

# **NORTH EAST SPACE STRATEGY**

# Introduction

In 2022, the James Webb Space Telescope returned its first images, after a 1.5 million kilometre journey into space. Onboard the telescope are optics developed by Durham University's Centre for Advanced Instrumentation, based in North East Technology Park (NETPark) County Durham. This is just one of the many achievements of the North East's space industry. With capabilities in areas ranging from secure communications to advanced computing, the North East is poised to seize on the opportunities offered by the new space economy.

**The North East Space Strategy sets a clear path forward for the development of the North East Space Hub.** Building on the significant progress made over the last decade, we are taking the next ambitious step towards becoming a leading centre of the UK space industry. Space is forecast to be a major driver of innovation in the 21<sup>st</sup> century, and the North East is well placed to capture a portion of this significant market. This strategy's vision is to be the guiding point for the creation of a strong regional hub for space activities. We want to bring the North East to the forefront of this fast-growing industry, and create a vibrant centre of innovation and excellence.

**The space sector is of ever-growing importance to the UK.** In 2020, the UK space economy generated £16.5 billion in income and employed close to 47,000 people. Of this, the North East was estimated to have contributed £113 million\*, which represents a significant increase compared to previous years and is considerably more than many other regions in the UK. The sector is increasingly important in the delivery of next generation digital technologies and products. On top of this, the space sector has an integral role in solving some of the most challenging global problems related to climate change, health, security, and disaster management to name a few.

**Due to expected growth opportunities, the space industry presents an exciting opportunity for the North East.** The region is already in a prime position to benefit from the increasing importance of space. We have a strong heritage of engineering excellence from our vibrant history as a centre for the manufacturing and maritime industries. Additionally, the North East already holds a strong base of well-developed space capabilities on which to build further. The North East space cluster consists of more than 50 experienced companies, a workforce of almost 1,400 people and income generated of more than £113 million\* annually. This vibrant ecosystem has supported by the North East Satellite Applications Centre of Excellence (NESACoE) and Local Enterprise Partnerships, and has the opportunity to develop into a fully-fledged, internationally-connected space region.

**Space presents a substantial commercial and economic levelling up opportunity for the region.** R&D and innovation spend by companies within the space industry is significant. The industry caters for a broad range of qualifications, demonstrating a diverse range of skills with a near even split of non-graduate, graduate, and post-graduate employees. The economic potential of space is increasingly being recognised by many countries across the world and several regions in the UK. With its proximity to other space clusters, namely in Scotland, Yorkshire, and the North West, the North East can benefit from significant demand for space-related services and products.

**This strategy lays out the current status of the North East's space ecosystem, and sets out a path for future development and growth.** Executing the actions within this strategy, offers immense potential benefits. The first part of the strategy summarises the regional and national context. The second sets out our action plan and the path forward. The North East Space Leadership Group will shape and enable the vision, mission, and strategy with clear outcomes for the North East of England, helping to contribute towards the UK's aspirations as a space nation. This builds on the significant development work already invested by the North East Satellite Applications Centre of Excellence since 2014.

**Following through on our ambitions presents an exciting challenge ahead. By realising our vision, we aim to establish North East England as a world class, vibrant UK region for Space businesses to grow.**

\*update: £129m in Size and Health of the UK Space Industry 2022

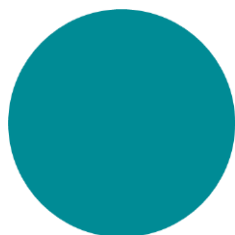
**Our Vision:**

**North East England as a world class, vibrant UK region for space businesses to grow**

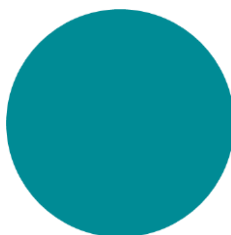
**Our Mission:**

- 1** To work together to build a thriving space cluster, enable businesses to be successful, and grow space sector employment in the region to 10,000 by 2030
- 2** To empower the North East to be recognised as a prime destination for talent to prosper, through developing an excellent infrastructure, skills, research and business ecosystem
- 3** To enable a step change in growth in the North East space economy over the next 3-5 years, and to help deliver the UK's ambition and goals as set out in the National Space Strategy through increased capability and capacity
- 4** To empower the North East to become a fully connected space region, central to the national space industry
- 5** To develop an optimal ecosystem involving business, investors, academia, and public sector, by addressing three key ecosystem components: talent, infrastructure, and investment
- 6** To capitalise on key addressable market opportunities: resilient communications, space sustainability, and Earth observation for climate change

