



# A world empowered by space

ANNUAL REPORT 2024

We work with



Innovate  
UK

# Chair statement

We sit firmly at the heart of the space services revolution, empowering innovative companies to succeed and driving take-up of technology and applications to shape and sustain tomorrow’s world.

At the Catapult we are focused on addressing system and market challenges to drive the successful commercial expansion of the UK Space sector, and growth of the UK economy.

The UK Government Space Strategy themes are to “Grow and level-up our space economy” and “Use space to deliver for UK citizens and the world” and our new mission-led approach perfectly aligns with this direction. Through our four missions, which you can read about on the following pages, we have started to capture our key opportunities and planned impacts through 2030. I would like to thank all our teams who have worked hard to make it happen and get it right.

### Highlights for 2023

We are investing in our state-of-the-art facilities to support ambitious smaller companies in testing their products and services before they bring them to market. We saw a 112% increase in customers using our technical facilities in 2023. At the same time, we have seen an increasing interest in space from non-space sector stakeholders, including investors at events such as the UK Space Conference and participants in the Unlocking Space for Business project. Last year’s highlights include conclusion of our IOD programme with the launch of IOD-6 with Open Cosmos, which is now sending Atlantic coastal and maritime data back to earth, providing key insights to monitor the sustainable use of natural resources. It has also been a great year for in-orbit servicing, assembly and manufacturing (IOSM) and some of our most exciting collaborations in 2023 took place at our IOSM facility, testing advanced spacecraft robotic arms and controls for future use in space. We have also continued to expand remote satellite connectivity both in the UK and as far afield as Colombia.

### The UK space sector

We need to make sure that successful, innovative UK firms in the space sector have the right support and market conditions to remain based at home in the UK. To retain our significant expertise, we need to develop an environment that supports large-scale investment in the domestic space sector. Otherwise, successful firms will continue to be bought by overseas players or move to other countries in return for investment. Connecting government and industry stakeholders is crucial to show how the Space sector can support economic growth across the country. The new UK Government’s commitment to an industrial strategy and expected spending review are clear opportunities to make UK Space a priority.

### Outlook

I am looking forward to our mission-led approach moving beyond strategy and becoming the delivery vehicle for our activity and impact over the coming year. Our expert teams are in place, and we have strategic development leads ready to engage with the wider market. Going forward, we will deliver on our promise to support the economic growth of a vibrant and innovative sector, while continuing to change and grow with it.



Sanjay Bhandari  
Chair

### 2023 Highlights:

- IOD-6 mission launched, providing data on sustainable resources.
- Expanded satellite connectivity, reaching as far as Colombia.
- Space Solar spin-out in July 2023.
- Increased support for small companies through state-of-the-art facilities.
- The Catapult remains committed to growing the UK space economy and advancing its mission-led approach.



# Chief Executive's statement



John Abbott  
Chief Executive

The Catapult is focused on expanding the adoption of satellite technology across non-space sectors, ensuring commercial growth for the UK space sector.

135  
participants

In the Space Placements in Industry (SPIN) programme.

Successful launch of the IOD-6 mission

Giving companies the chance to trial their services and bring products to market faster.

It has been a transformational year at the Catapult, and there is much to celebrate: from expanded facilities and the launch of our latest in-orbit demonstration satellite to a whole new way of working.

With our new mission-led approach, we are in a strong position to drive the commercial growth of the UK space sector by expanding adoption of satellite technology across non-space sectors. Our mission leads are already bringing a renewed level of focus to the Catapult's work, ensuring we concentrate our efforts where we can make the greatest difference – from advancing our IOSM capabilities to broadening connectivity and making more satellite data available to companies across the UK.

## A team contribution to our success

Our new team of experienced leaders is helping us deliver on those ambitions. I want to thank Paul Febvre and Alan Cox, our outgoing Chief Technology Officer and Chief Commercial Officer, for their tireless efforts over the past decade. They have been instrumental in making the Catapult what it is today and will be greatly missed. I am delighted to now be working alongside Richard Lowe, our new Chief Technology Officer, whose experience across all major space technology disciplines will ensure we stay at the forefront of satellite innovation. With Stephen Potts as our new CFOO, Mark Saxon as our new CEA, and Helen Adams as our new CCPO, we have added even more capabilities and expertise to our senior leadership team.

I am grateful to everyone at the Catapult for welcoming me so warmly: their hard work and dedication is an inspiration. I am excited to engage with the incredible expertise and generous spirit of this industry as we continue to define our focus areas for the coming years.

## Progress during 2023

In 2023, we developed a host of important initiatives across skills and industrial placements, as well as technical facilities development. We are investing in the next generation and have almost doubled our successful Space Placements in Industry (SPIN) programme to 135 participants.

The launch of the IOD-6 demonstration satellite 'HAMMER' with Open Cosmos in March 2024, was a personal highlight. This new earth observation satellite was designed, built, tested, launched and commissioned using our In Orbit Demonstration programme. It joined the Open Cosmos OpenConstellation and will capture hyperspectral imagery on the Atlantic coastal and maritime areas. Onboard AI processing and intersatellite links will improve the service provided by HAMMER. The In Orbit Demonstration programme gave companies the chance to demonstrate their services and helped bring their products and services to market even faster and to grow their businesses.

We believe the UK can take a leadership position in future licensing and regulation of In-Orbit Servicing and Manufacturing (IOSM), helping us to secure a share in the burgeoning IO economy. With projects such as the ongoing upgrade of our IOSM Yard at Westcott, we are building world-leading validation and verification facilities and systems that are easily accessible to UK-based companies for technology and mission testing. Reducing the risks associated with IO missions is crucial for attracting new investment in the Space sector.

