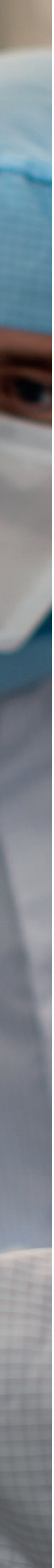
UK space sector mission to Global Space and Technology Convention 2023

HM Government

UKRI Science and Technology Facilities Council
RAL Space

UK SPACE AGENCY

GREAT
BRITAIN & NORTHERN IRELAND



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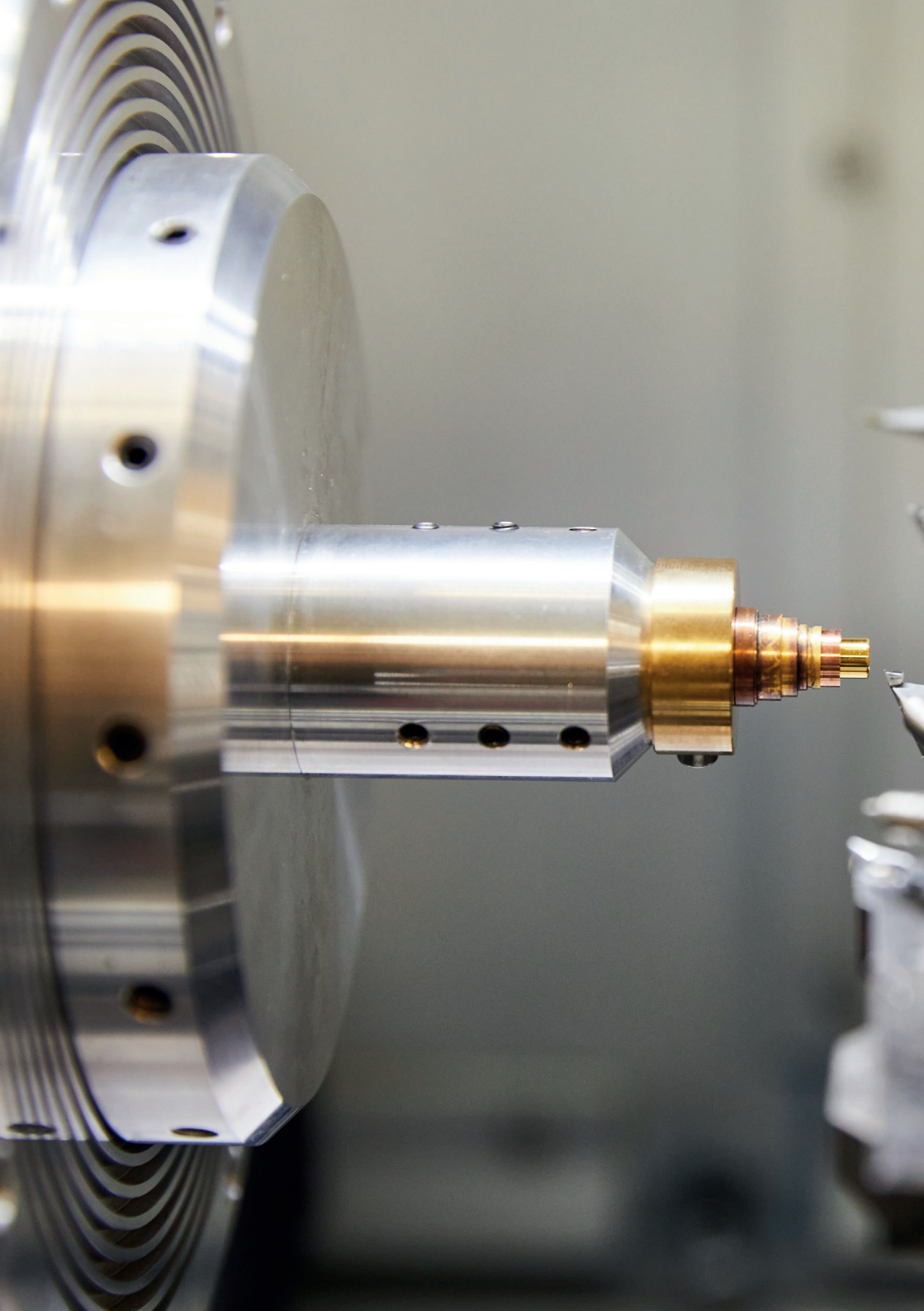