## Strategic Context



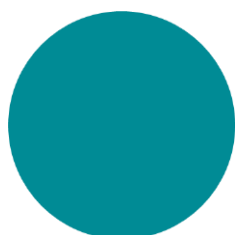
**>\$400 billion**  
global space industry  
in 2021<sup>1</sup>



**\$1 trillion**  
forecast global space  
industry by 2040<sup>2</sup>



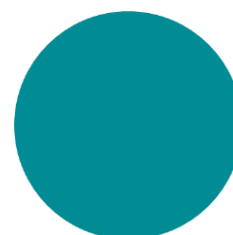
**More than 1 million**  
employees in the  
global space industry<sup>3</sup>



**£16.5 billion**  
income generated by  
the UK space industry  
in 2020<sup>4</sup>



**47,000**  
UK space industry  
employees in 2020<sup>5</sup>



**£836 million**  
space R&D spent  
within the UK in 2020<sup>6</sup>

### Global context

**The global space industry is large and fast-growing.** Estimated at more than \$400 billion in 2021, it is forecast by some to reach \$1 trillion by the year 2040. A wide array of industries are continually increasing their reliance on space for their operations. On top of this, more and more international governments are determined to harness the benefits space can offer. In combination, these factors create a compelling opportunity for the space industry to drive future regional prosperity and job creation.

**The space industry encompasses a large variety of sectors.** From satellite communications and remote sensing, to launch services, space for defence and security, and downstream applications, the benefits that space can offer will only increase in the coming years as technology develops, accessibility improves, and costs decrease. Internationally, many nations realise the criticality of the space domain in enabling global infrastructure, reflected in their policies and national space strategies. As access to space-enabled technology increases and the entry costs decrease, commercial actors can seize the opportunities to provide valuable services to society and the wider economy.

<sup>1</sup> Satellite Industry Association. 2022. State of the Satellite Industry Report; EUSPA 2022, EO & GNSS Market Report

<sup>2</sup> Morgan Stanley. 2020. Space: Investing in the Final Frontier.

<sup>3</sup> OECD. 2019. The Space Economy in Figures.

<sup>4</sup> BryceTech. 2022. Size and Health of the UK Space Industry 2021.

<sup>5</sup> Ibid.

<sup>6</sup> Ibid.

## National Context

**The UK government has set a strong strategic direction for space.** The publication of two critical national strategies clarifies the future direction of the UK space industry, laying a path into the 2030s. Notably, the 2021 National Space Strategy outlines the UK's economic, security and social aspirations in space. Similarly, the 2022 Defence Space Strategy has outlined how the UK intends to use the space domain to bolster its national security capabilities. The Defence Space Strategy saw an additional £1.4 billion of investment in space committed over the coming decade.

**The UK space industry is a resilient and core enabling industry for the UK economy.** Annual space industry related income was £16.5 billion in 2020 and currently underpins over £360 billion per year in UK economic activity.

Space activities in the UK have a clear commercial focus.

- 83% of income is derived from direct-to-consumer and business-to-business sales
- 17% comes from governmental business, of which 9% is attributed to defence uses

Space employment has grown at an annual average growth rate of 6% since 2000, more than tripling in the last two decades.

- Space related employment today accounts for 0.14% of the total UK workforce
- About 47,000 individuals are involved in direct space employment and about 143,000 further jobs are supported by the space industry

Investment in UK space has contributed to strong and consistent growth in the number of UK space organisations in recent years, averaging nearly 21% growth per annum, totalling approximately 1,300 organisations in 2021.

**UK launch is set to further boost UK space activity in the coming years.** From 2022, the first launches from UK soil are set to take place from Spaceport Cornwall, providing an accessible route to orbit for small satellites and boosting opportunities for the UK space industry over the coming years. Additional spaceports are currently under development in the UK, including in Scotland with whom the North East space cluster has developed collaborative relationships and enjoys efficient transport links.