## Unlocking global challenges

We are also broadening the adoption of space-based data by commercial and research organisations through projects such as our Earth Observation Data Hub and methane monitoring partnership with GHGSat. Supporting programmes like these and UK Space Agency's Unlocking Space for Business means we can bring the benefits of space-based data to even more sectors in the future.

Space data and technology have a role to play in solving countless global challenges. Expanding satellite communications can bring connectivity to more underserved regions, unlock access to the digital economy and better support our critical national infrastructure and public services. Broadening access to earth observation data also gives companies and regulators the tools to transform sustainability reporting and enable more effective disaster planning and climate-related mitigation. With our team and mission structure firmly in place, we are even better positioned to enable these advances – and, in doing so, help to establish the UK as a world leader in the science, research and development of space-based technology.

## John Abbott

### Most Important Focus Areas:

- Sustainable Earth: Increasing use of space data, technology and services by non-space sectors and support global climate efforts.
- Autonomous and Connected Earth: Accelerating the development and adoption of new technologies to support Satcoms and Autonomous systems.
- Beyond Earth: Advancing the UK's in-orbit capabilities, bolstering our safety and security and unlocking economic growth.
- UK Economic Growth and Leadership: Establishing the UK as a world leader in the global space economy to support job and wealth creation.



© image: ESA/Measuring\_cyclones

# The Year in Numbers



**£120.51m**

Total private sector funding secured by 9 supported SMEs



**263**

Employee growth in supported companies



**£9.32m**

Total public sector funding secured by 25 supported SMEs



**234**

Supported companies



**115**

Non-space sector companies engaged

# Who we work with





# Our Sustainable Earth

## Supporting climate-displaced people and their communities

Our Sustainable Earth mission cuts to the core of the climate crisis. We have a clear objective to create a more sustainable and secure future for hundreds of millions of people who are facing displacement due to climate change and nature loss.

This mission aims to use space capabilities to help communities:

- build social cohesion and inclusion
- mitigate and adapt to climate change
- reverse biodiversity loss and ecosystem collapse
- promote environmental regeneration
- achieve a safe and just energy transition

Space technologies have a crucial role to play in achieving our Sustainable Earth goals. In 2023, we made significant progress across our key mission interventions, advancing the development of space-based solar power and driving the commercial adoption of space data to further embed the use of satellite observations in the financial sector.

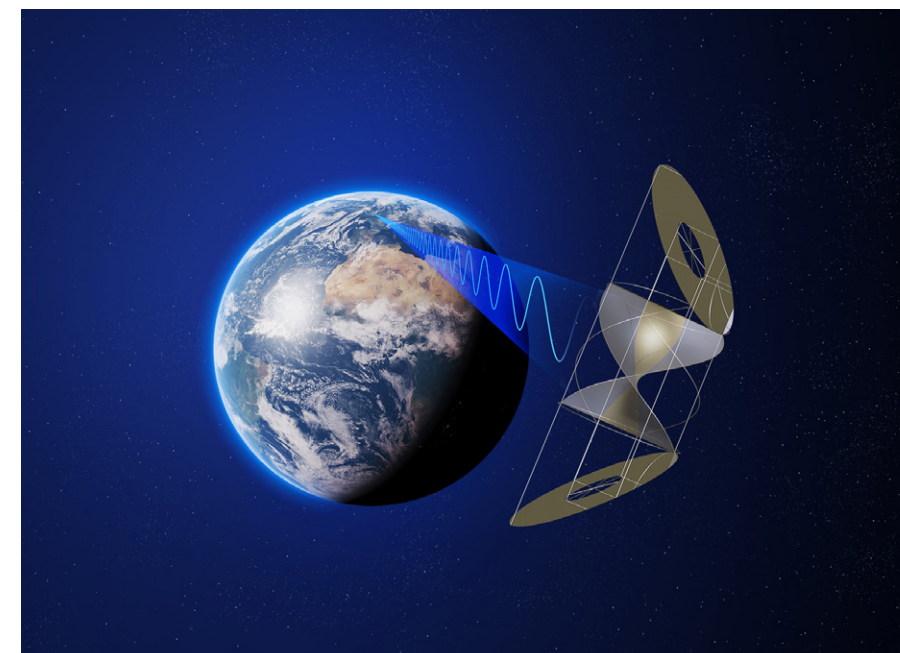
### Space-based solar power

Harvesting solar power in space and beaming it back to earth – day and night, whatever the weather – has the potential to transform our energy system. Securing low-emission baseload power is essential to meeting the UK's Net Zero target.

During 2023, we successfully spun out Space Solar Innovations Ltd, (with the Catapult as a minority shareholder) to develop technological demonstrators for space-based solar power. Space Solar passed a major milestone earlier this year, demonstrating a working prototype of the world's first 360-degree wireless power transmission system.<sup>1</sup> It is now scaling up to develop a system that can deliver power from space.

### Key Facts:

- Space Solar Innovations Ltd successfully spun out in 2023, developing world-first solar power demonstrators.
- Milestone: The first 360-degree wireless power transmission system demonstrated in 2023.
- Promoting satellite technology for environmental monitoring and sustainable finance.
- Focused interventions for climate action: mitigating biodiversity loss, promoting environmental regeneration, and fostering a just energy transition.



<sup>1</sup> <https://www.spacesolar.co.uk/breakthrough-in-space-based-energy-space-solar-demonstrates-worlds-first-360-wireless-power-transmission/>



### Sustainable finance, investment and risk

We are promoting the use of space data in financial markets to drive uptake for earth observation services across non-space sectors. There is growing demand from sustainable investors for better data to understand the sustainability credentials of businesses they invest in and validate emissions-reduction strategies throughout their supply chains. Promoting the benefits of satellite technologies within the finance sector can therefore stimulate demand for geospatial solutions across the economy and drive broader commercial adoption of environmental monitoring.