Memorandum of Understanding between the UK and Singapore

The ongoing science and innovation partnerships between the Science and Technology Facilities Council (STFC), Singapore Space & Technology Ltd (SSTL), and their partners has resulted in a wide range of new research and business partnerships. In 2022 STFC and SSTL signed a Memorandum of Understanding to facilitate co-innovation and co-development between UK-based and Singapore-based start-ups to encourage partnership and internationalisation opportunities and further the strong track record of business support and incubation activities that STFC and SSTL currently provide.

Additional collaborators that include the UK Space Agency (UKSA), the Foreign, Commonwealth and Development Office (FCDO), Innovate-UK Edge, and Department for International Trade (DIT) have been instrumental to maximise the business and innovation potential for the companies and universities involved. This year, we hope to build upon the previous 3 years of activities and provide even more opportunities for companies and universities to access and expand into new markets, seek investment and funding, and gain access to world class space expertise, technology, and facilities.

STFC is part of UK Research and Innovation, including RAL Space. RAL Space is the UK's National Space Laboratory with over 60 years' experience and more than 210 instruments in space, plus a wide range of open-access facilities including the National Satellite Test Facility (NSTF). STFC is also home to the ESA Business incubation Centre UK network, the Astronomy Technology Centre in Edinburgh, and the Harwell Space Cluster, made up of over 100 space companies employing more than 1400 people.

Singapore delegation to UK. September 2022


ACS

Exhibitors

UK government

Department for Business, Energy and Industrial Strategy
UK Space Agency
Department for International Trade
Science and Technology Facilities Council: RAL Space
British High Commission Singapore

UK companies

ACC Clyde Space
Archangel Lightworks
Benchmark Space Systems UK Ltd
Black Arrow Space Technologies Ltd
Celestia
Metrea Mission Data
Oxford Space Systems
Satellite Vu
Space Forge
Space Park Leicester

Supporting UK organisations

Satellite Applications Catapult
Innovate UK

Department for Business, Energy and Industrial Strategy

Organisational summary

The Department for Business, Energy and Industrial Strategy (BEIS) is the central department with coordinating responsibility for civil space policy, through the Space Directorate. It is also the sponsoring department of the UK Space Agency and UK Research and Innovation, which are key agencies for the delivery of the UK's National Space Strategy. Through its arms-length bodies, it uses satellite-enabled capabilities to monitor land use, deliver accurate weather forecasting, and coordinate resilience to space weather.

The BEIS Space Directorate has dedicated policy teams working on priority areas such as Launch, Regulation and Sustainability, Skills, Sector policy, ESA, Earth Observation and International space policy.

BEIS is a Ministerial department focused on leading economy-wide transformation by backing enterprise and long-term growth, generating cheaper, cleaner, homegrown energy and unleashing the UK as a science superpower through innovation.

BEIS replaced the Department for Business, Innovation and Skills (BIS) and the Department of Energy and Climate Change (DECC) in July 2016. We employ around 5,000 staff who work in our offices in London, Aberdeen and around the UK.

Partnership offering

The BEIS Space Directorate is responsible for overseeing the implementation of the United Kingdom's civil space strategy. We are looking to foster international partnerships to help deliver our strategic objectives.

Department for Business, Energy & Industrial Strategy

gov.uk/government/organisations/department-for-business-energy-and-industrial-strategy

CommonsBEIS

BEIS Gov UK

Contact | will.smith@beis.gov.uk

UK Space Agency

Organisational summary

The UK Space Agency plays a major role in delivering the government's National Space Strategy.