**As one of the UK's thirteen critical national infrastructures, space now plays an integral role in the UK economy.** The space industry is ensuring the continued prosperity of the UK's social, economic, scientific, and security frameworks. Data derived from satellites enables innovation and contributes to the growth of a vast array of sectors, ranging from the finance industry to emergency services. Space is also essential to scientists tracking how human actions are impacting our global environment, contributing to the UK's net zero and climate goals. Satellites can provide decisive data, capable of monitoring climate change and informing policy makers of the most appropriate courses of action. In the defence sector, space provides pivotal capabilities for national and international security. From early warning systems and secure communications, to reconnaissance and navigation services, space is a critical enabler of defence operations in the 21<sup>st</sup> century.

## The North East in Focus

From its world class infrastructure, to its vibrant industry and highly-skilled research ecosystem, the North East holds great potential in the space domain. As the North East capitalises on its strengths and removes residual barriers to growth, considerable opportunities promise to be unlocked by the further development of the space industry.

### Strengths



**The North East Technology Park (NETPark) located in County Durham is a nationally important centre for innovation, fostering the growth of science-based or technological industries. NETPark has been hosting the North East Satellite Applications Centre of Excellence (NESACoE). Now, NETPark will become the nucleus for the proposed North East Space Hub. Proposed future developments include constructing a Disruptive Innovation for Space Capability (DISC) that will provide lab facilities to lower the cost barriers for businesses looking to innovate – as well as those wishing to enter the booming space sector.**

**The North East delivers critical enabling infrastructure.** There are more than ten innovation centres in the region, including the National Innovation Centre for Data, the Offshore Renewable Energy Catapult, NETPark, the Centre for Process Innovation, and the PROTO Emerging Technology Centre. There are two international airports and five seaports, as well as extensive road and rail infrastructure. Two local RAF bases exist in the region, including the RAFX innovation centre at RAF Leeming. Additionally, Teesside has been confirmed as one of the eight new freeport locations across the UK, with current plans setting it up as the largest freeport zone by area in the UK.

**The region enjoys strong support from local authorities and its large number of innovation centres.** The local space sector enjoys significant regional support from multiple Local Enterprise Partnerships and county councils. It also benefits from NETPark in Sedgefield which offers laboratory, clean room and office space and is now one of the UK's premier science parks with 30+ companies and over 550 highly skilled jobs. Some of the most complex optical technologies for space research



and satellites such as for the Hubble and James Web space telescope originate from the site. Since 2014, NETPark also houses the North East Satellite Applications Centre of Excellence, funded by the Satellite Applications Catapult and UK Space Agency, which is now the focal point of the emerging space sector in the region. NESACoE has helped organisations secure £9.2 million in funding, engaged with over 670 entities and seeded more than 280 collaboration links.

**The North East’s local academic ecosystem is exceptional.** The region benefits from its local universities, which include Durham University, Newcastle University, Northumberland University, the University of Sunderland, and Teesside University. Together, these universities provide access to more than 50,000 STEM graduates annually, as well as world-renowned research and innovation projects. The universities are a key contributor to the local talent pool. Some of the recent exciting achievements in the region range from major space weather projects, such as SULIS and research into optical communications at Northumbria University, to Durham University’s work on thermal infrared telescopes and contribution to the James Webb space telescope.

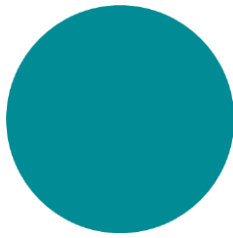
**The North East offers savings on operating costs of more than 30% compared to London.** It is the second least expensive location to hire space-related staff in the UK. The region has a range of incentive programmes and support organisations to assist companies entering the market. It can also offer some of the UK’s most cost-effective Grade A office space – less than a quarter the price of London, and 40% cheaper than Scotland. Currently planned is an £85 million extension of NETPark of up to 12 units from 5,000 to 35,000 sq. ft which is due to be completed within 5 years.

**Leading global aerospace company Raytheon commits to the region, acquiring North East space company NORSS**

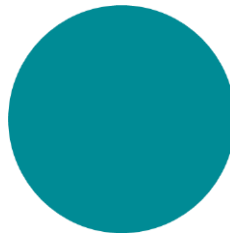
*“Already, 98% of the work Raytheon does in the UK is outside of London. [Our acquisition of NORSS] intensifies our push to the North. We opened in Manchester in 2016 for our cyber division. This puts our space division next to those connected and critical aspects of the future for space”*