During 2023, we formed a core team for our sustainable finance intervention and defined its strategy and methodology. Following a detailed market analysis, we are increasing our work with environmental consultancies that use satellite data on behalf of companies that are setting ESG-related targets.

In partnership with Route2, an organisation providing sustainability reporting and advice to companies and investors, we are developing data-driven sustainability indicators. We are collaborating on three test cases, the first on soybean production and deforestation impacts on Indigenous territories in Brazil.

We have also conducted a study for National Highways to identify the most effective earth observation technology for measuring and monitoring biodiversity along the UK's road network, and worked with the UK's Foreign, Commonwealth and Development Office, drawing on satellite images and other geospatial data to support humanitarian relief efforts in Yemen.

Other projects include:

- **IOM Armenia Data Integration:** We have built a migration and climate change decision support tool with the UN International Organisation for Migration and the Government of Armenia. The tool will help policymakers to understand the relationship between migration and the impacts of climate change. It is replicable at national and regional levels and will require collaboration with UK industry to further develop the tool.
- **XCEPT Delivery:** We are providing access to satellite-derived imagery, monitoring, analysis, modelling and forecasting capabilities as part of the UK Government's Cross Border Conflict Evidence and Policy Trends (XCEPT) programme, which aims to inform effective policy and programme responses through better understanding of conflict-affected borderlands.



### Projects Showcase

# Methane monitoring from space

We provide state-of-the-art satellite data for UK organisations to monitor their own methane emissions, and those of their suppliers, driving more effective climate action through a UK Space Agency funded programme.



### Link

See how the Methane Monitoring programme could benefit UK organisations <https://sa.catapult.org.uk/projects/methane-monitoring/>

### March 2025

The UK programme ends on 31 March 2025 but users retain access to archive satellite-data for a further 12 months.

### Why methane is a problem

Methane is the second-largest contributor to global warming after carbon dioxide (CO<sub>2</sub>) and methane concentration in our atmosphere has grown by 16% over the past four decades.<sup>2</sup>

More than 150 countries have signed the Global Methane Pledge<sup>3</sup> to reduce global methane emissions by at least 30% from 2020 levels by 2030. However, gathering high-quality data on methane-emitting installations is complex and expensive, and many organisations lack the accurate information needed to reduce their emissions effectively.

### Gathering granular satellite data

Earth observation satellites provide a valuable way to regularly monitor methane on a global scale. Launched in June 2023, our Methane Monitoring Data Supply for UK programme provides UK organisations with access to high-resolution methane emissions data from small satellites operated by GHGSat. Using infrared sensors, it already tracks over 2,000 individual emission sites across the globe, ranging from livestock farms to difficult-to-monitor infrastructure such as coal mines, oil pipelines and landfills. This means companies can effectively monitor sites to address methane emissions across their operations and in their supply chains, reducing their environmental impact.

### Leading the way

Funded by UKSA, our Methane Monitoring Data Supply for UK the Programme is encouraging UK organisations to consider the benefits of using satellite-derived data applications to monitor facilities for emissions in sectors including oil and gas, farming, large industrial processes and waste management.

Enabling UK organisations to develop effective emissions strategies supports the UK's target to reach Net Zero by 2050. Better data also makes it easier for regulators to assess compliance with climate commitments, verify emissions claims and pinpoint where to intervene. Through this programme, we want to incentivise broader adoption of methane monitoring initiatives around the globe.

<sup>2</sup> <https://www.iea.org/reports/methane-tracker-2021/methane-and-climate-change>

<sup>3</sup> <https://www.globalmethanepledge.org/>



# Our Connected Earth

## Affordable connectivity everywhere

Our Connected Earth mission aims to develop solutions to make safe, secure and affordable connectivity possible everywhere. We inspire the development of innovative solutions that will improve peoples' lives, address environmental solutions and build a more inclusive society.

Advancing connectivity is crucial to ensuring safe and secure communication not only for businesses, but also for billions of people. Satellite technology is bridging gaps in broadband coverage in traditional terrestrial communication networks, particularly in remote and underserved areas. As well as supporting sustainability goals, for example by enabling more effective monitoring of forests and water supplies, expanding access to broadband feeds into critical sectors including national security, maritime operations and aviation.

Our two interventions for this mission boost the adoption of new communications technology and offer companies the opportunity to undertake testing at our state-of-the-art facilities.

### Advanced communication capabilities

We developed next-generation solutions in digital connectivity during 2023, with significant progress on several projects. We are championing the rollout of new waveforms including 5G and developing beamforming and phased array antenna systems. By increasing the capacity of next-generation solutions, with minimal investment in new infrastructure, we are bringing the benefits of digital connectivity to as many people as possible.

### Future network testbeds

We operate a range of testbeds designed to drive faster adoption of next-generation networks by helping businesses embed innovative satellite connectivity into their solutions. In 2023, we started working on several new projects at our award-winning 5G testing facilities in Harwell and Westcott:

- Enhancing 5G capabilities in high-density environments, such as stadiums, with shared infrastructure and neutral hosting models
- Developing a fully autonomous robotic platform to improve soil health sampling, monitoring and analysis
- Developing a technical, policy and business roadmap for 5G and satellite connectivity in Türkiye
- Developing and testing a system simulator to advance satellite terminal design for unmanned aerial vehicles
- Creating an end-to-end testbed to explore Next Generation vehicle eCall via satellite

We are exploring other development opportunities and in 2023 prepared a white paper for a UK Telecoms Innovation Network working group on non-terrestrial networks. We also carried out testing for using the ESA-funded ARTES 5G TINA testbed to explore future 3D architectures between terrestrial and non-terrestrial networks (NTN).

### Key Facts:

- **New Waveform Developments:** In 2023, the Catapult made significant progress in digital connectivity by championing 5G and beamforming technologies, enhancing communications capabilities with minimal infrastructure investment.
- **Testbeds in Key Locations:** The Catapult operates 5G testbeds in Milton Keynes, Dorset, and Westcott, focusing on accelerating next-generation satellite connectivity.

