

# The Microgravity Opportunity: from Lab to In-Space Manufacturing

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We work with



## Vision

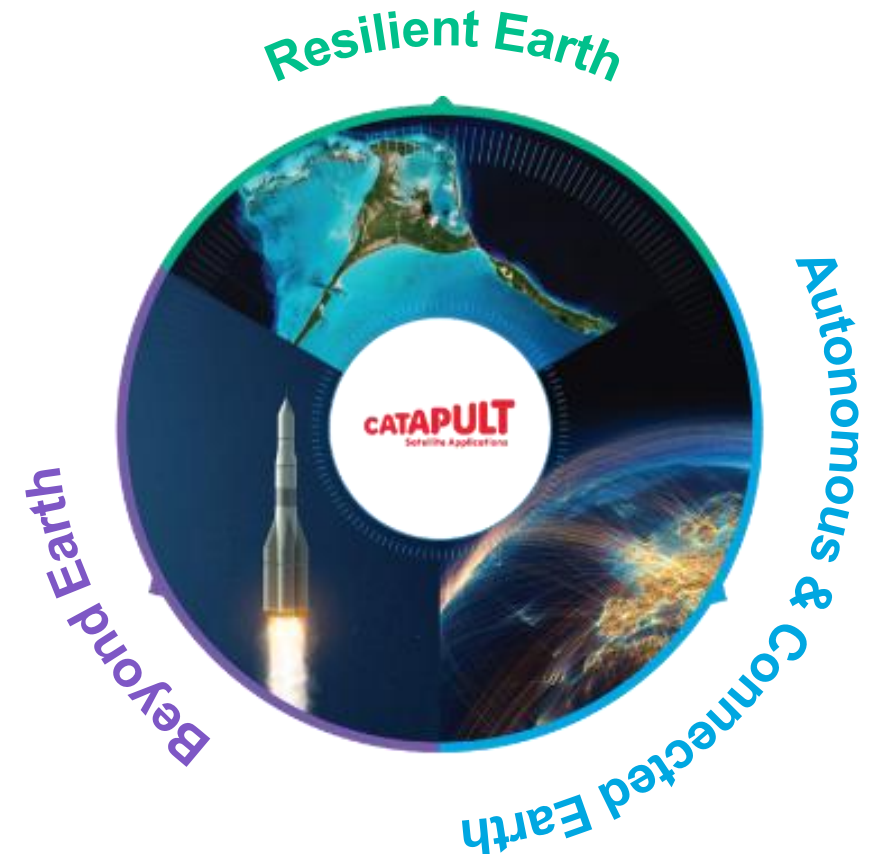
To enable a world-leading space sector to solve some of the world's greatest challenges

## Purpose

To grow the UK economy by supporting our best companies to accelerate the invention and adoption of space data and technology

# A Mission-Led Organisation

**Our Missions** focus efforts on the highest-impact challenges and opportunities for the UK Space sector



**About our Missions**

[sa.catapult.org.uk/missions](https://sa.catapult.org.uk/missions)



# Beyond Earth Mission Overview



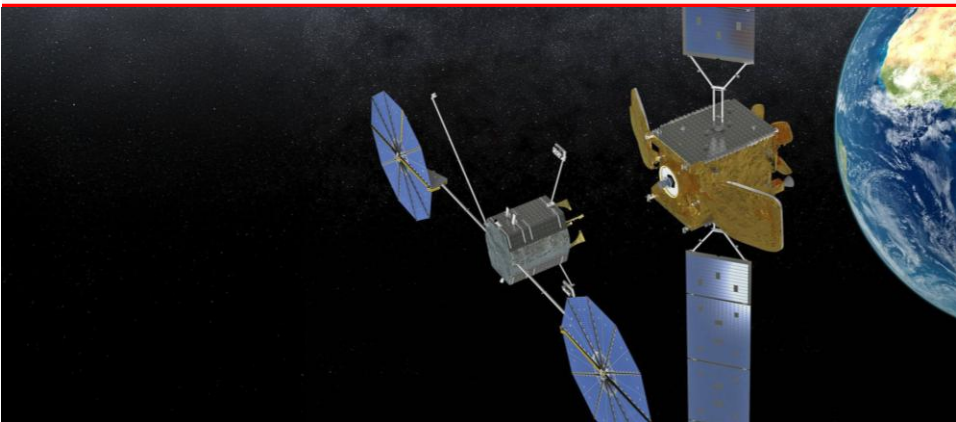
**Purpose:** The aim of the Beyond Earth Mission is to unlock high value markets emerging from the in-space economy.