We support a thriving space sector in the UK, which generates an annual income of £16.5 billion and employs 47,000 people across the country.

Our staff include scientists, engineers, commercial experts, project managers and policy officials who help to:

- catalyse investment to support projects that drive investment and generate contracts for the UK space sector
- deliver missions and capabilities that meet public needs and advance our understanding of the Universe
- champion the power of space to inspire people, offer greener, smarter solutions, and support a sustainable future

Partnership offering

To achieve the greatest impact in these three areas, we focus most of our resource behind eight delivery Priorities. These are;

Launch - supporting satellite launch services from UK spaceports

Sustainability - taking a leading role in keeping space safe and accessible now and in the future

Discovery - supporting space science and exploration missions

Innovation - investing in bold new technologies

Levelling-up - boosting space investment and jobs across the country

Earth observation - studying our planet to drive discovery and tackle climate change

Low-Earth orbit - delivering vital everyday satellite services

Inspiration - inspiring new space customers, investors and the next generation

UK SPACE AGENCY

gov.uk/government/organisations/uk-space-agency

spacegovuk

UK Space Agency

Department for International Trade

Organisational summary

The Department for International Trade (DIT) lead the UK's trade relationships. We facilitate foreign direct investment into the space sector competitively and securely. DIT enables exports to global markets including working with UK Export Finance, and jointly enforces the UK's strategic export controls over dual-use space technologies and services.

DIT have a team 100% focused on the space sector. We work with UK and international stakeholders throughout the supply chain and across all space capabilities.

Partnership offering

We work on a wide range of topics. Speak to us about;

- Engaging with the UK space sector
- Investment opportunities in the UK
- FTA negotiations
- Defence opportunities
- Capital growth
- Clean growth

Department for International Trade

gov.uk/government/organisations/department-for-international-trade

Contact | space@trade.gov.uk

tradegovuk

Department For International Trade

Science and Technology Facilities Council: RAL Space

Organisational summary

The Science and Technology Facilities Council (STFC) coordinates research on some of the most significant challenges facing society, such as future energy needs, monitoring and understanding climate change, and global security. It offers grants and support in particle physics, astronomy and nuclear physics, and operates major UK science facilities at its research and innovation campuses in Harwell (RAL), Daresbury, Edinburgh (UK ATC).

In the space sector, STFC operates RAL Space, the space hub for UK Research and Innovation, the National Space Test Facility (NSTF), the UK Astronomy Technology Centre as well as incubators and common-access facilities at Harwell, Daresbury and Edinburgh. RAL Space has had significant involvement in over 210 space instruments over the last 60 years and the UK ATC has played a key role in designing and building many astronomical instruments, including the MIRI spectrometer for the James Webb Space Telescope.

Science and Technology Facilities Council

RAL Space

Partnership offering

Space at STFC: your partner in space

Occupying a unique position between industry, academia, and government STFC RAL Space can be a collaboration partner, provide access to world class facilities, and support business growth.

Access to expertise

Work directly with world-leading scientists and engineers from STFC RAL Space and UK Astronomy Technology Centre.

Access to facilities

Harness the power of the UK's most advanced space and science facilities, such as the National Satellite Test Facility and Chilbolton Observatory along with technology and hardware.

Access to campuses

Home to hundreds of businesses in space and complementary sectors from the Space Cluster at Harwell to the Higgs Centre for Innovation in Edinburgh.

Access to networks

Open new markets, join accelerator programmes, secure funding from investors and meet with key bodies from across the globe.

ralspace.stfc.ac.uk

Contact | RALSpaceEnquiries@stfc.ac.uk

RAL_Space_STFC

RAL Space

ral.space

RAL.Space

RALSpaceSTFC

British High Commission Singapore

Organisational summary

The British High Commission in Singapore maintains and develops relations between the UK and Singapore.

We encourage Singapore to look to the UK as a global partner of choice in trade, investment, science and research, and we help Singapore on low-carbon economic development. Every year, we help about 100 UK companies gain a foothold in Singapore. We also work with Singapore to protect the national security of both countries, including through holding joint military exercises under the Five Power Defence Arrangements.