## 5G & 6G advancements

Focus on next-generation 5G and exploring 6G for future applications.

### Multiple key projects

Developing a business roadmap for 5G and satellite connectivity in Türkiye and testing satellite terminal design for UAVs.

### Cross-Collaboration

Ongoing partnerships with University of Bristol, University of Strathclyde, and Offshore Renewable Energy Catapult to drive non-terrestrial network innovation and explore 3D architecture for terrestrial and non-terrestrial networks.



We are also engaging with industry and academic partners to develop next-generation satellite collaboration opportunities, including:

- Ongoing strategic partnership with University of Bristol and University of Strathclyde to set up a joint 5G/6G non-terrestrial network capability across our mutual testbeds
- Cross Catapult collaboration with Offshore Renewable Energy (ORE) Catapult on tech transfer to their testbed, integrating NTN into ORE line of work and consultancy for ORE
- Joint bid with University College London for the SafeRoute-6G project under the CELTIC-NEXT Eureka Cluster for next-generation communications
- Collaboration with the University of Surrey on several of our ongoing projects, for example development of a flexible radio performance tool to evaluate the co-existence of terrestrial cellular and non-terrestrial systems



## Projects Showcase

# Connecting rural Colombia

Boosting access to the internet can dramatically improve lives – or even help save them. Whether in remote regions of Colombia or inside UK ambulances, our innovative work on connectivity makes a difference.

Bringing resilient connectivity to rural communities has many benefits, from raising standards of living and education to helping people integrate into society. It cuts to the heart of our mission to bring safe, secure and affordable connectivity to people everywhere, particularly in hard-to-reach regions.

Colombia has 17 fixed internet connections for every 100 inhabitants and ranks last in connectivity among OECD members<sup>4</sup>

Our 'Rural Connected Colombia' project plays a key role in shaping policy and commercialising space/terrestrial 5G communications for rural communities. We are developing satellite technology to connect rural areas in Colombia with reliable and affordable broadband internet, based on our state-of-the-art future network testbeds in the UK. During 2023, we completed feasibility and implementation planning and developed a technical policy and business roadmap, and we are now piloting a connectivity solution with AgriTIERRA before rolling it out throughout Colombia.

### Equipping the ambulances of the future

Two-way communications are essential on both dual-crewed ambulances and smaller rapid response vehicles, and reliable connectivity to medical equipment, ambulance hubs and other emergency responders can mean the difference between life and death.

The Hybrid Connex Digital Ambulance of the Future project, funded by the European Space Agency in collaboration with the NHS, aims to equip the UK's ambulance sector with resilient connectivity by seamlessly combining 4G, 5G and satellite connections. With access to our bespoke testbed facilities, we integrated technology, and de-risked and verified different stages throughout the project's development. The project has created a blueprint for fully connected digital ambulance services, providing community-based care and diagnostic support to patients while eliminating unnecessary trips to emergency departments.



## Link

see how we are helping people to Protect Homes in Colombia <https://sa.catapult.org.uk/projects/rural-connected-colombia/>

**“We’ve gained a comprehensive understanding of the local connectivity supply chains, regulatory framework, and innovation landscape — crucial for delivering sustainable international connectivity projects.”**

Angel Almeida, Senior Telecommunications Systems Engineer, SAC<sup>5</sup>

**“As we move forward with the integration of digital technology to ambulance front line care, we need to be connected. Paramedics need to know they can always have the same information available no matter where they attend to their patients”<sup>6</sup>**

Phil Elvidge EPCR Clinical Lead (Paramedic)

<sup>4</sup> <https://blogs.worldbank.org/en/latinamerica/improve-internet-access-amazonas-colombia>

<sup>5</sup> <https://sa.catapult.org.uk/blogs/the-importance-of-understanding-local-context-in-sights-from-a-colombian-engagement/>

<sup>6</sup> <https://www.ardengemcsu.nhs.uk/services/hybrid-connex/>



# Our Autonomous Earth



## Powering the autonomous applications of tomorrow

Highly sophisticated autonomous services have the potential to transform industries from agriculture and mining to transport and healthcare. We have a critical role to play in building safe and resilient foundations for future satellite-based autonomous applications.

Scaling autonomous systems will create unprecedented demands on satellite systems and services. Through our Autonomous Earth mission, we aim to create a resilient UK-based infrastructure to develop satellite-enabled autonomous services. During 2023, we made progress in several interventions and are now primed to play a larger role in shaping the UK's autonomous future.

### Low-earth orbit

Through our low-earth orbit intervention, we are boosting the uptake of autonomous vehicles and urban systems designed for it by developing infrastructure that supports Position Navigation Timing (PNT) services. Our SAFEROUTE6G project, led by HITEC Luxembourg, focuses on whether 5G and 6G can provide highly reliable, low-latency communications for remote monitoring and driving.

### Coordinated autonomy

Our coordinated autonomy intervention focuses on faster computing that can empower autonomous services and applications for different situations. During 2023, we identified several opportunities, including mail delivery via drone to the Orkney Islands with Royal Mail and developing real-time video analytics, drone swarming capability, situational awareness and UTM integrations within the small satcom segment.

### Drone Test and Development Centre

A major milestone in 2023 was opening our Drone Test and Development Centre (DTDC) at Westcott. The facility provides a runway and flexible workshop spaces for developing innovative drone technology, as well as testing capabilities that support Beyond Visual Line of Sight operation, pilot training and remote flight operations. Our first DTDC customer, Skyports Drone Services, is already using the facilities as its flight operations headquarters.