**James Gray, Raytheon UK, July 2022**

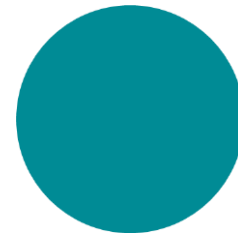
**The North East has already leveraged early investment and partnerships to create space-related labs, prototyping facilities, manufacturing lines, and jobs.** The North East has already leveraged early investment and partnerships to create space-related labs, prototyping facilities, manufacturing lines, and jobs. Community platforms developed by the North East Satellite Applications Centre of Excellence are enabling local stakeholders to engage with each other and explore the opportunities the sector has to offer. Recent funding and investment successes achieved by some of these stakeholders are evidence that this platform, in addition to the activities of the Centre, is enabling the region to become a more significant player in the UK space landscape. For example, the Centre was recently successful in securing Community Renewal Funding with Business Durham and the North East Local Enterprise Partnership to provide a six-month space business support programme in Durham, Gateshead, and Sunderland. Other examples of recent funding successes in the North East include Northumbria University, which secured £500,000 of internal funds to scale up satellite research and curriculum content, along with £650,000 of funding from UKSA to support the development of a laser-based inter-satellite communications system.



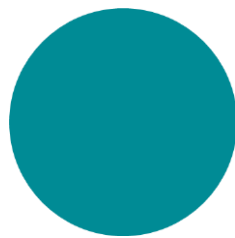
**£113 million**  
North East space  
income in 2020<sup>7</sup>



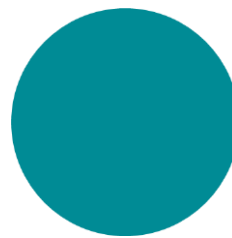
**1,365**  
North East space  
employees in 2020



**90% income growth**  
**2015-2020**



**50% space**  
**employment growth**  
**2015-2020**



**54 space**  
**organisations in**  
**2020**

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<sup>7</sup> BryceTech. 2022. Size and Health of the UK Space Industry 2021.



## Spotlight: Major Investment into the North East's Space Ecosystem



Lockheed Martin is building on the North East's unique capabilities, and supporting space development in the North East, through backing various initiatives, including the North East Skills and Technology Centre, the North East Space Camp, and a £630,000 investment to Northumbria University. This investment will provide additional support to research in optical intersatellite links and the wireless charging of satellites, further aiding the development of skills across the region.



Raytheon recognised the North East's unique capabilities and contribution to the sustainable use of space during its acquisition of NORSS, a North East space situational awareness start-up. This will "enhance the quality of the UK's orbital analysis and space situational awareness technologies" according to Jeff Lewis, chief executive of Raytheon UK.

## Opportunities

**The North East is strategically well positioned to capture a larger part of the national and global space economy.** According to the 2021 UK Space Size and Health report, 54 identified North East space organisations generate £113 million in annual income and employ 1,365 people.\* This represents an increase of 90% in income and 50% in employment between 2015 and 2020.

Through investment in emergent capabilities, and clearing barriers to growth, the North East can accelerate the success of its space sector. By encouraging collaboration between North East space companies, the wider industrial base, academic groups, and the public sector, the region has the potential to create powerful synergies and high value local jobs, as well as boost economic activity and drive positive societal change.

The region's space industry has an array of capabilities and skills that are transferable in disciplines such as:

- Advanced manufacturing
- Automotive and rail
- Telecommunications
- Data science
- Precision engineering
- And our renowned ability to deal with the harsh environments in the energy sector

Over the coming years, the North East will continue to significantly contribute to Net Zero objectives through the North East Driving Electric Revolution Industrial Centre, battery gigafactories, and offshore wind energy generation. In addition, the North East is poised to capitalise on its blossoming digital sector and is one of the strongest regions in the UK for immersive technologies. Further specialist areas include:

- Geospatial systems
- Optics
- Quantum technology
- Astrophysics
- Space science
- Cybersecurity
- Life sciences
- Machine learning and AI
- Robotics
- Gaming, VR and AR
- Advanced materials
- Process and chemicals

*"With its strong manufacturing heritage, highly-skilled workforce and reputation for quality, we've identified North East England as a strong contender for our future operations, potentially creating new high-technology engineering and manufacturing jobs for the region"*

**Nik Smith, Lockheed Martin, March 2022**

**Space can help level up the North East and boost UK global competitiveness.** Space and satellite services, combined with the industry's economic output, hold the potential to be a key driver of the region's post-pandemic recovery and future prosperity. According to the 2021 Size and Health of the Space Industry report, the sector boasts high comparable investment in R&D and is highly skilled when compared to other industries. This places the industry as a key part of the UK's plans to become a Science Superpower and raise its R&D spending as a percentage of GDP to 2.4% by 2027<sup>8</sup>. Finally, the space industry also features relatively high export intensity, with 32% of industry income derived from exports. Space therefore promises economic opportunity from both domestic and foreign markets for the North East.