The UK is a global leader in science and innovation. International collaboration is essential to maintaining the excellence of the UK's research base and the competitive advantage of our innovative businesses, for filling capability gaps and for ensuring value by leveraging international resources. Maintaining our science excellence and supporting innovation ensures the UK is a partner of choice, and helps UK companies with ambitions for rapid global growth.

Partnership offering

The UK Science and Innovation Network (SIN) team in Singapore works with local stakeholders to develop partnerships and collaborations across the breadth of science and innovation.

British
High Commission
Singapore

gov.uk/world/organisations/british-high-commission-singapore

UKinSingapore

UK in Singapore

UKSINet

UKinSG

AAC Clyde Space

Organisational summary

AAC Clyde Space, a leading New Space company, specialises in small satellite technologies and services that enable businesses, governments, and educational organisations to access high-quality, timely data from space. This data has a vast range of applications, from weather forecasting to precision farming to environmental monitoring, and is essential to improving our quality of life on Earth.

Partnership offering

Our growing capabilities bring together three divisions:

Space Data as a Service – delivering data from space directly to customers.

Space missions – turnkey solutions that empower customers to streamline their space missions.

Space products and components – a full range of off-the-shelf and tailor-made subsystems, components, and sensors.

AAC Clyde Space's main operations are located in Sweden, the United Kingdom, the Netherlands, the USA and South Africa, with partner networks in Japan and South Korea.

AAC CLYDE SPACE

aac-clyde.space

Contact | enquiries@aac-clydespace.com

AACClydeSpace

AAA Clyde Space

Archangel Lightworks

Organisational summary

Archangel Lightworks is a laser communications company building high-volume, secure, wireless technology to create the space-enabled networks of the future.

Today, space and terrestrial networks are not well-connected leading to insecure, insufficient, and vulnerable infrastructure. Wireless laser communications (lasercom) technology offers new solutions; however, adoption of the technology has been slow due to availability concerns, lack of interoperability standards, difficulties associated with lasercom on the move, and high production costs. Archangel Lightworks was set up to solve the space-ground connectivity problem. We are driving down the size, weight, power & cost (SWaP-C) of optical ground equipment to make space-ground lasercom available and affordable.

Partnership offering

We currently have four laser communications technologies:

1. The ASTRA-X, a low-SWaP laser communication terminal for direct-to-Earth communication for small satellites
2. The STRATA-X, an airborne laser communications platform for persistent airborne lasercom
3. The TERRA-M, a low-SWaP, deployable optical ground station; and,
4. The TERRA-FP, flat panel laser communication technology.

We are looking for partners to work together to ensure interoperability and for demonstrations with our Generation 1 prototype in 2023.

archangel.works

Contact | sales@archangel.works

Archangelworks

Archangel Lightworks

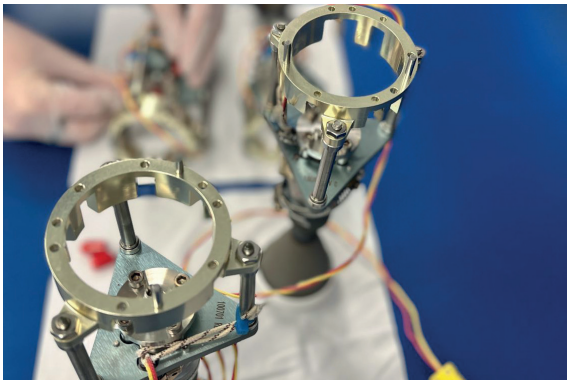
Benchmark Space Systems

Organisational summary

Benchmark Space Systems is a full life cycle in-space mobility provider, delivering products and partnerships from mission planning through decommission. Founded in 2017 to develop green propulsion technologies and flexible product configurations to market, the team's rapid growth and focus on the development and sustainability of a democratized space domain has resulted in a product line-up of turn-key propulsion systems for 3U CubeSat through ESPA and OTV class spacecraft in LEO, GEO, and beyond. Benchmark's patented and proprietary innovations focus on eliminating customer pain-points and increasing asset value for unparalleled ROI.