**“The Catapult’s cutting-edge facility compliments our commitment to innovation. We look forward to continuing our work together to build a world-class drone services hub in Westcott.”**

Michael Merritt, Strategy Associate, Skyports Drone Services

### Key Facts:

#### 2023 Milestones

- Significant progress in next-generation solutions for digital connectivity, with a focus on new waveforms such as 5G and beamforming.

#### Testing facilities

- Milton Keynes, Dorset, and Westcott are driving innovation in 5G and satellite connectivity.

### Key Projects:

- Enhancing 5G capabilities** in high-density environments (stadiums, neutral hosting models).
- Developing** a fully autonomous robotic platform for soil health monitoring.
- Creating** a business roadmap for 5G and satellite connectivity in Türkiye.
- Testing** a system simulator to advance satellite terminal design for UAVs.
- Exploring** an end-to-end testbed for Next Generation vehicle eCall via satellite.

<sup>5</sup> <https://sa.catapult.org.uk/blogs/the-importance-of-understanding-local-context-insights-from-a-colombian-engagement/>

<sup>6</sup> <https://www.ardengemcsu.nhs.uk/services/hybrid-connex/>



# Beyond our Earth



## Breaking down barriers to innovation

Our Beyond Our Earth mission aims to revolutionise the space industry by establishing a thriving in-space economy with a robust services sector and logistics infrastructure – fostering collaboration, accelerating innovation and expanding possibilities.

The in-space economy represents a tremendous growth opportunity for the UK space sector. Commercial activity in space will span a wide range of applications from logistics services and infrastructure development to manufacturing and exploration. The UK has globally recognised expertise in autonomous robotic systems, in-space close-proximity operations, satellite manufacturing, space domain awareness, space regulation, insurance and finance.

UK leadership in strategic areas of the in-space economy will generate high-skilled employment, enhance national productivity, ensure security of sovereign space assets, and foster economic growth.

### Advanced robotics to lead in-orbit operations

There are an estimated one million pieces of space debris between 1cm and 10cm in orbit, many from disused satellites. Tackling space debris is vital for future space exploration and protecting our everyday services – from the financial system to weather forecasting and broadband – and presents an ideal proving ground to perform close-proximity in-orbit operations with advanced robotics. Increasing this capability could unlock a range of commercial opportunities in space beyond debris removal, including spacecraft servicing and the manufacture of large structures in orbit.

Our IOSM intervention helps to develop the technology and systems needed for servicing and repairing satellites in orbit and upgrading their capabilities with new hardware and software. The Beyond Earth team lead our IOSM activities which includes our Robotics Development Centre at Westcott, with expertise in robotics, manufacturing and in-orbit operation.

In 2023, we introduced a system from a UK-based business, Extend Robotics, to operate a robot through a virtual reality headset. We have also developed a data integration toolset that harvests and collates data from our robots and motion capture system. We reached a key milestone with our new collaboration agreement with UKAEA's Remote Applications in Challenging Environments (RACE) robotics centre and are working on joint activities with the nuclear sector. Alongside the Innovate UK Business Connect, Offshore Renewable Energy Catapult and High Value Manufacturing Catapult, we are developing a Service Robotics Proving Ground, a new network of centres with the resources for robotics companies to test and develop common standards and methods.

“While the space industry has assembled structures and serviced them in the past, it has been extremely costly. We need to remove these barriers and use robotics as we expand our reach beyond Earth.”

Jeremy Hadall, Robotics Development Lead, SAC

### Key Projects:

- **Space Debris:** Over one million pieces of debris between 1 cm and 10 cm are currently in orbit, posing risks to satellite operations and space exploration.
- **Advanced Robotics:** In 2023, collaboration with Extend Robotics enabled remote robot operations through virtual reality, enhancing in-orbit servicing capabilities.
- **Robotics Development Centre:** The Catapult's Robotics Development Centre at Westcott is leading innovations in in-orbit operations, servicing, and robotic manufacturing

### Space Economy Growth

UK leadership in the in-space economy will generate high-skilled employment and enhance national productivity, with a focus on services, manufacturing, and space infrastructure.

### In-Orbit Operations

Progress in space robotics and in-orbit servicing opens new opportunities for debris removal, spacecraft servicing, and the manufacture of large structures in orbit.

### Collaborative Milestones

Key partnerships in 2023 with UKAEA's RACE Robotics Centre and other UK-based organizations are advancing space robotics and nuclear sector applications.

<sup>7</sup> The NASA ORBITAL DEBRIS PROGRAM OFFICE quotes 500,000 items at 1-10cm <https://orbitaldebris.jsc.nasa.gov/faq/#>  
ESA says 'the actual number of space debris objects larger than 1 cm in size – large enough to be capable of causing catastrophic damage – is over one million' [https://www.esa.int/Space\\_Safety/Space\\_Debris/ESA\\_Space\\_Environment\\_Report\\_2024#:~:text=The%20amount%20of%20space%20debris%20in%20orbit%20continues%20to%20rise,than%2010%20cm%20in%20size.](https://www.esa.int/Space_Safety/Space_Debris/ESA_Space_Environment_Report_2024#:~:text=The%20amount%20of%20space%20debris%20in%20orbit%20continues%20to%20rise,than%2010%20cm%20in%20size.)



In 2023, the Low Earth Orbit (LEO) Manufacturing Cluster successfully secured International Bi-Lateral Funding from UKSA to develop a business case for a space-based IOSM Testbed. We engaged international partners to develop a LEO IOSM Testbed and advance skills, technology and regulation for IOSM. Alongside Canadian company Obruta Space Solutions, we assessed the commercial viability of the testbed, conducted research to support the development of an IOSM governance framework and developed a communications strategy.

We also launched the Business in Space Growth Network Advanced Materials Bridging Phase project to accelerate at least two commercial ventures that are developing space-based advanced materials research and manufacturing technologies for IOSM, helping them to mature commercial, technical, programmatic and funding aspects so they qualify for ESA programmes.

