Wales – Baden-Württemberg Space Sector Comparative Study

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SPACE WALES

Ariennir gan Lywodraeth Cymru
Funded by Welsh Government

CATAPULT Satellite Applications

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Executive Summary

This report provides an overview of the space ecosystems of Wales and Baden-Württemberg to identify areas of complementary strength, strategic gap, and practical opportunity.

It is intended to support more informed engagement between the two regions, with particular emphasis on collaboration, foreign direct investment, export potential, and cluster-to-cluster relationship building. As such, it should be read not simply as a description of two regional space sectors, but as a practical comparison of where each region is strong, where each faces development constraints, and where future engagement may generate mutual value.

The report also sits within the wider context of activity supported through Agile Cymru funding, designed to strengthen links between Wales and Germany in the space sector. Within that wider programme, Baden-Württemberg has particular relevance because of its role within the Wales–Baden-Württemberg relationship and its significance as one of Germany's most developed regional space ecosystems. This comparison, therefore, serves both a project-specific and a wider strategic purpose: supporting future Wales-focused international engagement, while also providing clearer evidence on how one of Germany's leading regional ecosystems compares with, complements, and potentially connects to Wales.

The analysis shows that both Wales and Baden-Württemberg are credible regional space ecosystems, but with markedly different profiles. Wales is characterised by agility, emerging cluster identity, strong enabling assets in aerospace, engineering, test and evaluation, and a growing challenge-led proposition linked to resilience, sustainability, and public-sector application. Its key challenge is to deepen ecosystem scale, improve commercial packaging, strengthen investment readiness, and convert existing capability into a more visible and coherent market offer. Baden-Württemberg, by contrast, is defined by industrial depth, advanced manufacturing, research capability, propulsion-related activity, satellite communications, and strong integration into wider German and European space systems. Its central challenge is to convert this technical strength into broader commercial scale, stronger downstream and digital business models, greater visibility, and a more complete end-to-end proposition in selected growth areas.

Taken together, these findings suggest that the relationship between Wales and Baden-Württemberg is best understood in terms of complementarity rather than direct competition. Wales brings agility, a challenge-led framing, growing mission-planning and launch-enabling ambition, and the potential to act quickly in niche areas. Baden-Württemberg brings industrial density, engineering depth, technical specialisation, and a stronger concentration of mature research and manufacturing assets. This creates clear opportunities for practical cooperation in areas such as advanced manufacturing, subsystem capability, test and evaluation, sustainable space, digital and data-enabled services, mission planning, and the wider translation of research and engineering capability into commercial outcomes.

The report concludes that the strongest opportunities lie not in either region trying to replicate the other, but in using their differences strategically. For Wales, Baden-Württemberg offers access to deeper industrial networks, stronger technical partners, and greater supply-chain maturity. For Baden-Württemberg, Wales offers an agile cluster environment, challenge-led application opportunities, and a potential route for piloting, partnership development, and market-facing collaboration. On that basis, the comparison points to a credible foundation for more targeted bilateral activity between the two regions.

Introduction

This report provides a comparative assessment of the space ecosystems of Wales and Baden-Württemberg. Its purpose is to identify areas of strategic strength, development need, and practical opportunity across both regions, with a particular focus on where comparative analysis can support future collaboration, foreign direct investment, export activity, and cluster development. Rather than treating each region in isolation, the report is designed to assess how their respective capabilities, priorities, and gaps relate to one another, and where those relationships may create value.

This comparative focus is important because Wales and Baden-Württemberg occupy different, but potentially complementary positions within the wider European space economy. Neither is a standalone national system, yet both play important roles within broader political, industrial, and inst0itutional structures. Wales sits within the UK space sector as a growing and increasingly organised regional cluster, while Baden-Württemberg sits within Germany as one of the country's most capable industrial and research-intensive space regions. Comparing them offers a useful basis for identifying not only what each region is doing, but how their different profiles may create openings for partnership and mutual benefit.

This standalone report sits within a wider programme of activity supported through Welsh Government Agile Cymru funding. That project was designed to strengthen links between Wales and Germany in the space sector, building on the relationship with Baden-Württemberg and using engagement activity, ecosystem mapping, and analysis to support future collaboration, trade, and inward investment. Within that wider programme, the Baden-Württemberg-focused work has a dual value: it supports a Wales-facing international partnership, but it also provides wider Welsh and UK stakeholders with clearer market intelligence on one of Germany's most significant regional space ecosystems. This supports the implementation of the Wales – Baden-Württemberg Shared Statement of Cooperation and the UK – Germany Kensington Treaty by providing a clearer evidence base for future engagement (Welsh Government, 2023; UK Government, 2025)[1],[2] .

The report is structured around three core questions. First, what are the principal strengths of each regional ecosystem? Second, where do the main development gaps or growth constraints lie? Third, how might those strengths and gaps align in ways that create opportunities for collaboration, investment, or market development? To answer these questions, the report first outlines the space story and strategic direction of each region, then examines current capability through a comparative gap-analysis lens, before drawing out areas of complementarity and practical opportunity.

The report should be read as an opportunity-identification and comparative gap-analysis document. For businesses, it can help indicate where firms in one region may find partners, customers, suppliers, or demonstration opportunities in the other. For investors, it can help identify where one region's capability base may be strengthened by capital, partnerships, or ecosystem support from the other. For policymakers and cluster organisations, it can help clarify where bilateral engagement is most likely to produce meaningful outcomes. In that sense, the value of the report lies not only in describing Wales and Baden-Württemberg, but in showing how the comparison between them can be used strategically.

[1] Welsh Government, 2023. Wales strengthens cooperation with German state of Baden-Württemberg through signing of a joint declaration. [Online] Available at: https://www.gov.wales/wales-strengthens-cooperation-german-state-baden-wurttemberg-through-signing-joint-declaration [Accessed 26th March 2026].

[2] UK Government, 2025. Treaty between the United Kingdom of Great Britain and Northern Ireland and the Federal Republic of Germany on friendship and bilateral cooperation. [Online] Available at: https://www.gov.uk/government/news/treaty-between-the-united-kingdom-of-great-britain-and-northern-ireland-and-the-federal-republic-of-germany-on-friendship-and-bilateral-cooperation [Accessed 26th March 2026].

Caveats and Limitations

As with all studies, it is important to recognise and acknowledge limitations and highlight appropriate caveats.

The scale and complexity of the space ecosystem presents significant challenges to developing a complete and comprehensive mapping of all supply chain stakeholders, their capabilities, and their activities. It is important to recognise that this analysis, while insightful, may not capture every aspect of the space capability landscape. Mapping has been limited by the availability of data, particularly with respect to private sector infrastructure where providers may not always publicise the full extent of their capabilities for commercial or proprietary reasons. This report may therefore, in certain areas, be limited in its ability to evaluate and analyse all activities and capabilities available to support the realisation of capability goals.

These limitations underscore the importance of interpreting the findings with caution, particularly where generalisations or extrapolations are made. Future research would benefit from additional primary data collection and expanded stakeholder engagement to address these gaps.

For further insights into the organisations and stakeholders working across the UK, Wales, Germany, and Baden-Württemberg space ecosystems, please visit the Catapult's *Space Capabilities Catalogue (SCC)*.

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Wales

The Welsh Space Sector, Strategy, & Priorities

The Welsh Space Story

The story of Wales' space sector is a recent one, shaped less by a single national space programme and more by the gradual mobilisation of long-standing Welsh assets in defence test and evaluation, space science, and an aerospace-strong nation.

Wales' enabling foundations can be traced back to the Second World War, when a military testing range was established in Cardigan Bay, controlled from a site near Aberporth (MOD Aberporth). This created enduring range, tracking, and airspace infrastructure that would later become relevant to near-space activity and wider spaceflight-adjacent operations (QinetiQ, 2026)[3]. Complementing this, Llanbedr Airfield was opened in 1941 and became part of Wales' long-running test, flying and range-related lineage in North Wales (ABCT, 2025)[4]. Wales also established an early, visible milestone in space science with the opening of the *Spaceguard Centre* near Knighton in 2001, which operates as the UK's national near-Earth objects information capability and a working observatory.

Its subsequent journey towards space-enabled growth and a modern, coordinated Welsh space story started with early sector mapping work in 2006 carried out with support from the Aerospace Wales Forum alongside the then British National Space Centre. A more decisive phase began in 2014, when Welsh Government commenced sustained engagement with the UK Space Agency (UKSA), creating a stronger policy and funding interface between Wales and the UK space ecosystem. This was followed by the publication of the first Wales Space Strategy in 2015 and the Welsh Government's "Spaceport Snowdonia Wales" brochure in early 2017, signalling intent to anchor Welsh growth around both upstream capability and downstream applications (Meechan, 2015)[5].

[3] QinetiQ, 2026. About MOD Aberporth. [Online] Available at: https://www.qinetiq.com/en/aberporth/about [Accessed 20th January 2026].