Partnership offering

Benchmark combines mission heritage, best-in-class propulsion products with advanced control systems and complementary products and services to deliver bundled in-space mobility solutions with significant cost, schedule, and capability benefits over traditional offerings and procurement methods. The Benchmark propulsion system suite included chemical, electric and hybrid systems.



BENCHMARK space systems

benchmarkspacesystems.com

Contact | Mark Arthur
marthur@benchmark-space.com

BenchmarkSpace

Benchmark Space Systems

Black Arrow Space Technologies Ltd

Organisational summary

Black Arrow's plans bring together the strengths of the UK's high-performance (Formula1, space/aerospace and maritime) industries, and secure mobile electronic and tracking ecosystems, with the best commercially available components drawn from our partners around the World, into a unique undertaking; through the application of state-of-the-art technologies, and a highly reliable seaborne spacefleet, the company will offer the broadest, most flexible space launch service of scale available to global customers and, through early adoption of innovative clean-space materials and processes, and ambitious operating policies, become the World's first NetZero space launch provider, demonstrating an excellent level of environmental stewardship for a cleaner world.

After introducing the initial commercial service, the Company will quickly scale up vehicle and spacefleet capacities to allow greater capability, agility and cost reductions, to put us in the middle of a highly competitive world market, with reliability, flexibility and security at our heart.

From anywhere to everywhere.

BLACK ARROW
SPACE TECHNOLOGIES

blackarrow.space

Contact | +44 7733 116 562

BlackArrowSpace

Black Arrow Space

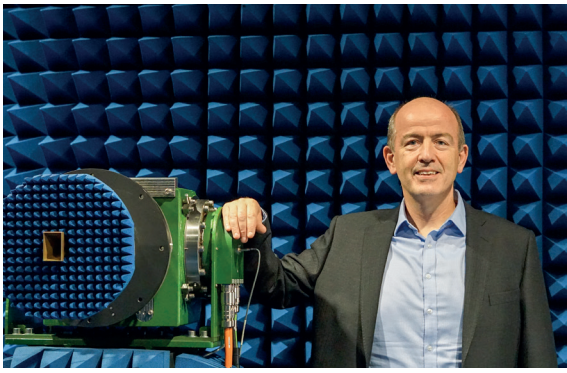
Celestia

Organisational summary

Celestia focuses on continuous innovation in spacecraft communications. Experts in RF Engineering (S band to Q/V band), Ground Station Systems, Payload Simulation and Testing and IoT, the business delivers technology products, systems and services to the space, defence, telecoms and satellite markets, investing in research and development to give customers a true competitive edge. Global in reach, its multi-disciplined teams create smart responses to communications challenges using new ideas, new technologies and new ways of thinking.

Partnership offering

Celestia UK offers particular expertise in ground segment technologies, with a full range of capabilities in equipment and systems integration. Products span electronic steerable antennas, radiofrequency, monitoring and control and baseband alongside ground station capabilities in earth observation, navigation and telecoms. Its highly experienced team has a heritage in working alongside organisations including ESA and Eumetsat plus leading commercial customers, satellite and teleport operators and ground segment primes.



CelestiaUK

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UkCelestia

Celestia Technologies Group UK

Metrea Mission Data

Organisational summary

Metrea Mission Data specialises in putting data first in C4ISR mission effects to deliver information and decision advantage. We combine the experience of our front-line ISR operators with our in-house software and Cyber Security teams, to develop innovative capability solutions for customers across the defence and commercial sectors. Our focus areas include complex data analytics encompassing the collection, processing, fusion and visualisation of large data sets, AI and ML algorithm development, end to end Tactical Data Link solutions, Cyber Security services and Space Domain Awareness capability research and development.