**Goal:** Establish the UK as an integral supply chain actor and service provider within the global ISAM market by 2035.



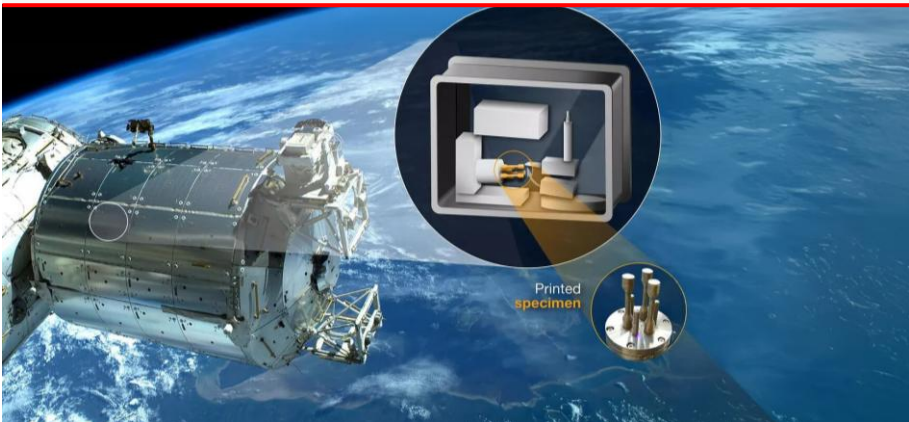
## In-Space Logistics, Servicing & Assembly



Support integration of UK capability (e.g. robotics, proximity operations, spacecraft manufacturing) into the global ISAM supply chain.



## In-Space Manufacturing and R&D



Support the UK to become a globally recognised hub for in-space R&D in biopharma and advanced materials.



# In-Space Manufacturing and R&D

Opportunities for new drug development enabled by space could generate large revenues for the pharmaceutical sector. UK companies are actively engaged in these applications.

