

The logo for Space Wales features the word "SPACE" in red and "WALES" in white. A grey swoosh underline starts under the 'A' in "SPACE" and curves under the 'S' in "WALES".

**SPACE WALES**

The background of the cover is a dark space scene. On the left, a large, grey, cratered celestial body (likely the Moon) is partially visible. In the lower-left quadrant, the Earth is shown as a blue and white sphere with a thin atmosphere. The rest of the background is black with scattered white stars.

**WALES**  
**A SUSTAINABLE SPACE NATION**  
**EXECUTIVE SUMMARY**

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# WALES A SUSTAINABLE SPACE NATION

Wales, with a population of 3 million people, totals around 5% of the UK populace. In the aerospace sector Wales has around 10% of the overall UK workforce and arguably punches above its weight. When it comes to the space sector Wales has only around 1% of the overall UK personnel and so there is a huge opportunity for growth in a sector which is growing significantly. The UK space sector has set a target of achieving a 10% share of the predicted £400 billion per annum global space market in 2030. A 5% share of this for Wales would equate to £2 billion per year and this is a realisable target which we aim to achieve and will work to exceed.



Space has proved to be one of the UK's fastest growing sectors trebling in size since 2010. It now employs 42,000 people and generates an annual income of £14.8 billion. The global space economy grew by 6.7% on average per year between 2005 and 2017, almost twice the average yearly growth of the global economy of 3.5%.

The growth of the sector also has the potential to help us address some of the key issues facing Planet Earth and the challenges within Wales itself.

Currently there are around 5000 satellites circling the earth in various orbits. Only 2,000 of these are operational. If OneWeb, Starlink and other potential networks continue with their projected growth that number could increase by a massive 4,500% in the next five years!

Demand for data is on the increase, and launching satellites that offer broadband internet service will help to drive down the cost of that data. Reusable rockets and satellites will also help drive down costs and so too will the mass-production of satellites and the development of satellite technology. Earth observation is currently the biggest user of satellite manufacturing and launch services and remains a key driver for the overall industry.

Further to the funding already received by the Welsh Government and the UK Space Agency for the space sector in Wales, an agreement on further funding is essential to support the future growth of the sector. To develop the opportunities in Wales funding support will also be required from UK Government. All parties need to work together to maximise the return on investment and to ensure alignment with the policies and priorities of UK and Welsh Governments.

# THE CURRENT AND POTENTIAL FUTURE SPACE SECTOR IN WALES

With support from the UK Space Agency a mapping exercise of the sector was completed using a mixture of survey data, workshops and individual interviews. A Space Wales Leadership Group and Space Wales network have been established to offer guidance to the project team and will drive our aspirations forward.

Wales has the following key elements and associated opportunities:

## Space launch, training, and experience capability.

Spaceport Snowdonia based at Llanbedr Airfield is one of the UK's potential horizontal spaceports and has a route map to achieve certification in 2022. It has a legacy as a flight test and evaluation site, linked to an MoD/QinetiQ segregated airspace and tracking range. Partners include a B2Space, with their stratospheric balloon launch system, Newton Launch Systems and Spaceflight Academy and continues to be used by emerging technology-based aircraft. Spaceflight Academy is looking to establish a comprehensive spaceflight training and experience facility at the site. Snowdonia has a niche capability for test and evaluation together with sub-orbital flights including some horizontal orbital launches.

As an alternative to land based vertical or horizontal launch a group of companies, including Black Arrow Space Technologies, are proposing to establish the Port Talbot Space Centre as a centre for research and manufacturing supporting a sea-based launch system for space vehicles.

## In-Space Manufacturing and the associated ability to recover space vehicles.

Space Forge has established a facility in the Compound Semi-conductor Applications Catapult in Newport to develop a reusable manufacturing LEO satellite and the capability to return satellites to Earth for repair and refurbishment. Significant funding has been made available to support this venture in what is seen as an area with high growth potential.

## Existing advanced manufacturing capability and technology clusters.


Wales has several established clusters which have capabilities relevant to both the upstream and downstream elements of the space sector. For example: aerospace, automotive, electronics & software, medical, compound semiconductors, photonics/optoelectronics/optics, life sciences and cyber security. Many companies in these sectors already service the space sector.

## Test and evaluation eco-system based on existing facilities.

These include Llanbedr and Aberporth Range, Radnor Range and Pendine, open to both military and civil use.