Partnership offering

LASSO – Low Earth Orbit Airborne Space Surveillance Operations

LASSO is an innovative, software-only solution that adapts existing under-fuselage air platform-mounted EO/IR camera systems to look up, in addition to their traditional look down capability, delivering a unique agile and passive Low Earth Orbit (LEO) Space Domain Awareness (SDA) capability.

MMD also have a diverse portfolio of downstream wider Space Data tools which correlate and fuse multiple on-orbit ISR data streams (e.g. SAR tasking) and domain interference measurements (e.g.PNT and SATCOM).

Metrea

metrea.aero

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Senior Space Consultant
info@mmd.metrea.aero

MetreaMD

Metrea Mission Data

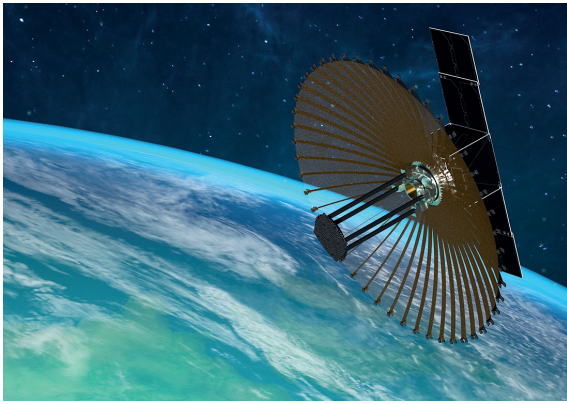
Oxford Space Systems

Organisational summary

Oxford Space Systems is aiming to become the global leader in deployable antennas for space, providing effective solutions to unlock the future of satellite services. We use techniques inspired by origami and space qualified stored energy materials to create deployable antennas that stow into a compact volume for launch and unfold to an accurate form when deployed in orbit. Our antennas enable a wide range of space-based services for the Internet of Things and vessel tracking (AIS/VDES) using deployable helical and yagi structures, Synthetic Aperture Radar using deployed reflector surfaces and data relay using deployable high gain steerable antennas. Oxford Space Systems is based in the Harwell Campus, United Kingdom.

Partnership offering

Our company brings together skills in radio and mechanical engineering, mechanisms and materials to provide customers with antennas that deliver the optimum trade-off between performance, mass budget and stowed volume while maintaining high standards of quality and dependability, enabling greater capability from a smaller satellite platform.



OXFORD SPACE SYSTEMS

oxford.space

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Business Development Manager
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OxfordSpace

Oxford Space Systems

oxford_space

Satellite Vu

Organisational summary

Satellite Vu is launching the world's first constellation of very high-resolution thermal infrared imaging satellites. The constellation will be capable of resolving building level thermal change measurements, at multiple times of day or night.

This unique technology will enable analysts to understand change and activity within the built and physical environment that traditional visible wavelength imagery will not detect. The imagery will help determine whether a structure is in use, identify if industrial processes are operational, and measure heat signatures from vehicles and other assets.

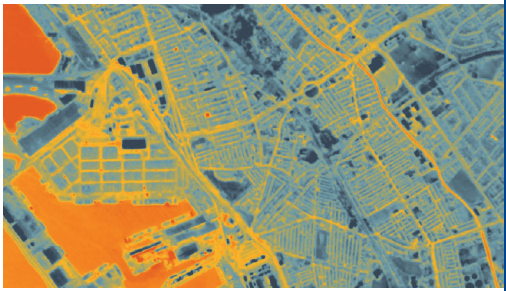
Partnership offering

Based in the UK, with headquarters in London, Satellite Vu is working with partner Surrey Satellite Technology Limited (SSTL) to build the constellation of 8 satellites. The first satellite is scheduled for launch in June 2023, with commercial service following soon after, with the full constellation completed by the end of 2025.

There are no other competitors launching similar imaging capabilities in this timeframe.

Satellite Vu will provide this imaging capability to its customers via an online, cloud-enabled platform and API that will allow customers to order imagery to be collected on-demand and access the data archive of images from the entire constellation.