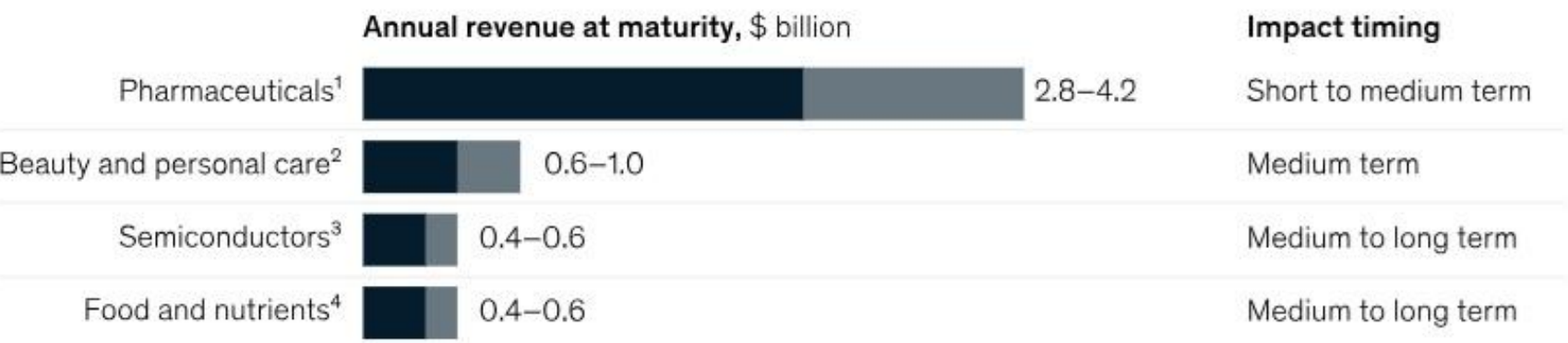
## Advanced Materials

Products such as **semiconductor wafers** and **low loss fibres** command high price per kg and are often used in high-value market such as quantum, telecoms, aerospace, and defence.

## Biopharma

- **Drug Discovery and Design** through crystallisation and formulation studies
- **Drug Screening and Pre-Clinical Testing** through tissue and organoid platforms
- **Regenerative and Personalised Medicine** through organ grafts, and stem cell therapies

Revenue growth forecasts of selected industries if they collaborate with space companies



**Non-Space  
economic  
benefits:  
~\$5bn (2035)**

# There's never been a better time to manufacture in space

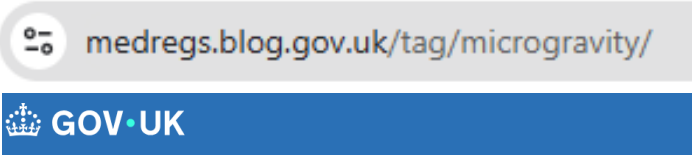
**CATAPULT**  
Satellite Applications



Cosmic<sup>maker</sup>



BioOrbit has successfully launched the world's largest scale manufacturing mission in space, sending its BOX-E autonomous crystallisation unit to the International Space Station.



Blog  
**MedRegs**

**The Next Frontier: unlocking in-orbit manufacturing of medicines**

# The case for microgravity in biopharma



Space provides a **unique environment** for the development of better protein crystals, stem cells, tissues and organoids



While research in space isn't new, **access to space** is increasing dramatically and driving a renewed interest into the benefits for biopharma



Over **3,000 experiments** have been conducted on the ISS, resulting in over **\$2 billion of investment** in the life sciences sector

# ISS research informs new FDA-approved cancer therapy

From a two-hour injection to one minute every three weeks

## Challenge

Keytruda®, a cancer drug by Merck, needs intravenous (IV) infusions because protein crystals formed on Earth are irregular and difficult to concentrate, increasing time at hospital. 350k doses in the UK / year.

## How space helped

Samples flown to the ISS formed more uniform protein crystals. This helped Merck redesign the formulation so it could dissolve efficiently in a small subcutaneous injection rather than an IV infusion.

## Benefits

The new formulation can be delivered in one minute instead of hours, reducing hospital time for patients and easing pressure on healthcare systems. The injectable version received FDA approval in 2025.



ESA astronaut removes Protein Crystallization hardware from an ISS incubator for the CASIS PCG-5 investigation, which crystallized a monoclonal antibody developed by Merck Research Labs.

<https://www.nasa.gov/missions/station/iss-research/space-station-research-informs-new-fda-approved-cancer-therapy/>



# Ultra-smooth protein-based retinal implants

**From a two-hour injection to one minute every three weeks**

## Challenge

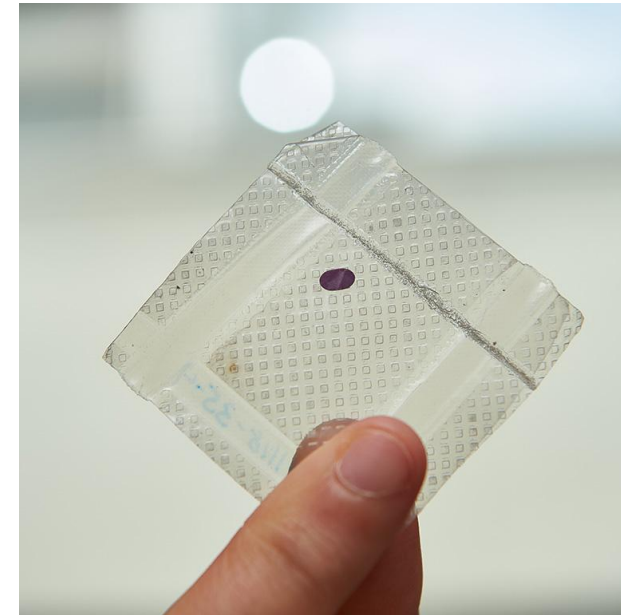
LambdaVision's artificial retina relies on ultra-thin protein films, but gravity-driven convection on Earth makes it difficult to deposit uniform layers, reducing implant performance. 1.5M people affected.