[4] ABCT, 2025. Llanbedr. [Online] Available at: https://www.abct.org.uk/airfields/llanbedr/ [Accessed 20th January 2026].

[5] Meechan, B., 2015. Mission: Wales aims for £2bn a year from space industry. [Online] Available at: https://www.bbc.co.uk/news/uk-wales-33507590 [Accessed 20th January 2026].

By 2019, Wales' ambitions were increasingly visible on the UK stage. The UK Space Conference, hosted at the newly opened International Convention Centre in Newport, became a platform for announcements tied to sector investment in Wales. Among these was a £500k award to Snowdonia Aerospace Centre from UKSA's Horizontal Spaceport Development Fund to develop a Spaceport Snowdonia Development Plan.

As strategic intent translated into delivery, Wales began strengthening the networks needed to turn capability into a coherent ecosystem. Over the five years leading into 2021, Welsh Government and the Aerospace Wales Forum worked to grow the national space sector network and raise its profile:

- Wales a Sustainable Space Nation was published in February 2022 (Welsh Government, 2022)[6];
- Space Wales established to drive the sector forward and to support engagement with space disruptors and entrepreneurial start-ups whose culture and business models differed from mainstream aerospace (Space Wales, 2026)[7];
- The Wales Academic Space Partnership (WASP) was established to strengthen university to industry cooperation, while Aerospace Wales formed a dedicated Space Group.

Alongside convening, Wales' space story has become increasingly defined by practical activity and enabling infrastructure. Snowdonia Aerospace Centre continued to expand its client base for future flight and space-related operations, boosted by £820,000 in funding from the UK Space Agency under the Space Clusters Infrastructure Fund (SCIF) to support the development of a new Space Technology Centre at the former Llanbedr Airfield (UKSA, 2023)[8], while near-space operations commenced through flights such as B2Space's stratospheric balloon and the Astigan HAPS, leveraging the established MoD / QinetiQ tracking range in Cardigan Bay.

Wales' trajectory is also tied to upstream manufacturing ambition and a growing commercial base. Space Forge's work on a returnable in-space manufacturing platform intendeds to enable materials manufacturing that is not feasible on Earth. In parallel, Wales also has downstream strengths, particularly in Earth observation (EO) and data-enabled services. Capability includes Environment Systems' Satellite Data Services (launched in 2017) and Aberystwyth University's Living Wales project, a world-first concept intended to capture landscape dynamics using EO data integrated with ground measurements and models, with longer-term potential to evolve beyond research into a national observatory concept.

This evolution is framed against a clear economic rationale. Wales has a strong position in aerospace (c.10% of the UK aerospace workforce) compared with a much smaller share of the UK space workforce (c.3%). Within that context, there is an ambition to achieve a space economy worth £2bn per year by 2030.

[6] Welsh Government, 2022. Wales: a Sustainable Space Nation. [Online] Available at: https://www.gov.wales/wales-sustainable-space-nation-html [Accessed 12th March 2026].

[7] Space Wales, 2026. About Us. [Online] Available at: https://spacewales.co.uk/about-us/ [Accessed 20th January 2026].

[8] UK Space Agency, 2023. £47 million investment to supercharge space infrastructure across the UK [Online]. Available at: https://www.gov.uk/government/news/47-million-investment-to-supercharge-space-infrastructure-across-the-uk [Accessed 23rd February 2026]

Wales' space story is presented as one of structured growth. The UKSA cluster development programme enabled the establishment of a Space Wales brand, Leadership Council, and network intended to develop and maintain a thriving space sector in Wales. At the same time, Wales has articulated a distinctive long-term identity: an ambition to become the world's first "sustainable space nation" by 2040, "leading the way to a greener space", with sustainable upstream practices and demand-led downstream innovation positioned as core drivers of future competitiveness.

Figure 1. Overview of Space Wales strategy development

Strategies & Priorities

Wales: a Sustainable Space Nation

The Wales: a Sustainable Space Nation strategy sets out a pathway for growing the Welsh space cluster by building on existing aerospace strengths and developing a coordinated ecosystem spanning upstream capability and downstream applications. It frames the Space Wales cluster and Leadership Group as mechanisms to maintain momentum, review progress against an action plan, and adapt priorities as circumstances change.

A distinctive feature of the strategy is its explicit positioning of sustainability as both a differentiator and a delivery principle: it links space activity to Wales' long-term well-being and sustainability drivers, while also recognising that space missions can have negative ecological impacts and that Wales should help drive cleaner approaches across manufacturing, launch, and operations.

Within that framing, the strategy articulates its priorities through a set of opportunity areas that span the full value chain and are intended to be advanced through practical actions, working groups, and key programmes. In summary, the priorities can be expressed as:

1. **Spaceflight, training, and experience:** The strategy positions spaceflight-adjacent activity, centred on the development of Llanbedr airfield / Spaceport Snowdonia, as a cornerstone priority, with actions covering site development planning, flood defence work, regulatory steps (including licensing), and the practical requirements to operate in restricted airspace (including engagement with MOD / QinetiQ regarding access and costs). It also links this to community engagement and an end-to-end demonstrator programme to evidence operational capability.
2. **In-space manufacturing and recovery of space vehicles:** The strategy identifies in-space manufacturing and recovery as a priority growth area and frames it as part of Wales' emerging upstream proposition, sitting alongside launch and test capability and linked to the wider aim of building sovereign and commercially attractive capabilities suited to Wales' geography and industrial base.
3. **Test and evaluation ecosystem:** A central enabling priority is the strengthening and marketing of Wales' test and evaluation capability as the UK launch market grows, including addressing gaps and bottlenecks, improving the collective visibility and accessibility of facilities, and tackling the regulatory challenges that can slow testing, qualification, and flight-adjacent activity. The strategy explicitly connects this to the need to develop and market Welsh test facilities and to resolve practical barriers such as charging regimes, access arrangements, and the wider approvals environment needed to support operational use.
4. Advanced manufacturing capability and emerging clusters: The strategy treats advanced manufacturing as a strategic upstream lever, building relationships with primes and OEMs, strengthening supply-chain readiness, and using coordinated sector engagement (events, supplier days, cluster-to-cluster collaboration) to convert Wales' wider industrial strengths into space-relevant opportunity and inward investment.
5. **Earth Observation (EO) and data-enabled services:** On the downstream side, the strategy highlights Wales' EO ecosystem, referencing university sensor capability, commercial analytics and applications, and institutional adoption (including public bodies using EO data). It proposes formalising this through an Earth Observation Group and explicitly links this to the potential establishment of a National Wales Space Observatory concept.
6. **Research and teaching facilities:** The strategy recognises skills, research capacity, and university–industry linkages as a priority, including the role of the Wales Academic Space Partnership (WASP) and actions to strengthen connectivity between academic capability audits and the wider Space Wales network.

Across these priorities, the strategy also sets out several cross-cutting "how" mechanisms, most notably: (i) leadership in sustainability via a proposed Sustainable Space Accelerator; (ii) alternative launch and recovery strategies; (iii) an attraction strategy to bring in "magnet businesses"; and (iv) governance / funding arrangements intended to keep investment decisions close to commercial exploitation while maintaining alignment with UK Government and UKSA.

2024 Space Wales Governance Workshop

In 2024, the cluster's strategic direction was reviewed to better reflect the Welsh space sector's value proposition and distinctive capabilities, and to define the approach needed to realise Wales's ambition to become the world's first sustainable space nation by 2040. The Leadership Council led the review and identified three key themes: alignment with UKSA objectives and wider national strategies; skills demand; and supply chain development. The cluster model and its support offer were also examined to ensure the cluster and partner organisations respond effectively to local stakeholder needs.

As part of this process, the Catapult was invited to deliver a Governance and Strategy Workshop in July 2024 to review the structure of the existing strategy, identify priority areas and required updates, and shape an approach that is clearer to communicate and easier to implement (including roles / responsibilities, commercialisation, and community-facing messaging).

Rather than replacing the Sustainable Space Nation priorities, the workshop refines how Wales articulates them. It proposes a more visual, value-chain representation that is accessible to non-experts and can be reused across the strategy (including to frame sustainability), underpinned by economic growth, cluster activities, and support mechanisms. The refined framing includes:

- **Design & Manufacture:** advanced space materials; optics and photonics; space software & AI; research and development.
- **Mission Planning & Launch:** energy and propulsion systems; nuclear testing; launch systems and support; ground and space-based operations.
- **In-space Operations & Services:** microgravity R&D and manufacturing; space-based solar power; in-space communications and data centres.
- **Downstream Applications:** resilient communications and connectivity; cross-sector collaboration; space data for public sector; monitoring, security, and cyber.