**The defence industry provides a strong foundation for future North East space growth.**

Alongside the Defence Science and Technology Laboratory (Dstl) presence in Newcastle and RAFX Innovation Centre at RAF Leeming, the North East's space supply chain features multiple players making valuable contributions to the nations' security. Space plays a crucial role in the UK's defence strategy and ecosystem. The UK's £16.5 billion defence budget announced on the 18th November 2021 included funding to build up Space Command as well as to create a national Cyber Force. Capability areas in which the North East is particularly strong, including resilient communications and

<sup>8</sup> ONS. 2022. Research and development expenditure by the UK government: 2020

\*update: £129m and 1310 employees in Size and Health of the UK Space Industry 2022

space situational awareness, are the exact technologies the UK requires in order to be a strong international security player in space.

**Space provides opportunities for meaningful engagement with adjacent regions.** With Scotland seen as a significant centre of activity within the UK space industry, the North East's geographical location offers opportunities for meaningful engagement, particularly with spaceports and launch services for payload development, and in-orbit capabilities. Nearby Glasgow hosts a significant percentage of the innovative European CubeSat manufacturing supply chain. Road, rail, and sea transport links provide easy access to the planned spaceports and also show potential to work in collaboration with the established Scottish space cluster. The North Sea has assets that can provide the ideal environment for testbeds and for businesses to develop new products and services using satellite applications. Yorkshire and North West clusters are a major hub of industry including aerospace and automotive manufacturing with companies such as Rolls Royce and BAE systems, creating potential for collaboration.

## Growth Barriers

For the North East to realise its full potential in space and capitalise on the above opportunities at scale, key barriers must be overcome. The strategic action plan in this report addresses how these challenges can be tackled in order to unlock the full potential of the region.

**Investment:** In order to grow and scale, space businesses in the region, as well as businesses in adjacent sectors require sufficient capability to secure suitable investment finance and funding, and improved access to help them enter and grow in the space market. An opportunity therefore exists to better engage with the investor community and prime manufacturers regionally, nationally, and internationally to help improve access to investment, skills, and infrastructure.

**Skills:** The highly skilled nature of the space workforce means that employees in the industry are extremely productive. However, it also means businesses find it challenging to recruit the people they need for their innovation activities. Businesses therefore need support to define the workforce skills they need for on-going innovation. Education and training suppliers need to understand the skills and attributes needed for successful innovation. Skills challenges in the space industry are not unique to the North East, however, they must be overcome for high growth to be achieved. It is critical that businesses are supported to attract new talent to the industry, equip the existing workforce at all levels with new skills, and horizon-scan for the future skills and talent needs. A skills mapping study performed in 2022 will enable the development of a North East skills roadmap in order to address these challenges.

# Space Capability in the North East



**LEGEND**

- Industry
- Academia
- Catapult/Innovation Centre

As of October 28, 2022

- Drone Lab
- Flo Culture
- Origin Tech
- Realsafe Technologies
- Digital Catapult Immersive Lab Northeast
- PROTO - Emerging Technology Centre

- E2e
- Kratos Communications
- WHP

- aXenic
- Chapter Six
- Evince
- Filtronic
- Kromek
- Silentsensors

Durham University Centre for Advanced Instrumentation

- Centre for Process Innovation (CPI)
- National Centre for Healthcare Photonics
- National Formulation Centre
- National Graphene Application Centre
- North East Satellite Applications Centre of Excellence

Modus

Teeside University National Horizons Centre

Kielder Observatory

Aavid Boyd Corporation

TT Electronics

Ultramap

Reece Innovation

Spincraft ETG

Merit

Heraeus Conamic

Satstream Media

Centre of Excellence for Sustainable Advanced Manufacturing (CESAM)