## How space helped

Space Tango CubeLab on the ISS was used to carry out layer-by-layer film assembly in microgravity, eliminating convection and producing more uniform coatings that can be analysed in real time.

## Benefits

Films were twice as smooth, brighter and more reliable. This has sped up human trials for vision restoration, showing how high-value biomedical materials can be manufactured in microgravity.



LambdaVision's tiny protein-based retinal implant. The implant is the small purple dot, about the size of a paper punch.

Media Credit: Peter Morenus/UConn Photo.

<https://issnationallab.org/press-releases/release-ng20-lambdavisision-retinal-implant/>

# Biopharma Microgravity Workshop (April 2025)



## Objective

Convene industry and academic experts to explore the barriers to adopting microgravity R&D, and emergent opportunities to promote the development of new products and therapies.

## Outcome

A shared understanding of the barriers led to the creation of a collaborative roadmap to overcome them, shaping a strategic vision for the **UK to lead in microgravity-enabled healthcare.**

Five workstreams were identified, which are being taken forward through a **Microgravity Life Sciences Working Group.**

## Participants

Organised by Satellite Applications Catapult, Cranfield University, Medicines Discovery Catapult and Weston Strategy Labs

26 stakeholders from 17 organisations



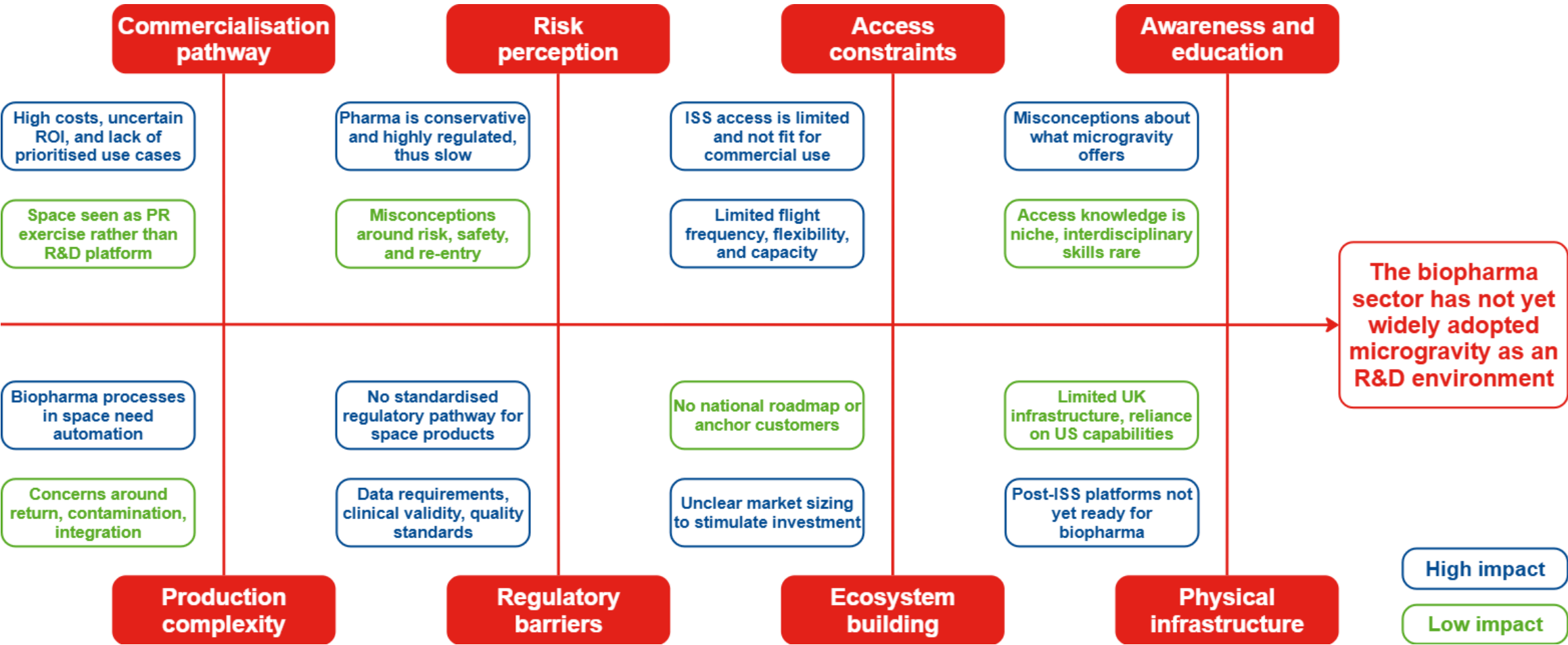
## Download the whitepaper

<https://sa.catapult.org.uk/news/unlocking-the-potential-of-microgravity-a-new-frontier-for-the-biopharmaceutical-industry/>