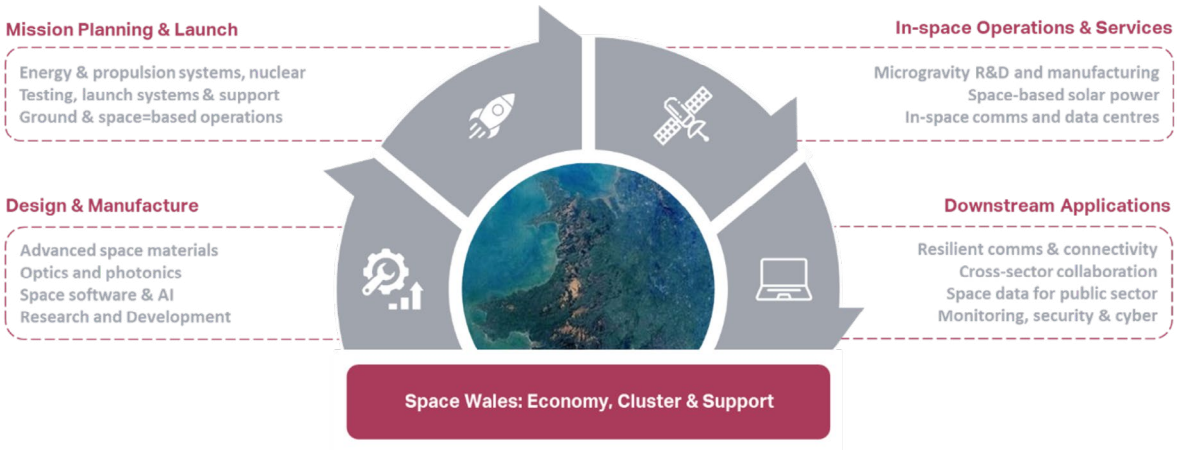

Figure 2. Space Wales supply chain visualisation

This refinement usefully bridges the original priority areas into a structure that is (i) more intuitive to external audiences, and (ii) readily mapped to both upstream capability development and downstream outcome themes.

Space Wales set out in its Strategy the ambition to establish a Sustainable Space Accelerator as a mechanism to stimulate collaboration, grow capability and embed space-enabled solutions into priority sectors across Wales. With support from the UK Space Agency, this ambition has been operationalised through the Space Wales Catalyst Fund (Space Wales, 2025)[9], an intervention designed to turn strategic intent into funded collaborative projects. Rather than focusing solely on early-stage R&D, the Catalyst Fund has leveraged the Welsh space community to address clearly defined priorities, encouraging partnerships between space companies, non-space sectors and public bodies, and accelerating the development of market-ready, sustainability-aligned solutions.

The Fund demonstrates how the Sustainable Space Accelerator concept can move from strategy to delivery: mobilising the cluster, directing resource towards areas of national relevance, and strengthening Wales' position as a sustainable space nation. The Catalyst Fund has created a practical pathway for translating community capability into funded projects that support environmental resilience, economic growth and cross-sector innovation.

Resilient Wales

Building on the Strategy Review, Space Wales has sought to position space as an enabling sector within Wales, one that supports growth and resilience across priority industries rather than operating in isolation. This framing aligns the Space Wales agenda with Welsh policy and legislative drivers, including the Well-being of Future Generations (Wales) Act and the Welsh Government's International Strategy 2020 – 2025, which identifies Germany as a priority market for Wales and emphasises values that resonate strongly with space-enabled capability, including the ambition for a "Resilient Wales" (Welsh Government, 2020, p. 36)[10].

Against this backdrop, Space Wales commissioned the Satellite Applications Catapult in 2025 to examine how satellite connectivity and EO can support national resilience outcomes within the Welsh ecosystem. That work identified three interlinked challenge areas where space-enabled technologies can make a material contribution to Welsh priorities:

- **Climate & Environment:** improving monitoring, early warning and decision-support for flood risk, wildfire exposure, land degradation, biodiversity loss, and coal tip stability under increasing climate pressure.
- **Rural Connectivity & Inclusion:** reducing digital not-spots that constrain access to healthcare and telecare, education, productivity tools, logistics, and emergency communications in hard-to-reach areas.
- **Infrastructure & Energy Resilience:** strengthening situational awareness and continuity for ageing and dispersed assets, coastal infrastructure at risk, renewable expansion, and grid monitoring across exposed geographies.

These three themes provide a challenge-led umbrella for the Welsh space proposition and are reflected throughout the gap analysis that follows.

[9] Space Wales, 2025. Space Wales Announces Successful Projects to be Funded by Wales Space Cluster Catalyst Fund. [Online] Available at: https://spacewales.co.uk/space-wales-announces-successful-projects-to-be-funded-by-wales-space-cluster-catalyst-fund/ [Accessed 23rd February 2026].

[10z] Welsh Government, 2020. International Strategy, Cardiff, Wales: Welsh Government

Wales Space Sector Gap Analysis

Using ecosystem data presented in the Satellite Applications Catapult's Space Capabilities Catalogue as of February 2026, this section identifies where Wales has existing strengths in the priority areas set out in their space strategy. The following segment shall seek to outline, in brief, where Wales already excels and where it needs to develop to meet the objectives set out in in its Strategy. Each segment will outline a strategic priority, existing strengths, and areas for development.

Upstream

Design & Manufacture

Expertise

Wales shows a credible upstream base in design and manufacture, anchored by organisations providing Space Engineering, Space Hardware, Space Materials, and associated enabling services. The Welsh supply chain includes established aerospace and high-value engineering manufacturers (e.g., Magellan Aerospace, Electroimpact, Cottam & Brookes Engineering, GJM Engineering), advanced materials and manufacturing capability (e.g., Ensinger Precision Engineering, BlociCarbon, Formagrind), and electronics / components supply (e.g., Charcroft Electronics, Teledyne Labtech). Wales also a strong semiconductors and advanced materials ecosystem relevant to space hardware and sensing supply chains (e.g., IQE, the Compound Semiconductor Applications Catapult, CSconnected, and the Centre for Integrative Semiconductor Materials (CISM)). Together, these strengthen Wales' relevance to space hardware, sensing, photonics, and next-generation electronics supply chains, alongside a wider set of "spin-in" and enabling engineering firms that can be mobilised into space-relevant manufacture.

Opportunity Area

Wales' opportunity is to increase the space-readiness and market accessibility of its upstream capability, so that "manufacturing strength" reliably converts into space contracts and inward investment:

- **Space-grade manufacturing readiness (quality, traceability, and assurance** Wales has strong engineering and manufacturing capability, but the gap is often the assurance layer that primes and integrators expect: rigorous quality systems, configuration control, verification planning, and documented processes that reduce perceived risk. This aligns with UK-wide evidence of persistent skills gaps, including in critical and emerging areas that support delivery confidence. Closing this gap increases Wales' eligibility for higher-value work packages, shortens supplier onboarding cycles, and improves conversion from capability to contracted programmes.
- **Packaging "manufacture, test, and integration" into an investable cluster offer:** Rather than presenting capability as isolated suppliers, Wales can create bundled, prime-facing propositions (supplier development, test access, and demonstrators) that explicitly show how Welsh firms can deliver end-to-end sub-systems, not only components. Done well, this makes Wales easier to "buy from", supports inward investment decisions, and creates a clearer pathway from SME capability to prime-tier supply chain roles.

Test & Evaluation

Expertise

Wales has an identifiable (though relatively small) testing and engineering cohort, aligned to the strategy priority to strengthen and market a Welsh test and evaluation ecosystem. In addition, Wales' test and range heritage (including the MoD / QinetiQ range infrastructure and the evolution of the Snowdonia Space Centre / Llanbedr site) provides a credible enabling foundation for spaceflight-adjacent and space-hardware qualification activity, particularly where testing, assurance, and operational readiness are central to buyer confidence.

Opportunity Area

The opportunity is to make Welsh test and evaluation more visible, more accessible, and more directly connected to pathways from prototype to operational deployment, including Assembly, Integration, and Test (AIT) as a stepping-stone towards longer-term launch ambitions:

- **Visible, accessible qualification testing pathways (and clearer facility propositions):** The UK facilities evidence base highlights the centrality of environmental testing (e.g., thermal-vacuum, vibration, shock, EMC) to qualifying space hardware. Wales can use its existing testing capability as a foundation, but the opportunity is to make facilities and services easier to find, procure, and use, reducing friction for SMEs and external customers. This directly accelerates time-to-qualification for Welsh hardware, attracts external test demand, and strengthens Wales' credibility as a launch- and manufacturing-centre. It also matters in a wider competitive context: other UK and Ireland locations, such as Resonate Testing in Newry, are already positioning themselves around accessible commercial test services for the space sector, including integrated vibration, shock, and thermal-vacuum testing. For Wales, the implication is not simply to have facilities, but to present a clear, market-facing proposition on access, turnaround, assurance, and how Welsh testing complements rather than duplicates nearby capability.
- **AIT as a strategic bridge (from testing to flight-adjacent readiness):** Whilst facilities, such as Snowdonia, pivots towards Assembly, Integration, and Test, Wales has an opportunity to position itself as a place where payloads and sub-systems are assembled, integrated, tested, and prepared for missions, even before routine launch operations are in-scope. This builds commercial traction now and creates a credible pathway towards sustainable launch in the longer term.