Nicholsons Sealing Technologies

Connor Solutions

Wessington Cryogenics

Durham

Sedgefield NETPark

ISOCOM

Bignall Group

II-IV Viper RF

CPI - National Printable Electronics Centre

Scoutek

Mowden Controls

Transmission Dynamics

Offshore Renewable Energy Centre

INEX Microtechnology

Nomad Digital

Northumbria University

Law School - Space Law & Policy

Optical Communications Research Group

Solar Physics Group

Newcastle University

Geospatial Engineering Group

Institute for Agri-Food Research and Innovation

National Innovation Centre for Data

Tyne Pressure Testing

Satcom Global

BEL Engineering UK

3DEO

Perfect Image

Ford Aerospace

Sunderland

University of Sunderland

Institute of Computer Science

Institute of Engineering and Advanced Manufacturing

Digital Catapult North East Tees Valley

Altec Engineering

Intelligence Fusion

Geospatial Research

Durham University

Institute for Data Sciences

Institute for Computational Cosmology

Merlin Flex

NEPIC

Middlesbrough

MConnected

Teeside University

School of Computing, Engineering & Digital Technologies

Cubic Transportation Systems

NORSS

NORSS Orbital Analyst Hive (NOAH)

Taotech UK

Analog Group

# Delivery Action Plan

## 1

### **Champion the North East Space Industry**

- We will enable the North East's vision, mission and strategy by presenting clear outcomes for the region
- We will identify and capitalise on opportunities to promote the North East at home and abroad, for example, securing high potential opportunity projects to showcase the North East for space
- We will work with partners to provide a strong narrative articulating the expertise and capabilities of the businesses and five Universities, who already offer over 200 courses related to space
- We will promote and advance North East capabilities to contribute towards the UK's defence ecosystem, in fields including space situational awareness and secure satellite communications
- We will facilitate the organisation of activities that showcase and boost engagement, including arranging investor days, industry tours, and university involvement such as space careers panels

## 2

### **Provide World-Class Space Infrastructure**

- We will work with partners to secure funding to construct a Disruptive Innovation for Space Capability (DISC) centre within NETPark Phase 3
- We will continue to work with partners to promote and operate ongoing programmes, such as the Satellite Applications Catapult's management of the Space Enterprise Lab
- We will scope facilities and infrastructure required in the North East Space Hub and region. We will support regional partners, including universities and the private sector, to develop and grow their provision of facilities and expertise in order to foster further innovation

## 3

### **Invest in Space Capabilities and Skills**

- We will work with partners to boost the region's space skills base, in particular, exploring the development of a Skills Academy
- We will collaborate with partners to strengthen the North East's academic capability in research, collaborations, and talent development
- We will provide support and funding for targeted capability development, particularly in:
  - Technologies relating to resilient communications and space sustainability
  - Adjacent sectors such as digital and AI, advanced materials, electronics and semiconductors, immersive technologies, and manufacturing
  - Space applications, particularly in health, transport & mobility
  - Data analytics and downstream applications that also incorporate data from the wide array of sensing platforms in development in the North East, such as HAPS and UAVs
- We will empower businesses to articulate both current and future skills needs
- Encourage and facilitate inward investment that enables upskilling across the supply chain
- We will work with academia and training providers to take a multi-disciplinary approach to the development of space curricula and a space skills programme to respond to industry needs in an agile way



# 4

## **Raise Awareness in the Investment Community**

- We will pursue funding to support growth and space start-ups in the region, building on the success of the Community Renewal Fund, a precursor to Shared Prosperity Fund
- We will work with partners to attract significant inward investment, in particular engaging investors
- We will maximise the region's opportunities to seize on national funding opportunities for space
- We will work with partners to attract investments for constructing facilities enabling businesses to accelerate the technological development and commercialisation of their products

# 5

## **Expand Space to Adjacent Sectors to Support Key Market Focus Areas**

- We will support and engage with non-space businesses to integrate them into the sector as suppliers and end users
- We will identify adjacent sectors in the region that are looking to diversify and will measure and communicate the value of the size of opportunity for these sectors
- We will work with critical related industries, especially resilient communications and compound semiconductor clusters, which will help accelerate space technology innovations and also be enablers for innovations in adjacent sectors

# 6

## **Foster Regional Collaboration as a Supercluster**

- We will work with Yorkshire and North West regions to implement synergistic actions
- We will identify and pursue engagement opportunities with Scotland, with proximity to Scotland presenting a unique opportunity for the North East and other northern regions to create high-impact synergies
- We will evaluate strategic collaboration opportunities with other regions in areas including: electronics, high-altitude platforms, RF, optical and quantum communications, supply chain development, space sustainability, and skills development