The company is also developing analytics to enable customers to receive information and intelligence derived from the images. This includes building thermal efficiency analytics, AI-based object detection – initially planes and boats, urban heat island surveying, and industrial activity monitoring.



SATELLITEVU

satellitevu.com

Contact | Simon Casey,
Channel Sales Manager
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satellitevu

Satellite Vu

Space Forge

Organisational summary

Space Forge Ltd is a Cardiff-based UK start-up on a mission to lead the clean industrial revolution by harnessing space. The company is developing fully returnable satellites that are designed for manufacturing next generation super materials in-space. In creating a reliable return, Space Forge will advance the expansion of the microgravity market for premium research and development applications by lowering the barriers to entry.

Partnership offering

The company is focused on R&D initiatives where dedicated return from the space environment can add a significant benefit, or overcome obstacles found terrestrially, to unlock new value and innovation.

SPACE FORGE

spaceforge.co.uk

Contact | hello@spaceforge.co.uk

Space_Forge

Space Forge

Space Park Leicester

Organisational summary

A world-leading cluster for innovative research, enterprise and education in space and Earth observation, Space Park Leicester represents a collaborative community for industry and academia to develop and grow.

Space Park Leicester provides state-of-the-art facilities for research, development and manufacturing. It houses capabilities and companies covering an end-to-end capability, from satellite design and engineering, through to downstream data and its applications. This creates unmatched opportunities for collaboration.

Partnership offering

Collaboration of research projects, knowledge transfer, satellite manufacturing. Partnerships including space instrumentation development, astrobiology and containment, lunar and deep space power and heat systems, earth observation and climate monitoring.

Space Park Leicester

space-park.co.uk

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SpaceParkLeic
Space Park Leicester
spaceparkleic

Satellite Applications Catapult

Organisational summary

The Satellite Applications Catapult is at the heart of the satellite services revolution, driving take-up of space technology and applications to shape, and sustain, the world of tomorrow. We're driven by how our actions help the organisations we work with, both large and small, bring new services to market. By connecting industry and academia we get new research off the ground and into the market more quickly.

We are one of nine Catapults, uniquely established to transform the UK's capability for innovation in specific areas and to help drive future economic growth. As a non-for-profit organization, we help other organisations make use of, and benefit from, satellite technologies, and bring together multi-disciplinary teams to generate ideas and solutions in an open innovation environment.

Partnership offering

The aim of the Satellite Applications Catapult Sustainable Development programme is to embed the power of satellite data, geospatial intelligence and ubiquitous connectivity across the full range of sustainable development activities, both in the UK and internationally, and working across all sectors, government, academia, NGOs, large businesses and commercial industries, to create innovative collaborations.

CATAPULT
Satellite Applications

sa.catapult.org.uk

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SatAppsCatapult

Satellite Applications Catapult

Innovate UK

Organisational summary

Innovate UK, part of UK Research and Innovation, is the UK's innovation agency. We work to create a better future by inspiring, involving and investing in businesses developing life-changing innovations.

Partnership offering

With an annual budget of over £1 billion we provide businesses with the expertise, facilities and funding they need to test, demonstrate and evolve their ideas, driving UK productivity and economic growth.

ukri.org/councils/innovate-uk

Contact | support@iuk.ukri.org

innovateuk

Innovate UK

UK space sector

Space is a vital part of the UK's economy. Satellites and space activities deliver navigation, weather forecasting, power grid monitoring, financial transactions, and better public services. Satellites also support television services to millions of UK households as well as other digital communications.

Levelling up the space sector is a key priority for the UK Space Agency and there are now 1,293 space organisations located across the UK, with Scotland responsible for around one fifth of the entire UK space workforce. The UK Space industry is now worth over £16.5 billion per year and employs over 46,000 people, with satellite technology being the largest industry sitting at £12.2 billion revenue in 2019/20. Space manufacturing, including satellites, spacecraft, launch vehicles and scientific instruments, grew the most in real terms; up by £23 million to £2.27 billion.