Mission Planning, Launch, & Return from Orbit

Expertise

Wales has an identifiable set of mission-planning and launch-adjacent signals centred on Spaceport Snowdonia / Llanbedr and a small group of organisations across enabling functions (mission design and operations signals, payload integration, assembly & integration, and launch-adjacent infrastructure). Representative examples from the Welsh supply chain include Snowdonia Aerospace (spaceport / site capability and enabling infrastructure), B2Space (mission design and mission operations, including balloon-launch elements), Space Forge (launch systems / re-entry systems), and manufacturing / integration contributors such as Magellan Aerospace and Electroimpact (assembly & integration and payload integration signals in launch-adjacent contexts).

In addition, Wales' ambitions around Llanbedr / Spaceport Snowdonia and associated testing infrastructure point to a broader "systems" mindset: building operational capability, test facilities, and demonstrators that can underpin wider resilience objectives, not solely spaceflight. The progress narrative around facility development at Llanbedr (including test centre development and capability-building activity) is important not only because of future space ambitions, but because the site is already being developed through a practical, commercially led model and used for wider aerospace and autonomous-systems activity. This supports the plausibility of Wales developing enabling infrastructure that can serve multiple resilience-linked agendas.

Wales' current trajectory reflects a phased approach: sustainable launch remains a long-term ambition, while the near-term emphasis is increasingly on AIT capability, mission enablement, and return from orbit as a growth focus.

Opportunity Area

The opportunity is to build the enabling functions that make Wales operationally credible and commercially repeatable across mission planning, AIT, regulatory delivery, and return, recognising that launch is a long-term outcome rather than the immediate priority:

- **Spaceport operations "wrap" (campaign delivery capability):** Beyond site infrastructure, Wales needs more capacity in the practical service layer that supports missions and campaigns: mission planning support, customer onboarding, safety/assurance documentation, scheduling and coordination, ground support equipment access, payload processing, and AIT-to-campaign readiness processes. These services reduce cost and friction for customers now, create near-term commercial value, and build the operational maturity required for sustainable launch in the longer term.
- **Regulatory and assurance delivery capacity (licensing readiness and return regulation):** UK rules require a CAA-issued spaceport licence to operate a spaceport, and UK guidance indicates it can take at least nine months for an application to be assessed. Wales can therefore treat licensing / assurance capability as an investable "gap": safety case development, compliance management, and mission assurance expertise that reduces regulatory friction and increases investor confidence. Strengthening this capability shortens time-to-licence, increases the probability of successful applications and campaign approvals, and provides customers with confidence that operations will be robust and repeatable.

- **Market resilience: mitigating launch availability and scheduling bottlenecks:** Industry reporting has highlighted UK launch availability constraints and knock-on effects for operators (e.g., limited access to launch slots at particular sites). Wales can strengthen its proposition by building partnerships and capacity that improve scheduling resilience; this requires clear campaign pathways, diversified mission profiles (e.g., balloon / HAPS and horizontal launch where relevant), and robust test-to-flight integration. In the near term, that resilience may depend as much on access to trusted external launch and return pathways as on domestic infrastructure alone. For Wales, rather than focusing primarily on launch slot availability, the strategic opportunity is therefore to reduce regulatory and operational friction, build credible AIT-to-mission support, and position itself so that, over time, more of the mission-enabling and return-related value chain can be anchored locally as the wider UK market matures.
- **Return from orbit as a near-term focus area (a credible step towards sustainable launch):** If Wales positions return as a strategic focus, it can capture value in recovery logistics, inspection and verification, refurbishment pathways, and mission assurance for returnable systems, aligned to sustainability objectives. In practice, a credible "return offer" differentiates Wales, creates demand for AIT and testing services, and establishes flight heritage and operational credibility that supports the longer-term sustainable launch ambition.

Image credit: NASA/Johnson Space Center

Downstream

Climate & Environment

Expertise

Wales has a credible foundation in climate- and environment-oriented space activity, particularly where EO and geospatial analytics support public value outcomes. The Welsh Government's Wales: a sustainable space nation strategy explicitly positions sustainability as both a differentiator and a delivery principle, linking space-enabled capability to Wales' wider well-being and sustainability objectives.

Organisations such as Environment Systems, Geo Smart Decisions, and Ultranyx suggest a cluster that is highly capable, but relatively concentrated, with a small number of firms spanning multiple layers of the EO value chain (data, analytics, and application). This positions sustainability as both a differentiator and a delivery principle for the Welsh space sector, which strengthens the credibility of using climate and environmental resilience as the organising logic for downstream space-enabled services. Taken together, the ecosystem is best characterised as a small number of capable actors with multi-disciplinary breadth, rather than a large, deep bench of specialist EO product firms.

Opportunity Area

Wales' main gaps are not in recognising EO's relevance, but in building the delivery and commercialisation layers that turn EO into repeatable, investable services that public bodies and regulated sectors can adopt at scale:

- **Broaden the bench of application-led EO product companies:** The supply-chain evidence points to a strong nucleus, but limited breadth. The opportunity is to attract and grow more firms that provide sector-specific EO products (e.g., flood / coastal risk, land-use change, biodiversity / peatland monitoring, infrastructure risk, and climate adaptation planning, etc.), rather than relying on a small number of multi-role actors to cover the full spectrum.
- **Build "procurement-ready" EO services and operating models for public sector adoption:** UK-wide evidence consistently highlights that public sector procurement of EO data / services can be difficult because the market changes quickly, offerings vary, and buyers struggle to assess value-for-money and specify requirements. This is a known barrier to scaling EO beyond pilots. A Welsh "observatory" concept will need robust service definitions, assurance, data governance, and outcome metrics that make procurement straightforward and repeatable.
- **Strengthen the bridge from data to decision-support and operational action:** There is a gap between "EO outputs exist" and "operators act on them". Wales can address this by growing integrators who combine EO with local datasets, modelling, and operational workflows (alerting, prioritisation, response planning), and by developing reference architectures that public bodies can adopt without bespoke rework each time.

Rural Connectivity & Inclusion

Expertise

Rural connectivity is a persistent and well-evidenced policy challenge in Wales, and the broader UK context reinforces why hybrid connectivity solutions (including satellite-enabled options) remain relevant even as fibre and 4G coverage improves. Ofcom's reporting shows that fixed broadband not-spots are reducing, but still exist, and that there remains a "long tail" of premises without decent fixed-line broadband, particularly in rural areas (Ofcom, 2025)[20].

Welsh Government activity continues to focus on extending access to fast and reliable broadband and maintaining intervention mechanisms (e.g., grant schemes and successor programmes to earlier roll-outs). In parallel, UK-level programmes to tackle rural mobile coverage gaps (including new mast deployments in Wales) illustrate both progress and the continuing need for solutions that work in hard-to-reach geographies, reinforcing why satellite and hybrid connectivity remain relevant as an inclusion tool.

Organisations such as Excelerate Technology, MLS Solutions, and Dragon WiFi suggests Wales has meaningful capability fragments across connectivity provision, enabling technology, and adjacent platforms, but the number of organisations remains relatively modest.

Opportunity Area

Wales' main gaps are not in recognising EO's relevance, but in building the delivery and commercialisation layers that turn EO into repeatable, investable services that public bodies and regulated sectors can adopt at scale:

- **Develop and / or attract hybrid connectivity integrators and managed service providers:** The opportunity is to grow providers who can design, deploy, and operate end-to-end solutions that blend satcom, terrestrial networks, and IoT, covering installation, service management, uptime assurance, and user support. This is typically the missing layer between "connectivity capability exists" and "rural services reliably run on it".
- **Create adoption pathways that are procurement-friendly for local authorities and anchor institutions:** Even where technology works, roll-out can stall without standard packages, framework-friendly contracting, and clear outcome measures (coverage, resilience, cost per user / site). Wales can position itself by developing repeatable deployment models for rural hubs (community facilities, healthcare access points, emergency connectivity, remote logistics nodes).
- **Embed security-by-design as a standard feature of rural inclusion services:** As rural connectivity becomes a pathway for delivering public services and handling sensitive data, cyber resilience becomes a prerequisite rather than an optional add-on. UK national direction is towards tightening cyber resilience expectations for essential services and their suppliers, which increases the value of having credible security integration capacity within Welsh delivery teams.

[10] Ofcom, 2025. Connected Nations Wales Report 2025, London, UK: Ofcom.

Infrastructure & Energy Resilience

Expertise

Wales has strong strategic rationale for positioning space-enabled capability in support of infrastructure resilience, given the importance of distributed rural networks, coastal exposure, and the need for continuity of communications and monitoring during disruptive events. Space-enabled monitoring (EO), data infrastructure, and communications resilience are increasingly mainstream parts of national resilience toolkits, and Wales' sustainable space framing creates a natural umbrella for applying these tools to asset integrity, environmental hazards, and continuity planning.

