics provides a fundamental underlying dataset. The links between EO and AI should be strengthened as EO offers an important source of training data. It is recommended to establish a public good EO training data set (as aligned with the AI roadmap recommendations) on which people can undertake research and innovation as well as education as an important driver of use cases for adoption.

Another key area would be around EO and Natural Capital, i.e., an extension of the economic notion of capital to goods and services provided by the natural environment. EO is already showing huge promise for global scale environmental monitoring in e.g., tracking deforestation, illegal fishing⁵ and global methane emissions⁶. The synergy between climate targets, natural capital, agricultural policy and emergent markets like carbon credits is a huge driver of opportunity. A coherent strategy is required for aligning both government and private investment in EO data infrastructures, which have the capability today to deliver against these needs.

National, cross-sector adoption

The real power of EO will be unleashed once there is mass adoption across sectors. To truly transform industries, there needs to be regulation of sales, which includes benchmarking and certification processes underpinning robust products and services. Currently a non-EO-expert investor or customer has no way to understand how accurate a given EO derived product or service is or the relative trade-offs/compromises when comparing similar solutions in the market. There must be a facility for supporting this benchmarking to allow the market to make more informed decisions and support increased adoption. Moreover, there is a need to aggregate various market requirements across sectors so that industry and academia have a coordinated approach to development. In this regard, the EO sector must focus on building trust in the demand-side markets through clear communication of capability, the value add in the context of clearly articulated business models and how to engage and procure from the sector. Today the market is unfocused, disparate and confused, leading to inefficiency, ineffectiveness and ultimately to lack of engagement or interest from some sectors.

⁴ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/987497/know.space-Size_Health2020-SummaryReport-FINAL_May21.pdf

⁵ <https://www.seafoodtaskforce.global/thailands-rapid-fisheries-reform-results-in-a-green-card-from-the-eu/>

⁶ <https://www.tandfonline.com/doi/full/10.1080/10095020.2017.1333230>

leveraging procurement and demand-side policies to pull technologies, will ensure successful translation and scaling of research outputs and innovations. To this aim, dedicated public funding mechanisms for academic and research institutions should be expanded with the ambition to reap the rewards of using satellite technologies across all sectors and markets.

Internal and international competitiveness

It is advised that an evolution of national capability is focused on vertical integration of the value chain, as opposed to creation of new technology that is not meeting current or future market demand. This would allow the value-added services industry in the UK to focus on delivering benefit to its customers and growing market share through the production of new and improved EO content, bringing on board new customers and sectors that previously did not make use of EO data. This would unlock increased private investment, build new global partnerships and exports and drive productivity in sectors across the UK economy. Such an approach would also successfully underpin cross-government initiatives (e.g., the UK government's commitment to reach net zero emissions by 2050⁷ and the new Agriculture Bill⁸), reducing costs and positioning the UK strongly in relation to European activity. Furthermore, addressing this need for vertical integration will allow the sector to respond to new developments from abroad, increase industrial competitiveness and grow its share of the global market through the development of new and high growth markets focused on key UK government priorities including growing and levelling up the economy and projecting Global Britain.

International partnerships will be key to both future export and inward investment opportunities, especially in the post-Brexit era of the UK. These partnerships will enable the pooling of resources across multiple nations, increasing efficiency and effectiveness and supporting UK government targets and programmes, such as international aid. Furthermore, consolidation of broader participation into programmes such as the European Space Agency (ESA) is essential to amplify return on investment. Examples of the UK having benefited from these international programmes are the EU Horizon 2020 programme, participation in the EU Copernicus programme and membership of the European Organisation of the Exploitation of Meteorological Satellites (EUMETSAT). Participation in such high-profile international programmes means that the UK stays abreast of international technological developments and develops proactive strategies to participate and lead international activities, rather than being reactive. It is imperative to continue supporting programmes such as the International Partnerships Programme (IPP) run by the UK Space Agency (UKSA), to meet climate goals and facilitate participation in international communities through technological innovation.

Skills and diversity

Due to the diverse nature of the UK EO sector, there is a strong skills requirement from a range of educational and skills backgrounds. As the sector continues to grow so too will demand for skills. It is anticipated that there will be high competition with parallel industries who have similar skill needs, e.g., machine learning. One way to mitigate against this is through greater collaboration between industry and academia on the development of higher education courses that correspond to current and predicted needs. It is also thought that a greater recognition of non-university education and training is an effective route to employment. Collaboration with and skills transfer from other industries is essential as is raising awareness of future sector skills need and the effective recruitment of talent. It is imperative that the Government recognises the impending skills gap and react accordingly.

(June 2021)

⁷ <https://www.gov.uk/government/news/uk-enshrines-new-target-in-law-to-slash-emissions-by-78-by-2035>

⁸ <https://www.gov.uk/government/news/landmark-agriculture-bill-becomes-law>