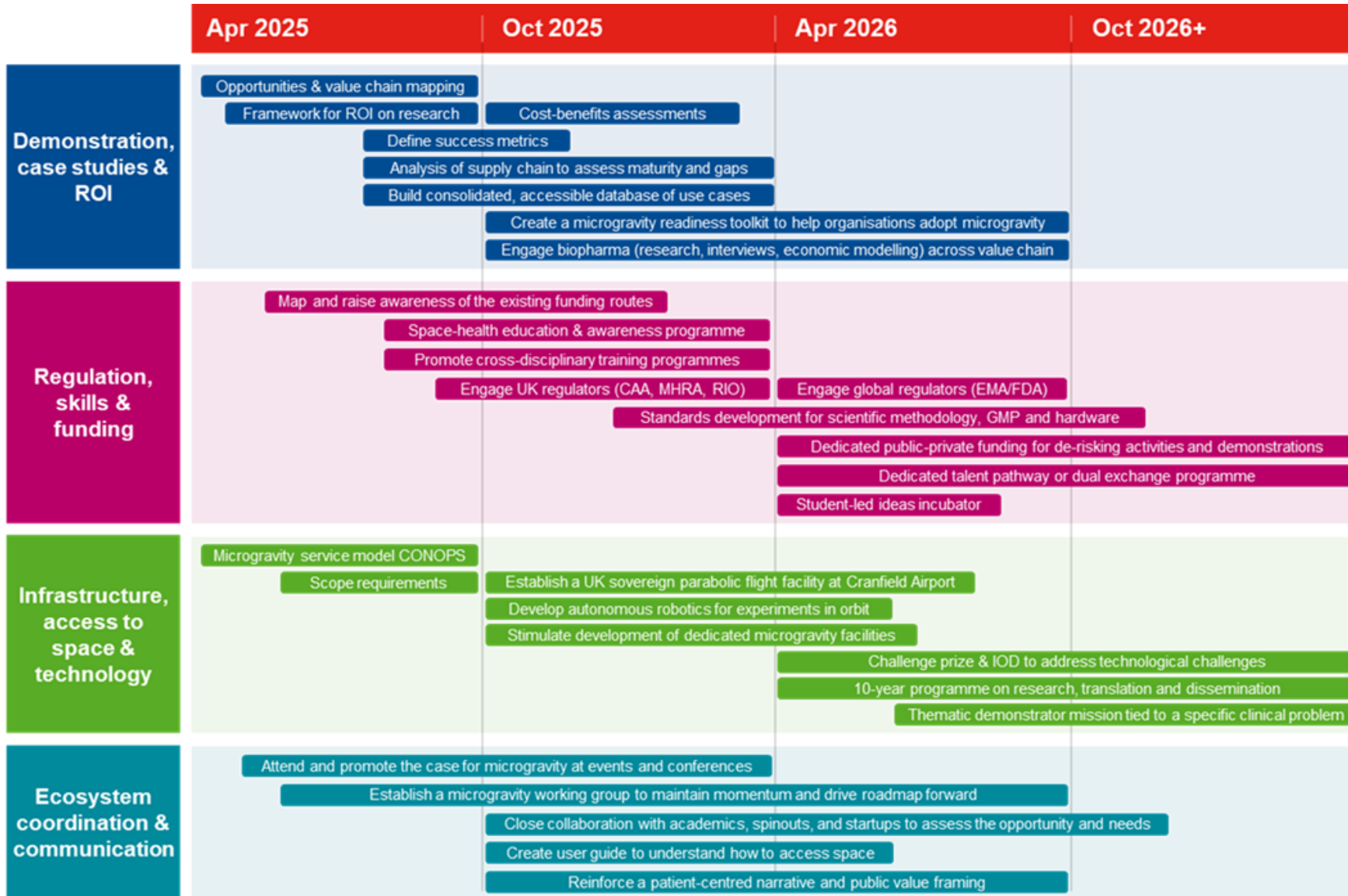


# Despite promise, commercial adoption remains low

Microgravity has already shown benefits for patients on Earth. The challenge is making it accessible and commercially viable.



# The future we need to build: a roadmap for adoption





# Engaging stakeholders: UK-Beyond Earth Network

A network of five space clusters to **accelerate space-enabled R&D**.  
UK-BEN maps the microgravity ecosystem, engages with organisations through events and drives collaborative R&D

Leading the **Microgravity Life Sciences Working Group**:

- Support the development of the **business case**
- Facilitate **knowledge exchange**
- Build a cohesive cross-sectoral **ecosystem**
- Support evolution of **regulatory frameworks**
- Improve accessibility of **space infrastructure**



UK - BEN | Powered by **Satellite Applications Catapult**

- **North West Space Cluster**
- Space Wales
- Harwell Space Cluster
- Westcott Space Cluster
- Space East
- Hertfordshire Futures



# A year of progress in microgravity R&D

## A community-led programme of events, publications and engagements



UK - BEN | Powered by Satellite Applications Catapult

### Knowledge Exchange

UK-BEN and Plastron event  
“Microgravity: Just Another  
Research Environment”. 50  
attendees, 3 project ideas

Planning a workshop to  
engage with life sciences  
organisations that have  
already been to space



### Business Case

Catapult x IBIC Microgravity  
Biopharma Accelerator. 2  
projects being accelerated

UK Microgravity  
Demonstration Programme  
Expression of Interest



### Regulation

Engaging with health system  
value chain to understand  
regulation and embed  
microgravity into regulations.

UKSA, MHRA, RIO and CAA  
joint statement published in  
March and blog update in June



### Ecosystem

Attended Making Pharma,  
J&J Space Day, Health from  
Space, Global Microgravity  
Research Forum, ELRIG  
Drug Discovery

Building a marketplace of  
microgravity providers



# IBIC Collaboration: Microgravity Biopharma Accelerator



**We are working with the Industrial Biotechnology Innovation Catalyst (IBIC) to translate academic research into commercial microgravity R&D**

## The opportunity

- Turn academic research into industrial applications
- Position microgravity as another research environment
- Support growing biotech companies across the North West
- Develop credible and fundable microgravity R&D projects