Opportunity Area

The principal gap is to convert resilience intent into integrated, operational services that infrastructure owners can buy, adopt, and rely upon. This implies three concrete opportunity areas:

- **End-to-end resilience products (not point solutions):** Wales can build propositions that fuse EO monitoring, communications continuity, and analytics into services for transport corridors, coastal infrastructure, and utilities, moving from data services to decision support and action. This requires more integrators, stronger user-driven requirements capture, and sustained customer relationships with asset owners and public bodies. This is how Wales converts "space-enabled capability" into recurring revenue and measurable resilience outcomes: buyers pay for reduced downtime, faster response, and lower lifecycle cost, not for datasets.
- **Assurance, testing, and operational readiness as a differentiator:** Resilience markets are risk-sensitive. To compete, Wales needs visible assurance pathways, test, verification, validation, and operational readiness, that give buyers confidence in performance during outages or extreme events. Llanbedr-linked infrastructure and test ecosystem development is strategically relevant here, but must be packaged as an accessible, market-facing capability with clear routes from prototype to operational deployment. This lowers buyer risk and shortens procurement cycles, because operators can evidence performance under stressed conditions and demonstrate compliance with internal assurance and safety requirements.
- **Security-by-design at scale:** Critical infrastructure resilience increasingly intersects with cyber and information assurance. Where space-enabled data feeds infrastructure monitoring and response workflows, the absence of a mature, well-networked security layer becomes a material adoption barrier. Even if the technical EO / communications capability exists, procurement and operational stakeholders will expect credible assurance and cyber integration as standard. Security-by-design is a gate condition for adoption: without it, services will stall at pilot stage because asset owners cannot accept the operational and regulatory risk of insecure data pipelines or unmanaged supply chains.

Summary

Overall, the Welsh ecosystem presents a strong strategic narrative and a credible base of capability, but the gap analysis indicates that Wales' challenge is now less about "what to prioritise" and more about how to convert capability into repeatable delivery and investable propositions.

Across upstream and downstream segments, the most consistent constraint is the missing middle between having technically capable organisations and achieving sustained outcomes: space-grade assurance and verification maturity, accessible qualification and test pathways, and packaged offers that prime contractors, public bodies, and infrastructure operators can buy with confidence.

- A first consistent gap is assurance, trust, and operational readiness. Whether the objective is manufacturing for higher-value work packages, operating a spaceport, or deploying resilience services into critical infrastructure and public sector workflows, buyers' willingness to adopt is driven by confidence in performance, safety, and compliance. This translates into a need for clearer verification and validation routes, stronger quality / traceability disciplines, and demonstrators that evidence performance under realistic operating conditions. Without this, activity tends to remain at the "pilot" stage, procurement cycles become protracted, and the ecosystem struggles to build the track record required to attract anchor customers and inward investment.
- A second consistent gap is service integration and commercial packaging. Wales has multiple capability fragments, but outcomes depend on integrators who can convert technology into end-to-end services: turning EO into decision support, satcom into managed connectivity, and monitoring into operational resilience products that asset owners can procure as a managed service. This is where many ecosystems stall: the value is not wholly in the dataset or component, but the ability to operate a service reliably, define clear service levels, and evidence value-for-money against outcomes. Strengthening integrator capacity and producing procurement-ready service definitions is therefore central to scaling the three challenge-led themes.
- A third consistent gap is ecosystem breadth and scale in priority niches. Several areas appear concentrated into a small number of multi-role organisations, which constrains growth and creates fragility. Wales' strategy ambitions, particularly around sustainable space leadership, EO-driven public value, and launch-adjacent activity, will be easier to deliver if Wales deliberately broadens the bench in thin, but strategically important capability types: specialist qualification / testing services, cyber and information assurance, space software and AI, and application-led EO product firms. This is also where "magnet business" attraction strategies are most defensible: targeting specific archetypes that fill recognised gaps rather than generic inward investment.

A practical route to closing these gaps is to focus on delivery mechanisms as much as capability building. First, Wales can accelerate downstream adoption by working more closely with programmes such as Unlocking Space for Government, using challenge-led public sector demand to define requirements, standardise service specifications, and move EO and connectivity from pilots into procurement-ready, outcome-based services. Second, establishing a Sustainable Space Accelerator would provide a coherent vehicle to raise "space readiness" across suppliers, coordinate test access and demonstrator pathways, and attract "magnet" businesses into thin, but strategically important areas (e.g., space software & AI, cyber / security-by-design, and specialist qualification services). In parallel, Wales should treat regulatory enablement as a strategic workstream, working with the CAA to streamline approval pathways and to develop a clear route for return from orbit into Wales, thereby reducing friction for near-term delivery while building the governance and assurance maturity required for sustainable launch over time.

Taken together, these interventions would help Wales translate its sustainable space positioning into a durable competitive advantage: credible, assured, and market-facing offers that support launch-adjacent growth while directly delivering climate, inclusion, and infrastructure resilience outcomes.

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Baden-Württemberg's Space Sector, Strategy, & Priorities

The Baden-Württemberg Space Story

Baden-Württemberg's space story is best understood not as that of a standalone national programme, but as that of a highly capable regional ecosystem embedded within German and European space activity. Its role has been shaped by a combination of advanced manufacturing, applied engineering, strong research institutions, and long-standing participation in major European programmes. In this sense, Baden-Württemberg has developed as an important space region in Germany: less visible politically than the federal level, but highly significant in the underlying industrial and research capabilities that make space systems possible.

The region's foundations lie in its broader industrial profile. Baden-Württemberg is one of Europe's strongest centres for precision engineering, automotive technologies, machinery, electronics, and high-value manufacturing. Over time, these strengths translated naturally into aerospace and space, where reliability, systems integration, specialist components, and applied research are critical. A regional study describes Baden-Württemberg's strength as an integrated value chain running "from the screw to the research satellite", which is a useful shorthand for the region's character: it combines deep supplier capability with nationally significant prime and research assets (DGLR, 2020, p. 21)[12].

[12] DGLR, 2020. RAUMFAHRT IN BADEN-WÜRTTEMBERG, Bonn, Germany: German Society for Aeronautics and Astronautics.

A defining feature of Baden-Württemberg's development has been the concentration of complementary space capabilities in several regional hubs. Around Friedrichshafen and the Bodensee area, the region hosts major satellite manufacturing and space hardware capability. Backnang developed into a leading centre for satellite communications. Stuttgart became a focal point for university-led space systems research, mission design, satellite operations, navigation, and enabling technologies. Lampoldshausen emerged as one of Europe's most important propulsion and test locations, with DLR's Institute of Space Propulsion tracing its history there back to 1959 and serving as a major European research and test centre for liquid rocket propulsion. Ulm adds further depth through quantum technologies, AI security, and communications-related research relevant to future space systems and secure digital infrastructure (DLR, 2026a; DLR, 2026b; DLR, 2026c; DLR, 2026d)[13],[14],[15],[16].

The University of Stuttgart has been especially important in giving the region a distinctive space identity. Stuttgart hosts the largest aerospace faculty in Europe, while the university's Institute of Space Systems has built a strong profile in small satellites, satellite technology, mission operations, and experimental in-orbit systems (BaWü, 2023)[17]. Its infrastructure includes its own ground station and satellite control capabilities, allowing Baden-Württemberg not only to design and build space systems, but also to operate them (UoS, 2026)[18]. This gives the region an end-to-end competence that goes beyond component supply and into system demonstration, mission execution, and skills development.

Research depth is another central part of the story. Baden-Württemberg's space ecosystem is supported not only by industrial firms and the University of Stuttgart, but also by DLR sites in Stuttgart, Lampoldshausen and Ulm, alongside Fraunhofer institutes and wider scientific infrastructure. DLR Stuttgart works on lightweight structures, re-entry technologies, and laser-based systems for space debris monitoring and removal. Lampoldshausen remains a core European asset for propulsion testing and launcher-related R&D. In Ulm, DLR's quantum technologies work is explicitly geared towards precision instruments for space applications. Taken together, these assets mean the region is active across propulsion, structures, satellite systems, communications, safety, security, and advanced instrumentation.

Baden-Württemberg's role is also notable for the way civil, commercial, and research capabilities overlap. The region contributes to traditional space strengths such as satellites, telecommunications, Earth Observation (EO), instrumentation, and propulsion, but it is also positioning for newer areas associated with commercialisation and "NewSpace". The state's aerospace strategy, launched in 2023, frames this explicitly: Baden-Württemberg aims not just to preserve existing strengths, but to expand them, open new fields, and increase the visibility of regional actors in federal, EU, and ESA programmes.