Space technologies and services also support the UK's ambition to be a science and technology superpower. Earth observation satellites increase our understanding of our own planet while telescopes, laboratories, and rovers expand our understanding of the universe. The technologies we develop and knowledge we gain through space support our wellbeing, provide services for our everyday lives, and help us support other countries and meet the United Nations' Sustainable Development Goals.

Reasons to invest in the UK space sector:

The space sector is undergoing a rapid, transformative change

UK civil expenditure on space has increased from £300 million in 2014 to £700 million in 2019, and the UK space sector has seen consistently high growth rates.

Developing leadership in high-growth areas

Over the next five to ten years, the UK will establish a global leadership in some of the largest and fastest growing markets in the space sector. Strengths in analytics, artificial intelligence, and app development, will create key opportunities in markets that use data from space to build services and applications for Earth observation, navigation, and space domain awareness.

Sustaining our current competitive strengths

The UK has existing areas of deep commercial and technical expertise which we will continue to support and develop. The UK excels in the manufacture of spacecraft and highly complex payloads, with particular strength in small satellites.

World-class Research and Development Expertise

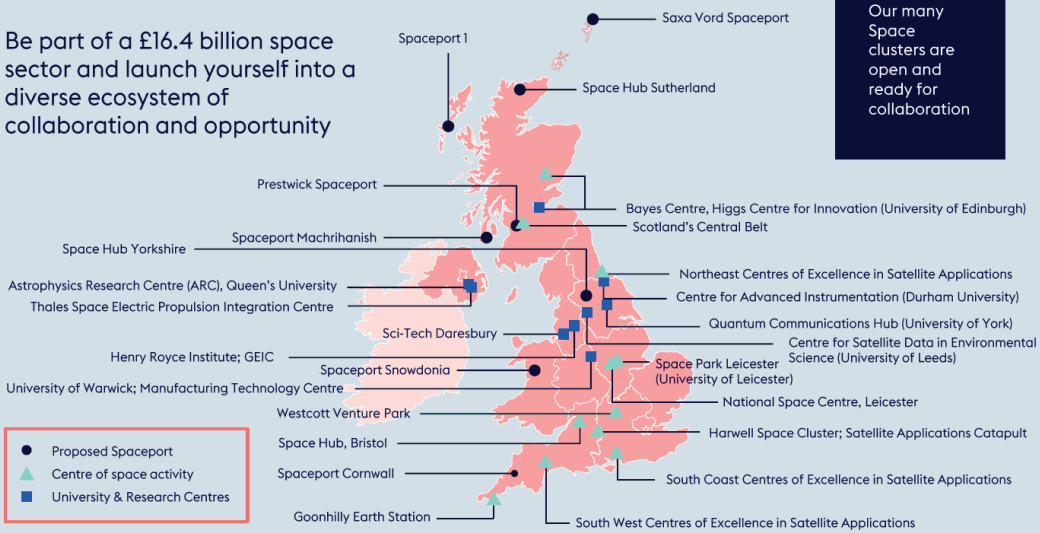
UK's unparalleled R&D capabilities, encompassing numerous Centres of Excellence across its world-class universities, will allow the nation to play a leading role in the space industry in the coming years. The UK Government is committed to supporting the UK's leading position by aiming to increase R&D expenditure to 2.4% of GDP by 2027.

Supporting Ideas and Innovation

Numerous initiatives offer expertise across technology development from research, innovation and design through to full scale manufacturing. The Satellite Applications Catapult helps to develop new products and services, and to drive economic growth through the exploitation of space.

Be part of a £16.4 billion space sector and launch yourself into a diverse ecosystem of collaboration and opportunity

Our many Space clusters are open and ready for collaboration



Source: Adapted from National Space Strategy, September 2021; Gov.uk, Boost for space clusters across the UK, Feb 2022

Find out more

Department for Business, Energy & Industrial Strategy

UK SPACE AGENCY

Department for International Trade

UKRI Science and Technology Facilities Council
RAL Space

British High Commission Singapore

AAC CLYDE SPACE

ARCHANGEL LIGHTWORKS

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