In May 2023, we signed an agreement with Open Cosmos, a space mission and data provider, to initiate our expanded in-orbit demonstration programme, IOD-6, and launch a demonstration satellite to join the Open Cosmos OpenConstellation. The HAMMER in-orbit demonstrator satellite launched successfully in March 2024 and now monitors the north Atlantic coastal and maritime areas, providing valuable data to help analyse environmental conditions and the marine traffic in the region. Onboard AI assists with tasking the satellite more efficiently and inter-satellite communications allow Open Cosmos to access data from the satellite in near-real time – enabling it to assist with marine rescue or disaster response, for example.



## Project Showcase

# A stronger Space

We are growing our understanding of the opportunities presented by ever greater access to space and accelerating the speed at which ideas can become reality. IOSM will revolutionise how we use space assets: extending their lifespan, reducing the cost of space operations and enabling new capabilities.



# £1.2–£4.0 billion

Growth in value of the global use of advanced materials, including composites and alloys in space industry technologies from 2023 to 2035.

## Taking responsibility to protect our everyday services

IOSM allows key activities such as inspection, repair, assembly and upgrades to be carried out in space. The Catapult provides UK organisations with access to world-leading IOSM expertise and facilities.

In May 2023, we launched our state-of-the-art IOSM Yard at Westcott. This is the UK's first IOSM facility and it is capable of verifying, validating and demonstrating IOS operations and technologies before launch, using robotic equipment to simulate a microgravity environment. We have already conducted trials at the Yard with operators for commercial contracts and grant-based activities and attracted £2 million in further funding to upgrade the Yard's functionality from UKSA. In 2023, we hosted multiple visits from Government departments and commercial organisations from the space as well as automotive, energy and maritime sectors.

“Facilities such as the IOSM centre at Westcott will support the UK’s ambition to become a leading nation in IOSM within the next decade.”

Ray Fielding, Head of Space Sustainability, UK Space



# Cross cutting

National capabilities and regional clusters

## Growing the UK space sector across the UK

Our vision is a robust and interconnected UK Space Ecosystem enabling innovation and growth, encouraging collaboration and technological advancement, and bringing economic benefits to all parts of the UK.

### Driving innovation through our Space Clusters

In 2023, UKSA announced £6.5 million funding to support regional Space Clusters – dynamic hubs with local leadership that foster space innovation. These hubs enhance knowledge exchange, raise the profile of industrial, academic and infrastructure capabilities, and increase collaboration in the industry.

Working collaboratively across the ecosystem to support businesses to start up, scale and innovate, and connecting different communities to benefit from space data and technology, means we can develop national capabilities and meet National Space Strategy priorities.

## £6.5m

funding in 2023

To support regional Space Clusters.

### Our Regional Clusters Advisory Board (RCAB)

Our RCAB governs our regional programme by:

- Providing a centralised forum for knowledge sharing and collaboration between stakeholders including Government
- Enhancing awareness of opportunities for Cluster leads and the wider Space Ecosystem
- Providing advice on policy and interventions affecting the Space Ecosystem

In 2023, we refreshed our RCAB Board to include members from industry, the Department of Business & Trade (DBT) and the Department for Levelling Up, Housing and Communities (DLUHC).

“Facilities such as the IOSM centre at Westcott will support the UK’s ambition to become a leading nation in IOSM within the next decade.”

Ray Fielding, Head of Space Sustainability, UK Space Agency

### Developing a national ecosystem

We support industry and academia to find the infrastructure they need to help research, innovate and commercialise products and services. In 2023, we published a dynamic Infrastructure Capabilities Map so industry and academia can access the infrastructure they require.

Published in March 2024, the Government’s Space Industrial Plan includes a section on Developing the UK’s Space Ecosystem. We organised three workshops with Space Ecosystem partners to get their input on collaboration, high-impact projects and harnessing capabilities across UK regions. A report featuring the findings will be published in 2024.

### Link

Visit the Space Capabilities Map <https://sa.catalogue.pult.org.uk/space-capabilities-catalogue/>

### Our Connected Capability Networks

We are developing Connected Capability Networks (CCNs) to support development of the specific capability requirements of our missions and the National Space Strategy. Managed by our regional Space Clusters, they link community activity, support research and development into commercial opportunities, and establish links to adjacent sectors.

### Connected Capability Networks (CCNs)

These networks are crucial for developing the specific capabilities needed for national missions and the National Space Strategy, with the first network (UK-EONS) launching in January 2024.



Our first CCNs launched in 2024:

- Sustainable Earth – UK Earth Observation Network for Sustainability (UK-EONS), launched January 2024. Led by Space Hub Yorkshire and delivered by a consortium of partners across the Space Cluster and Earth Observation capability communities.
- Connected and Autonomous Earth (UK-ACE), launched March 2024. Led by the Harwell Space Cluster, UK-ACE champions the integration of satellite and terrestrial networks, ensuring seamless connectivity irrespective of location.

Skills and Knowledge Exchange

Our Skills and Knowledge Exchange intervention included workshops, R&D projects, thought leadership and skills development. This intervention addresses a key area of the National Space Strategy, and aims to address critical skills shortages, foster innovative collaborations between academia and industry, generate strong partnerships with Government, and deliver UK Thought Leadership, all of which support growth of the UK’s space sector. Skills highlights:

- We run the SPIN (Space Placements in Industry) programme, which provides university students with paid internships in companies in the space sector and will double in size in 2024.
- More than 3,000 engagements with young people and students from Key Stage 1 to Key Stage 5, and into universities, describing STEM career opportunities and highlighting the roles available to students.
- We provided support for the inaugural Race2Space rocket engine competition for students from nine universities to hot fire test the rocket engines they designed and built using industry-standard facilities.
- With the Manufacturing Technology Centre (MTC) we supported the Workforce Foresighting Hub project to ensure the skills of the future workforce meet the needs of IOSM. The workforce foresighting programme is used by Innovate UK, UKRI, Skills England and the Department for Education to inform the development of degree programmes, apprenticeships, and other higher and further education schemes.
- We are part of the UKSA Space Skills Advisory Panel, developing a national skills strategy, together with representatives from industry, academia and government; and part of developing the Space Workforce Action Plan, which is based on the results of the Space Sector Skills Survey.