This gives Baden-Württemberg a space story with two linked chapters. The first is one of industrial and scientific depth: a region that became indispensable to German and European space through engineering excellence, propulsion, satellite manufacturing, communications, and research. The second is one of adaptation: how that legacy base is being reframed for a more commercial, competitive, and technology-convergent era in which space increasingly intersects with AI, quantum, climate services, secure connectivity, autonomy, and resilient critical infrastructure. Rather than trying to replicate a full national space architecture, Baden-Württemberg's strength lies in being a dense, innovation-driven regional node within a larger German and European system, with unusual breadth from research and testing through to subsystem supply, mission capability, and advanced applications.

[13] DLR, 2026a. The Institute of Space Propulsion. [Online] Available at: https://www.dlr.de/en/ra [Accessed 23rd March 2026].

[14] DLR, 2026b. DLR site Lampoldshausen. [Online] Available at: https://www.dlr.de/en/dlr/locations-and-offices/lampoldshausen [Accessed 23rd March 2026].

[15] DLR, 2026c. The Institute of Quantum Technologies. [Online] Available at: https://www.dlr.de/en/qt [Accessed 23rd March 2026].

[16] DLR, 2026d. The Institute for AI Safety and Security. [Online] Available at: https://www.dlr.de/en/ki [Accessed 23rd March 2026].

[17] BaWü, 2023. THE Aerospace LÄND, Stuttgart, Germany: Ministry of Economic Affairs, Labour and Tourism.

[18] UoS, 2026. Institute for Space Systems: Infrastructure. [Online] Available at: https://www.irs.uni-stuttgart.de/en/research/satellitetechnology-and-instruments/smallsatelliteprogram/flying-laptop/infrastructure/ [Accessed 23rd March 2026].

Strategies & Priorities

Baden-Württemberg's space strategy is set out within the state's 2023 aerospace strategy, which presents space not as an isolated sector, but as a strategically important high-technology field linked to industrial competitiveness, research excellence, climate and environmental goals, and future digital services. Within that wider framework, the space components of the strategy are centred on strengthening Baden-Württemberg's established capabilities while expanding its position in NewSpace, where commercialisation, agile development, data-enabled services, and cross-sector innovation are becoming more important (BaWü, 2023, pp. 9 - 10). The strategy is therefore both defensive and developmental: it aims to preserve the region's existing strengths, while repositioning Baden-Württemberg for a more competitive, sustainability-driven, and commercially dynamic space economy.

At the highest level, the strategy states that Baden-Württemberg wants to remain among the most successful aerospace regions and to respond to the major challenges facing the sector through a future concept built on **digitalisation, sustainability**, and **cooperation** (BaWü, 2023, pp. 3 - 4). In the space context, these pillars have a clear meaning. **Digital** space is about accelerating digital uptake across the sector, especially among SMEs, and using increasing volumes of data, particularly satellite data, to generate new services and business models. **Sustainable** space is focused on developing environmentally responsible space technologies and establishing a recognisable quality positioning for sustainable aerospace made in Baden-Württemberg as a hallmark of quality (BaWü, 2023, p. 16). **Cooperative** space is concerned with strengthening political representation, increasing the visibility and networking of the sector, and deepening collaboration between space and other industries. These three pillars operate as the organising logic for the region's space objectives.

Within the strategies dedicated space action fields, it identifies several priority objectives:

1. It seeks to **strengthen existing core competencies in conventional space while broadening capabilities in NewSpace.** This includes maintaining strengths in established industrial and research activities, but also adapting the ecosystem to faster development cycles, more agile technology programmes, and new commercial market opportunities. The strategy is explicit that digitalisation and sustainability should not remain isolated projects, but should be spread more widely across the sector.

2. The strategy places strong emphasis on **commercialisation and the use of space-derived data**. It argues that Baden-Württemberg should use satellite data to support the development of new digital services and business models, and to drive innovation beyond the space sector itself, including in areas such as autonomous driving, cybersecurity, and climate protection. This is an important point in strategic terms: the region is not only interested in upstream technologies, but also in downstream economic value creation from space-enabled data and services. In that sense, the strategy treats space as both an industrial capability and an enabling digital infrastructure for wider economic transformation.

3. **Sustainability** is positioned as a defining regional ambition in space. The strategy argues that Baden-Württemberg should take on a leading role in environmental and climate protection through space-based services and should make sustainable space a regional hallmark. This includes support for greener propulsion approaches, the reusability of engines, climate-friendly drive technologies, and a stronger focus on protecting space systems and avoiding space debris as orbital activity increases. The state is therefore not framing sustainability only in terrestrial terms; it also applies the idea to the conduct of space activity itself, including the long-term viability of the space environment.

4. The strategy gives notable weight to **research excellence, skills, and technology transfer**. It stresses the importance of maintaining and improving scientific capability, including the education and training of future space engineers, and explicitly identifies workforce security as a regional priority. This reflects Baden-Württemberg's wider model: the space economy is expected to be underpinned by strong universities, applied research institutions, and industry-research collaboration, rather than relying solely on prime contractors or standalone public programmes. The strategy, therefore, treats research capability, human capital, and translational innovation as essential enablers of long-term competitiveness.

5. The strategy seeks to **increase the visibility, political representation, and connectedness of the regional space sector**. It calls for stronger external visibility for Baden-Württemberg as a space location, greater networking within the sector, and more collaboration with other industries. This is partly about profile and influence, but it is also about economic structure: the region wants space to connect more effectively with adjacent strengths in digital technologies, manufacturing, mobility, energy, and environmental applications. This means Baden-Württemberg sees cross-sector spillovers as central to its NewSpace positioning.

These strategic themes are then translated into a number of specific space measures:

1. One of the most important is the continuation of the Integrated Research Platform for Affordable Satellites (IRAS), which is presented as a vehicle for agile technology development and structured collaboration between industry, the University of Stuttgart, and applied research organisations (BaWü, 2023, p. 16). The intention is to continue and expand this cooperative model, with particular importance attached to adapting process technologies and achieving very low cost targets, especially in ways that are accessible to SMEs. This makes IRAS a core instrument for improving agility, cost-efficiency, and cross-sector technology transfer in the regional space ecosystem.

2. A second major strand is the strategy's programme for sustainable space. This includes support for R&D on a launch vehicle using sustainable propulsion, support for the creation of a Green Space Baden-Württemberg centre to bundle environmentally oriented space activities, and stronger university research on Sustainable Space 2050 (BaWü, 2023, p. 17). The latter includes work on technical solutions for new orbital regions, exploration missions, minimising ecological impacts, protecting space systems, and reducing space debris. Taken together, these measures show that sustainability is not treated as a rhetorical theme; it is operationalised through propulsion, institutional capacity-building, and long-term research agendas.

3. The strategy also prioritises start-up support as part of its space agenda (BaWü, 2023, pp. 17 - 18). It states that the growth in satellite constellations and data volumes is creating new opportunities for services in climate and environmental protection, autonomous systems, and cybersecurity, and it links this to state-level support under Start-up BW and the ESA Business Incubation Centre in Baden-Württemberg. The emphasis here is on enabling new firms to build digital, data-driven products and services, rather than only supporting traditional hardware activity. This reinforces the broader strategic shift toward NewSpace and the commercial exploitation of satellite-derived capabilities.

4. Finally, the strategy underlines the need to strengthen cooperation with other sectors, including through a proposed "BW Space meets" event series intended to connect space more closely with other industry associations in the state and stimulate new innovative products (BaWü, 2023, p. 18). This reflects a recurring feature of Baden-Württemberg's approach: space is not treated only as a niche vertical, but as a source of technologies, data, and methods that can generate value across the wider economy.

Overall, the space aspects of Baden-Württemberg's strategy can be read as a regional competitiveness agenda built around five linked objectives: to modernise the space sector through digitalisation; to make sustainability a distinctive regional strength; to convert satellite data and NewSpace activity into new commercial value; to sustain research, skills, and agile innovation capacity; and to raise the visibility and connectedness of Baden-Württemberg as a space location. The result is a strategy that does not seek to replicate national space policy in full, but instead positions Baden-Württemberg as a high-value regional node within Germany and Europe, with particular emphasis on NewSpace, sustainability, and cross-sector innovation.

Baden-Württemberg's Space Sector Gap Analysis

Using ecosystem data presented in the Satellite Applications Catapult's Space Capabilities Catalogue as of March 2026, this section identifies where Baden-Württemberg has existing strengths in the priority areas set out in their space strategy. The following segment shall seek to outline, in brief, where Baden-Württemberg already excels and where it needs to develop to meet the objectives set out in in its Strategy. Each segment will outline a strategic priority, existing strengths, and areas for development.

Start-Up Growth, Commercialisation, & NewSpace Scaling

Expertise

The region does show signs of an entrepreneurial and commercial support layer. acitoflux is a useful example of venture and investment capability explicitly active in NewSpace and deep tech. **HyImpulse** and **Atmos Space Cargo** represent the type of younger, more frontier-oriented firms associated with NewSpace. **Xylene,** and some of the region's software- and analytics-led actors, indicate that there are also newer downstream-oriented business models present. This demonstrates that Baden-Württemberg's ecosystem is not composed only of universities, research institutes, and established engineering firms.