## Why it matters

- De-risks microgravity-enabled biotech innovation
- Strengthens North West leadership in life sciences
- Helps validate use cases and turn them into funded projects
- Builds a scalable model for growing the UK's microgravity economy



# UK Microgravity Demonstration Programme



**We are inviting UK organisations to propose microgravity research or manufacturing projects on the International Space Station.**

## **Support available:**

- Support for 2–3 high-impact projects
- ~15–30% funding contribution
- Technical, commercial & mission delivery support

## **Who Should Apply**

Companies, research orgs, consortia with clear microgravity advantage + commercial potential

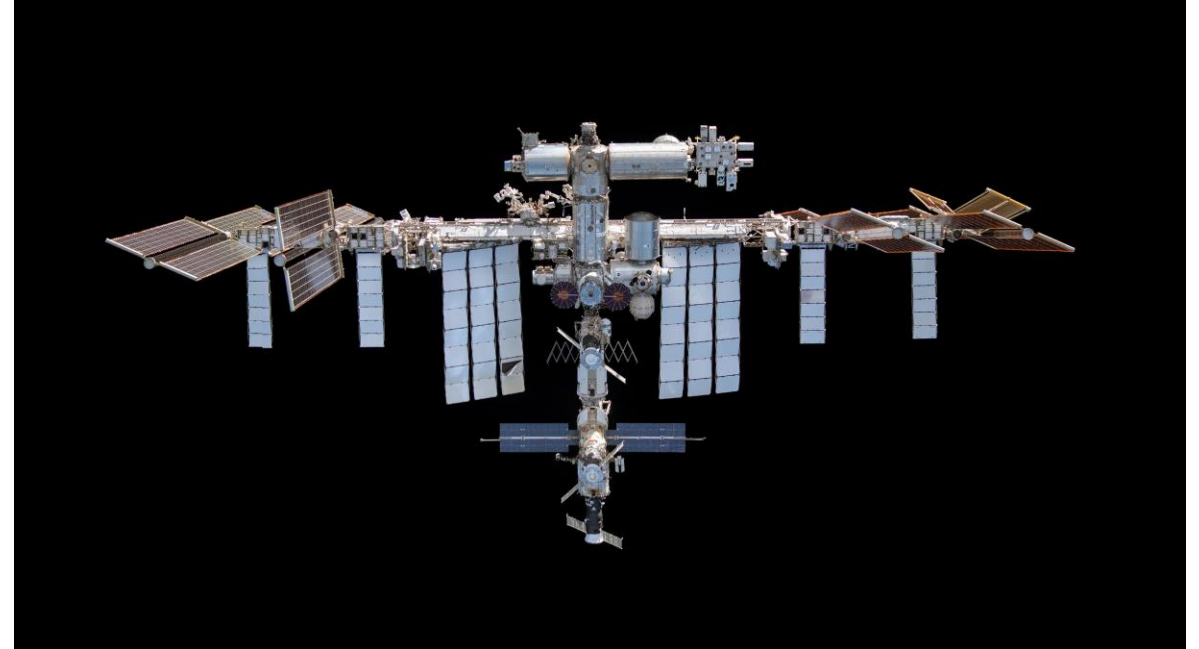
## **Key Challenge Being Addressed**

Reducing barriers such as cost, technical complexity, and access to space missions.

## **Next Steps**

Submit Expression of Interest (EOI)

Shortlisted projects progress to feasibility discussions



**Microgravity  
Demonstration EOI**





# From interest to implementation

**Microgravity-enabled biotechnology and drug discovery in the UK is moving from scientific curiosity towards implementation and commercialisation.**

## **One year later, we now have**

A defined collaborative roadmap

An active working group operating across five delivery pillars

Funded pilots in development

Ongoing regulatory engagement

A growing and more coordinated ecosystem

**Microgravity  
Demonstration EOI**



**Read the  
whitepaper**



**Join the MLS  
LinkedIn Group**



**Listen to our  
podcast**



# Thank you

**Visit our website to find out more and to get in touch with our teams.**

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