## A network of research and teaching facilities.

The WASP (Wales Academic Space Partnership) and catapult sites are referred to as "the arc of innovation." The Compound Semiconductor Applications Catapult is based in Newport and AMRC Cymru at Broughton. The Satellite Applications Catapult operates an outstation at Llanbedr in support of demonstrator programmes and discussions are ongoing about a potential DISC (Disruptive Innovative Space Capability) facility in Wales. Welsh Government, MoD and DECA are developing a proposal for the creation of ATRC, the Advanced Technology Research Centre, based at Sealand with a focus on defence electronics, including space related elements.



### EO - Earth Observation.

Over half of future nano/microsatellites will be used for EO and remote sensing and there is great potential for advance manufacturing of instruments in this market. The Glyndwr Innovations OptTIC centre and the associated optoelectronics/photonics/optics cluster has already established a significant space related capability. With EO analysis Wales has strong capability including Aberystwyth University and specialist companies such as Environment Systems and Geo Smart Decisions.

Environment Systems has a 17-year track record in using EO for addressing environmental and agricultural challenges. Most recently Environment Systems has been using EO analytics as part of the evidence for the Welsh Government national development framework Future Wales: the national plan 2040.

Aberystwyth University's Living Wales is a unique and novel world-first concept that aims to capture the state and dynamics of the landscape of Wales in near real time, historically and into the future through integration of EO data, supportive ground measurements and process models. There is an opportunity and a need to move this project beyond research into a longer-term commercial operation potentially as part of a National Wales Space Observatory.

# WALES CHALLENGES AND OPPORTUNITIES

Wales has an environment which poses challenges and opportunities for the downstream application of space data in terms of geography, transportation, communication, health, social inclusion, management of natural resource etc. supported by the resources of a devolved administration, local authorities, NHS Wales, Natural Resources Wales and the Life Sciences cluster. Wales can use the technology and services facilitated by the space sector to help grow the economy and to help deliver enhanced essential services across the nation.

It costs about five times more to get fibre connections to Welsh homes and businesses than the UK average. However, the emergence of networks such as OneWeb have the potential to deliver broadband connectivity worldwide to bridge the global Digital Divide by offering everyone, everywhere, access to the Internet of Things (IoT) and a pathway to 5G. A combination of fibre, land, air and space-based services could transform data and communications services across Wales, particularly in rural areas.

Swansea based Annwen provides an excellent example of the innovative use of space data. It is creating a voice-activated 'digital companion', providing public information in Welsh or other minority languages, particularly for citizens in remote locations, vulnerable members of society and those not used to using technology. They plan to deliver a satellite & 5G connected monitoring system for Wales.

## WALES – A SUSTAINABLE SPACE NATION, LEADING TO A GREENER SPACE

Wales and the UK are committed to a range of policies and actions to support a sustainable future. Space operations themselves can be made greener by the development of new propulsion systems and propellants, and the application of earth observation will play a key role in our stewardship of the Earth's precious resources.

Wales is proposing to establish a Sustainable Space Accelerator (SSA). Although this could be based in a university initially, perhaps in partnership with one or more companies, it is envisaged as being distributed across the nation rather than in a single dedicated building. The SSA will promote sustainable practices upstream and stimulate awareness and demand downstream whilst also driving demand-driven research and development.



## KEY RECOMMENDATIONS

- The Space Wales Leadership Group and Space Wales network will continue to operate and progress the short-term actions identified in partnership with Welsh Government. Space Wales will continue to operate as an arm of the Aerospace Wales Forum Ltd and discussions will be held with members and Welsh Government to determine future funding and governance models.
- Space Wales, Welsh Government and UKSA will agree the framework for measurement of the size of the sector in Wales to determine progress toward our goal of £2 billion by 2030.
- Working groups will be established to address specific opportunities and drive forward our ambitions. These include the Sustainable Space Accelerator, National Wales Space Observatory, space enabled broadband and communications system for Wales, public-sector engagement, application of advanced manufacturing to the space sector, Defence and Cyber and the development and marketing of test facilities.
- Key programmes such as the development and use of Spaceport Snowdonia, Port Talbot Space Centre and in-space manufacturing should continue to be developed through industry and government partnerships.
- WASP, the Wales Academic Space Partnership, will be encouraged to develop and grow and work in close partnership with Space Wales and Welsh Government
- These actions and recommendations will be reviewed and refined on a regular basis by the Space Wales Leadership Group. They will also continually be reviewed by the Welsh Government to ensure alignment with the UK and Welsh Government's policies and strategies.

*Further details can be found in the main report*

***Wales – A Sustainable Space Nation***