Opportunity Area

The principal gap is not the absence of start-up activity, but the relative thinness of the scale-up layer needed to turn promising firms into durable commercial anchors:

- **Scale-up capacity rather than start-up presence alone:** A region can generate innovative companies without consistently helping them become medium-sized or globally competitive firms. The likely gap in Baden-Württemberg is the architecture around growth: market access, customer traction, growth capital, procurement pathways, and the commercial support needed to move beyond technical proof points.
- **Commercial productisation of technical excellence:** Many of the region's organisations appear highly capable technically. The challenge is to ensure that this technical strength is turned into products and services that can be sold repeatedly, not only into bespoke engineering contracts or research-driven work. This is especially important if the strategy is to deliver in digital services, sustainability, and affordable mission architectures.
- **Visibility and bankability:** The strategy is right to emphasise visibility and networking. For younger firms, one of the practical constraints is not invention, but recognition by investors, customers, and public buyers. Baden-Württemberg's opportunity is to make more of its NewSpace firms legible as commercially credible, investable, and partnership-ready businesses.

Digitalisation & Satellite-data-Enabled Business Models

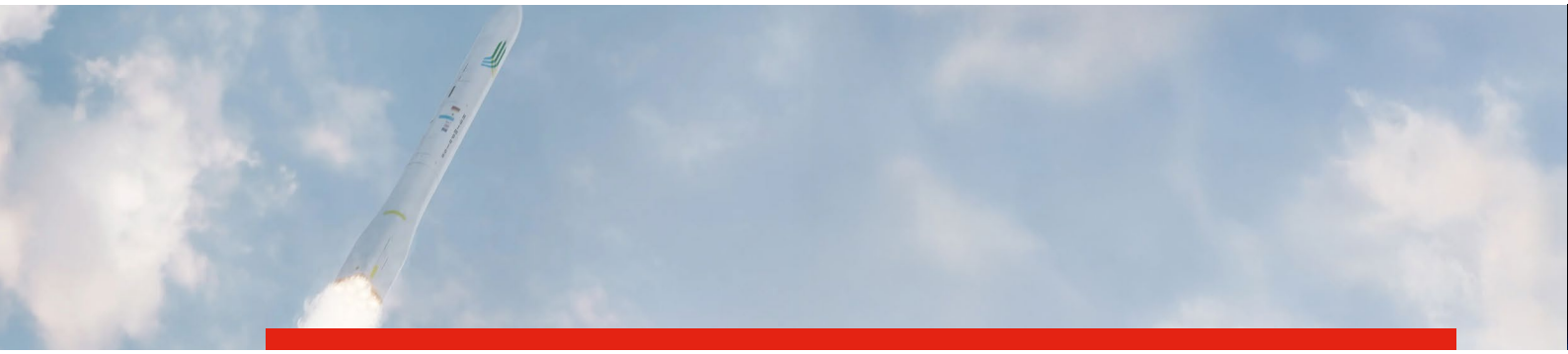
Expertise

Baden-Württemberg has a credible digital foothold, but it remains narrower than its upstream base and thinner than the strategy's ambitions imply. The regional ecosystem includes organisations able to support software, modelling, geospatial analysis, mission data handling, and digital applications. Illustrative examples include Altair Engineering, Spyrosoft, Xylene, NavPos Systems, and GTD System & Software Engineering, Taken together, these organisations show that Baden-Württemberg already has a strong base from which more advanced satellite-data exploitation and downstream product development could grow.

Opportunity Area

The principal gap is not the absence of digital competence, but the need to convert a technically credible set of capabilities into a broader, more commercially mature downstream layer that can deliver the strategy's ambitions around satellite-data-enabled business models and digitally enabled growth:

- **Application-layer scaling:** Baden-Württemberg has organisations that can process, model, analyse, and visualise data, but the ecosystem still appears stronger in enabling tools than in a thick cohort of companies turning space-derived data into commercial services. The strategic challenge is, therefore, to grow firms and propositions that sit closer to the customer and the market, especially in areas such as climate intelligence, industrial monitoring, mobility, and secure geospatial services.
- **From technical workflow to market-facing service:** A region can be strong in engineering software, mission tools, and analytics without necessarily capturing substantial downstream value. The gap here is productisation. Baden-Württemberg appears capable of supporting technical workflows around data and missions, but less visibly populated by firms packaging these capabilities into scalable services that can be adopted routinely by non-space customers.
- **Demand-side absorption across the wider economy:** The strategy's digital ambition depends not only on supply, but on uptake across Baden-Württemberg's, Germany's, and the wider industrial base. The opportunity is to strengthen the connection between space data and the region's non-space strengths, so that digitalisation becomes a route to new market demand rather than a capability that remains largely internal to the space and engineering community.



Sustainable Space, Environmental Services, & Responsible Operations

Expertise

Baden-Württemberg has meaningful building blocks for a sustainability-led space proposition. HyImpulse provides a clear example through its work on hybrid, paraffin-based propulsion and launch systems, aligning directly with the strategy's emphasis on greener propulsion approaches. Atmos Space Cargo adds capability around return-from-orbit systems, re-entry, and in-space research and manufacturing, which is highly relevant to questions of mission efficiency, reuse, and new sustainable mission architectures. Fraunhofer EMI brings research and engineering capability relevant to spacecraft testing, survivability, and system-level performance, while Fraunhofer IPA contributes manufacturing, coatings, testing, and industrial process capability that could support more efficient production and materials development. Organisations such as AZUR SPACE Solar Power, ASP Equipment, and Von Hoerner & Sulger further reinforce the regional base in photovoltaics, propulsion components, power systems, and payload-related engineering. Baden-Württemberg does have real capability that could underpin a sustainable space agenda.

Opportunity Area

The principal gap is that these capabilities do not yet appear to add up to a fully developed, system-level sustainable space proposition. The region has strong pieces, but less evidence of a broad cluster that combines green technologies, responsible operations, and downstream environmental value creation into a recognisable whole:

- **From technical inputs to a coherent sustainable space offer:** Baden-Württemberg has relevant strengths in propulsion, power, manufacturing, return systems, and research, but these appear somewhat dispersed. The opportunity is to connect them into a clearer regional proposition around sustainable space, rather than allowing sustainability to remain a useful narrative attached to isolated technical capabilities.
- **Operational responsibility beyond green hardware:** Sustainable space increasingly includes debris awareness, end-of-life planning, orbital responsibility, survivability, and protection of the space environment. Baden-Württemberg has some relevant technical foundations, but less visible depth in dedicated service-layer activity around debris, orbital safety, or responsible operational support. The gap is therefore one of operationalisation, not just technology.
- **Environmental services as a commercial growth area:** The strategy links sustainability to broader environmental and climate applications. While the region has some digital and geospatial actors that could contribute here, there is less evidence of a broad cohort of firms already monetising space-enabled environmental services at scale. The opportunity is to translate technical capability into stronger downstream environmental products and services.

Affordable Satellites, IRAS, & End-to-End System Integration

Expertise

Baden-Württemberg is particularly strong in the enabling capabilities that sit behind an affordable-satellite agenda. The region includes firms with credible hardware, subsystem, software, testing, and manufacturing expertise. TESAT is a major example, with capabilities spanning communications systems, payload design, photonics, RF electronics, optical relay systems, testing, and software. Von Hoerner & Sulger contributes payload design, propulsion components, deployment mechanisms, optical sensors, and testing services. ASP Equipment and AZUR SPACE Solar Power reinforce the base in power systems, photovoltaics, and engineering, while DIOPTIC, AXTAL, COMTRONIC, and Spherea add further depth in optical materials, photonics, radio electronics, control electronics, payloads, onboard processing, and testing. Astos Solutions contributes satellite platform design, mission design, and simulation software, and the University of Stuttgart Institute for Space Systems adds research, R&D, and skills development that underpin longer-term system capability. This is a serious upstream and technical foundation.

Opportunity Area

The principal gap is not component capability. It is the need to turn strong subsystem and engineering depth into more repeatable, integrated, end-to-end mission capability, consistent with the strategy's emphasis on affordable satellites and collaborative development:

- **System integration density, rather than component excellence alone:** Baden-Württemberg appears well supplied with organisations that can contribute parts, software, engineering, and testing. The thinner layer is end-to-end integration: actors that routinely assemble these capabilities into complete, affordable, repeatable satellite products and missions. That distinction matters because strategies built around affordability and agility depend on the ability to integrate, qualify, and deliver consistently, not only on technical excellence at subsystem level.
- **Operational follow-through across the asset lifecycle:** Affordable satellites also require mission planning, ground support, mission control, and operational continuity. Baden-Württemberg has some relevant assets here, but the operational layer still appears thinner than the underlying engineering base. The opportunity is to strengthen the full mission chain, from design through to operation and service delivery.
- **Industrialisation for speed and cost:** The strategy's Integrated Research Platform for Affordable Satellites (IRAS) project emphasis implies a need for faster cycles, cost-down production, and methods that can support SME participation. Baden-Württemberg has excellent manufacturing and engineering capability, but the opportunity is to align this more directly with modular architectures, quicker qualification routes, and more routinised delivery models that make affordability a sustained ecosystem characteristic rather than an occasional project outcome.