Knowledge Exchange highlights:

- The Researcher in Residence programme, funded by the UK Research and Innovations’ Engineering and Physical Sciences Council, and run by us enabled four researchers to work collaboratively with us on projects including baselining space sector carbon emissions; space traffic management and domain awareness; Earth Observation data analysis and links to long-term migration for policy; and enhanced connectivity.
- Coordinated a Knowledge Exchange sandpit with University College London (UCL) researchers. UCL unlocked c.£40,000 funding to offer to researchers to explore solutions in air quality assessment; space traffic management and domain awareness; and off-Earth power supply and generation.
- As part of the Academic Expertise Portal (AEP), we recruited an Academic Engagement Lead to develop the portal within the UKSA Local Growth Collaboration Award. The AEP maps UK academic capabilities in the Space sector for consultants, researchers and industry to build consortia, partnerships and conduct analysis. This tool has data from 1,245 researchers at 46 universities, spanning 37 research areas and 309 specialities.
- Issued 50 Letters of Support in 2023 and 2024 enabling growth and innovation across the sector, unlocking funding for critical collaborative research and development.

Strategic facilities

# Supporting SMEs to scale

Our world-class facilities remove barriers to growth for the UK’s space industry, providing state-of-the-art capabilities that support innovative companies in developing and testing their products and help them to get to market more quickly.

We provide smaller companies with affordable, flexible access to technical facilities and equipment, as well as expert support in robotics, design, manufacturing, assembly and integration of complex systems.

Our facilities



Harwell,  
Oxfordshire



- **Disruptive Innovation Space Capability (DISC):** Satellite Assembly Integration and Test facility with clean rooms, environmental and thermal vacuum chambers.
- **RF and Antenna test facilities:** including far and near field ranges, and smaller RF test equipment.

“The use of the Catapult’s facilities has been invaluable; we wouldn’t be able to safely perform these tests so quickly without them.”

Dr. Hira Virdee, CEO, Lumi Space



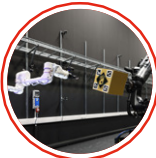


“Our collaboration with the Satellite Applications Catapult at Westcott has taken us a step closer to launching our technology into space and being a commercial provider of green space propulsion systems.”

Dan Etenberg, CEO, LIA Aerospace



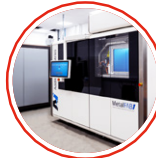
Our RCAB governs our regional programme by:



- **Westcott Innovation Centre:** stimulates the growth of new high-tech businesses and jobs, focused on novel propulsion systems for space and the development of unmanned aerial vehicles using satellite infrastructure in fields such as agri-tech.



- **Incubation Centre:** home to our Westcott Incubator and Accelerator Programme.



- **MetalFAB1 Additive Manufacturing:** facility with laser powder bed fusion technology to allow cost-effective creation of complex geometries and strong lightweight parts, with application in rocket engine development for in-space propulsion.



- **Drone Test and Development Centre:** purpose-built testing and development centre, including facilities to design, build, test and operate advanced remotely piloted and autonomous aircraft or drones.



- **Future Network Development Centre:** open and accessible test facility with satellite and terrestrial capabilities.



Launched in March 2023, we completed the first stage of the Safety Management System at our DTDC, ensuring safety practices meet Civil Aviation Authority Regulations and ensuring a systematic approach to managing safety risk. We reached a key milestone in early 2024, with full operational capacity as more organisations are making our DTDC home to their drone operations.





# Business Support

## Business Support

# Making the UK space sector more accessible

From business growth advice to technology and service acceleration, we set up space companies for success.

Our Business Support team provides services for start-ups and SMEs interested in using space data and technology through partnerships with UKSA, UK Space Accelerator and ESA Business Incubation Centre UK.

Our free-to-access resources include the Space Enterprise Community platform, which raises awareness of events, funding and collaborative opportunities, and the Space Capabilities Catalogue, which details the businesses and academic institutions in the UK space sector. We also run networking events for SMEs looking for financing and investors interested in the UK space industry, such as our first InvestSpace event in 2023.

### Environmental Space Living Lab (ESLL)

The Environmental Space Living Lab (ESLL) is a pioneering initiative which units space, business, and technology experts with policymakers, academia, and end users to tackle critical environmental challenges in water, soil, and biodiversity. Using satellite-enabled technology, ESLL drives sustainable agricultural and land management practices that foster business growth, protect natural landscapes, and create lasting social and environmental benefits.

Since its launch in September 2023 at Petroc, North Devon, ESLL has introduced the Green Technology Innovation Voucher scheme to provide tailored support and access to its facilities.

“Satellite-enabled technologies can accelerate the UK’s path to a carbon-neutral future, transform environmental management and increase agricultural sustainability.”

Lucy Edge, Chief Operating Officer, SAC





Explore the Map Impact Case Study

Scan the QR code or [click here](#) to read about how we are enhancing biodiversity conservation through the Innovate UK EDGE RTO Growth Grant.



Space Commercialisation Engine (SCE)

Located at Leicester Space Park, the SCE offers targeted support to help businesses get their Earth Observation (EO) idea from concept to prototype and then to market, quickly. Managed by the Catapult, organisations have access to experts at every stage of the product development process.

In 2023, we held an Earth Observation for Sustainable Finance event to raise awareness of the opportunities of space technology for sustainable finance applications and highlight the SCE to potential investors. By increasing the sources of external funding available we will be able to help more businesses to bring their ideas to market.