Skills, Research Translation, & Commercial Workforce Depth

Expertise

Baden-Württemberg is strong in research and technical capability development. The University of Stuttgart Institute for Space Systems is an obvious anchor, with research, R&D, and skills-and-training roles. Aalen University contributes applied research and workforce development. Fraunhofer EMI and Fraunhofer IPA add further depth in research, commercial R&D, testing, engineering, manufacturing, and industrial process capability. This gives the region a substantial knowledge base and a credible platform for longer-term talent development.

Opportunity Area

The principal gap is less at the research layer and more in the translation of technical excellence into a broader commercial and operational workforce suited to the strategy's ambitions:

- **A broader role mix for a changing sector:** Baden-Württemberg has engineers, researchers, and technical specialists. But a region pushing toward digital services, sustainable space, affordable missions, and New Space scaling also needs more people in product, operations, business development, regulation, programme delivery, and customer-facing roles. The opportunity is to broaden the workforce profile around the existing technical base.
- **Translation structures, not only education structures:** Strong institutes matter, but they do not automatically produce strong commercial outcomes. The strategic need is to improve the pathways between research capability, venture formation, industrial adoption, and scaled delivery, so that research excellence translates more consistently into market capture.
- **Retention and circulation of scale-up talent:** Regions with strong research systems can still struggle to build and retain enough commercially experienced growth talent. Baden-Württemberg's opportunity is to ensure that its ecosystem can support the people needed not just to invent and test, but to scale, sell, operate, and grow.

Summary

Baden-Württemberg is distinguished by deep industrial competence, strong applied research, and a concentrated set of regional hubs spanning satellite manufacturing, satellite communications, propulsion, mission design, and space systems research. Its role within the wider German and European space economy is as a high-value regional node: one that contributes critical enabling technologies, specialist engineering, research infrastructure, and mission capability into broader national and European systems. This gives the region a strong legacy base in conventional space activity, underpinned by strengths in advanced manufacturing, precision engineering, propulsion, telecommunications, and scientific research.

The Baden-Württemberg aerospace strategy seeks to build on that legacy by repositioning the region for a more digital, sustainable, and commercially dynamic space economy. The ecosystem evidence suggests that Baden-Württemberg already has much of the technical foundation needed to support this strategy. It appears particularly strong in upstream engineering, specialist subsystem capability, testing, manufacturing, propulsion-related activity, and research-led innovation. It also shows credible emerging strength in areas such as launch, return from orbit, mission design, and frontier NewSpace activity. However, the main challenge is not whether the region has capability in general, but whether it can convert that capability into a more complete and commercially mature ecosystem aligned with its strategic ambitions. The clearest gap areas are:

- **Digitalisation and satellite-data commercialisation:** Baden-Württemberg has a credible digital base, but it is still thinner than its upstream strength. The main gap is in scaling downstream, customer-facing products and services that turn satellite data into repeatable commercial value.
- **Sustainable space as a joined-up proposition:** the region has strong technical ingredients in propulsion, return systems, manufacturing, and research, but these do not yet appear to form a broad, system-level sustainable space cluster spanning green technologies, responsible operations, and space-enabled environmental services.
- **Affordable satellites and end-to-end integration:** Baden-Württemberg is strong in subsystem and engineering capability, but appears thinner in the layer of actors able to integrate, operate, and repeatedly deliver complete, affordable mission architectures.
- **Start-up growth and NewSpace scaling:** entrepreneurial activity is present, but the scale-up layer remains relatively narrow. The key challenge is helping promising firms move from technical credibility to durable commercial growth through stronger market access, customer traction, and growth support.
- **Skills and research translation:** the research base is a clear asset, but the region will need a broader commercially oriented workforce, including product, operations, regulatory, and business-development capability, if it is to deliver on its downstream and NewSpace ambitions.

Overall, Baden-Württemberg appears well positioned to remain one of Germany's leading space regions. Its strongest near-term advantage lies in the depth and quality of its engineering, research, and industrial base. Its longer-term success, however, will depend on how effectively it can translate those strengths into broader commercial capture: scaling NewSpace firms, growing downstream digital and environmental services, building more repeatable integrated mission capability, and turning cross-sector cooperation into sustained market demand. In that sense, Baden-Württemberg's opportunity is not to replicate national space policy at regional level, but to become an increasingly complete, visible, and strategically differentiated regional engine within Germany's and Europe's evolving space economy.

Conclusions

This report finds that Wales and Baden-Württemberg each have credible and strategically significant space ecosystems, but that they differ in structure, maturity profile, and routes to growth. Those differences create a strong basis for practical complementarity.

Wales and Baden-Württemberg are complementary rather than directly overlapping ecosystems. Wales offers agility, visible ambition, emerging launch-enabling and return-related thinking, developing downstream and applications capability, and the potential to act quickly in niche growth areas if supported by the right partnerships and market signals. Baden-Württemberg brings deeper industrial density, stronger subsystem and engineering capability, major research assets, and a more mature manufacturing and testing base. Wales' challenge is ecosystem depth and scale; Baden-Württemberg's challenge is commercial broadening, start-up scaling, downstream market capture, and fuller end-to-end system integration.

The central conclusion is therefore that the greatest value lies not in treating these ecosystems as competitors, but in treating them as complementary partners. A strategic approach to collaboration could help each side address gaps more quickly than attempting to build all capabilities domestically, while also creating new export routes, investment relationships, and joint propositions.

Opportunities for Wales to address Baden-Württemberg's gaps

Wales can contribute to Baden-Württemberg in areas where the German region needs broader commercial capture, ecosystem agility, and stronger market-facing application. Welsh strengths and ambitions in emerging launch-enabling activity, mission planning, return-from-orbit thinking, agile ecosystem development, and application-led collaboration may be particularly relevant where Baden-Württemberg seeks to convert technical assets into more complete and commercially visible propositions.

Wales may also be able to support Baden-Württemberg's downstream and service-oriented development through partnerships in applications, operational flexibility, and targeted niche capability building. Although Wales does not match Baden-Württemberg in industrial depth, it can offer a more agile testbed environment for cluster cooperation, pilot activity, and the development of smaller-scale collaborative initiatives that help move promising ideas towards market-facing outcomes.

Opportunities for Baden-Württemberg to address Wales' gaps

Baden-Württemberg is particularly well placed to address Welsh gaps in industrial depth, specialist engineering, subsystem capability, testing, propulsion-related research, and commercially translatable research excellence. For Wales, a relationship with Baden-Württemberg could provide access to stronger supply-chain depth, more mature research-industry interfaces, and partners able to support the growth of advanced manufacturing, system integration, and technical workforce capability.

This is especially relevant in fields such as manufacturing, test and evaluation, engineering, sustainable space technologies, and elements of end-to-end mission capability. Baden-Württemberg's deeper ecosystem may also help Wales strengthen the surrounding services and enabling conditions needed to move from niche capability toward a more complete and internationally competitive regional proposition.

Opportunities for Wales and Baden-Württemberg to collaborate

The Wales – Baden-Württemberg opportunity is arguably the most distinctive finding in the report. The project proposal itself anticipated collaboration opportunities in areas such as manufacturing, testing, data, and engineering, and the comparative analysis supports that direction. More specifically, the two regions appear well matched for cooperation around manufacturing and subsystem development, test and evaluation, engineering partnerships, mission planning, sustainable space, launch-enabling services, return-from-orbit related activity, and cluster-to-cluster knowledge exchange.

This relationship is likely to work best where it is made practical. That means moving beyond broad declarations towards identifiable firms, institutions, and cluster mechanisms; using ecosystem mapping as a basis for targeted

introductions; and focusing on activities that can generate visible results, such as trade missions, reciprocal delegations, pilot projects, demonstrators, collaborative bids, and targeted inward investment discussions. In that sense, the most valuable outcome of this report is not only the identification of complementarity, but the creation of a clearer platform for acting on it.

Closing Conclusion

Overall, the report finds that there is a credible and practical basis for deeper Wales – Baden-Württemberg engagement in space. The evidence suggests that the opportunity lies less in generic partnership language and more in deliberately matching one side's strengths to the other side's needs. For Wales and Baden-Württemberg, it means linking a growing, agile regional cluster with a technically deep and industrially mature one. If pursued through structured collaboration, targeted export activity, and focused investment engagement, these complementarities could support stronger economic outcomes on both sides.

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