Business Sprints

Our Business Sprint service offer targeted 1 to 1 support to high potential businesses that have impactful and novel applications that are underpinned by satellite technology. We work with businesses that we can offer the biggest impact to, and where the business can have the biggest impact on the world.

In 2023, we worked with businesses including:

- **Agtelligence** – shaping a service around sustainable farming solutions and monitoring.
- **Dilify** – shaping a technology direction and business case focused on the Indian rubber supply chain into Europe and the impending EUDR deforestation legislation.
- **Royal Horticultural Society** – exploring a State of Gardening report to identify biodiversity with cultivated gardens
- **Urban Data Dynamics** – shaping an EO solution for monitoring yellow disease within sugar beet crops. We are supporting a forestry monitoring solution with an application to building to prototype.

Spark Exploration workshops

Our Spark sessions identify opportunities for space technology that address sectoral challenges. Each session brings together partners in satellite technology and business strategy, sector experts and key stakeholders. We also offer post workshop support to help identify next steps to achieve the desired outcome.

In 2023, we ran workshops with Ordnance Survey Northern Ireland to identify opportunities for increasing government adoption of EO data; explored data cyber security opportunities for the space sector with the Space West Cluster; and worked with the University of Exeter, Devon County Council and Somerset County Council on water quality monitoring using EO data.

Innovate UK (IUK) Business Growth (previously Innovate UK EDGE)

The Innovate UK Business Growth programme offers UK companies access to the facilities and expertise of the Catapult network and Research and Technology Organisations (RTOs) with grants of up to £15,000 for businesses looking to grow and scale. In 2023, we completed projects with Yeet, Spire and Map Impact, Progressing Rocket Engineering and Darwin CAV projects. The programme enabled the companies to access Catapult technical experts or facilities such as our Operations Centre Facilities at Harwell.

Investment / International / Ignite leaders and Government work

A springboard for innovation and investment

Many start-ups and scale-ups focus on propositions with a hardware or infrastructure emphasis and large capital requirements, requiring diverse investment including from institutional investors such as pension funds.

London – a global centre for space finance

Our report ‘Creating a Global Centre for Space Finance in the UK’ aims to educate the financial community on the opportunities in space investment. Its findings are based on extensive work with pension funds, capital markets and insurance companies. We launched the report at an event chaired by Mark Garnier MP and attended by the Lord Mayor of London.

The report created a springboard into 2024 and we continued our extensive engagement with investors, trustees, legal service providers and insurers. Our interactions have broadened to include investment consulting firms, and we expect this broader engagement to yield results as we educate the financial community on the opportunities in space investment.

International

Over the past year, we engaged with international stakeholders from government, industry and academia across the Middle East, East Asia, Oceania, Africa, Europe and North America. Through our Ecosystem Mapping Programme, we have delivered projects in Singapore, Canada and Germany to identify mutual areas for space investment and export.

In 2023, our International Discovery Programme explored opportunities for collaboration between the UK and South Africa in the space sector, agriculture, extractive industries and ocean ecosystems. Following an event in October 2023, we are working on an ecosystem mapping programme in South Africa and building relationships with the South African Department of Science and Innovation and the South African National Space Agency.

Government demand creation

We engage with key stakeholders in the UK Government to ensure that our international strategy aligns with broader Government priorities, including UKSA International, Department for Science, Innovation and Technology (DSIT) Space Directorate International and Department for Business and Trade (DBT) Space.

Catalysing adoption

In 2023, we took part in UKSA’s Unlocking Space for Business programme to increase awareness, engagement and demand for satellite data and services from the UK space supply chain in the transport, logistics and financial services sectors. The programme provided 12 feasibility projects with a share of up to £200,000 each to develop innovative studies that combine ground-based and satellite services. We engaged with 300 organisations and provided technical expertise in 30 exploration workshops. We delivered space and satellite learning development modules and developed value propositions to encourage uptake of space data and services by private sector companies.

Read the Creating a Global Centre for Space Finance in the UK Full Report

Scan the QR code or [click here](#) to explore the complete report on creating a global centre for space finance in the UK.





# Financial Highlights

The Group uses the performance model of grant recognition under FRS102, with the whole capital element of grant income being recognised in the year that it is incurred. This results in large operating profits during periods of capital investment and operating losses when depreciation exceeds investment. Operating profit before depreciation for the financial year was £280k.

	2024	2023	2022	2021	2020
	£'000	£'000	£'000	£'000	£'000
Innovate core grant income	16,679	20,298	15,204	11,901	12,000
Collab and comm income	14,472	10,771	15,488	11,539	11,740
<b>Total income</b>	<b>31,151</b>	<b>31,069</b>	<b>30,692</b>	<b>23,440</b>	<b>23,740</b>
<b>Operating profit / (loss) before tax</b>	<b>(3,274)</b>	<b>798</b>	<b>4,348</b>	<b>1,422</b>	<b>(1,284)</b>

The Group has adopted the performance model of grant recognition under FRS102, with the whole capital element of grant income being recognised in the year it is incurred.

This results in large operating profits during periods of capital investment and operating losses when depreciation exceeds investment. The Group's 'normalised' operating deficit for the financial year totalled £1,209k (2023: surplus £217k). As a not-for-profit research organisation, any surplus is reinvested in pursuance of the Group's strategy.

Extracts of the consolidated statement of financial position as 31 March are as follows:

	2024	2023	2022	2021	2020
	£'000	£'000	£'000	£'000	£'000
Fixed Assets	12,832	15,804	14,972	10,924	10,824
Net Current Assets	3,232	4,161	4,321	4,075	2,451
<b>Total capital &amp; reserves</b>	<b>15,409</b>	<b>18,647</b>	<b>17,581</b>	<b>13,380</b>	<b>13,274</b>



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