

General Support Technology Programme (GSTP)

Initial Impact Analysis Report

March 2025



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GSTP Initial Impact Analysis Report

Executive Summary

This report, commissioned by the UK Space Agency and prepared by Frazer-Nash Consultancy, provides an early impact analysis of the UK's participation in the European Space Agency's (ESA) General Support Technology Programme (GSTP) between 2019 and 2024. Covering a sample of 44 funded activities from 11 organisations (representing 31% of the UK's GSTP funding), the evaluation assesses outcomes aligned with the UK's National Space Strategy.

Context

GSTP plays a critical role in helping UK companies, especially SMEs, de-risk high-potential technologies and bring them closer to commercial and mission use. Through this phased approach, GSTP enhances UK space capabilities, creates jobs, attracts private investment, and aligns with the UK's National Space Strategy goals.

GSTP Strengths

- **High flexibility:** Two funding routes (compendia and non-compendia) supported diverse innovation paths.
- **Technical support:** ESA officer engagement was consistently praised for accelerating development.
- **Strategic fit:** Strong alignment with UK goals to grow a globally competitive space sector.

Limitations and Recommendations

- **Sample scope:** Current findings reflect only 31% of UK GSTP funding.
- **Time-lag of impact:** Full economic and commercial effects may not materialize for 5–10 years.
- **Future evaluations** should expand sample size, track long-term mission integration, and assess cross-sector spillovers more systematically.

Key findings



Technological Advancement

- Average **TRL improvement**: +2.28 per activity.
- GSTP funding was **pivotal for early-stage technology development**, especially for SMEs.
- Projects experienced **rapid TRL progress** (up to +4 TRLs in one year) due to **ESA technical officer support** and de-risking funding mechanisms.



Economic Growth

- **£24.6 million in additional revenue** was generated, leveraging a **116% return on public investment**.
- **113 new full-time equivalent (FTE) jobs** were created, mostly within SMEs.
- Recipients attracted **private investment**, with notable funding rounds reaching ~£18 million.



Strategic Collaborations

- 73% of participants formed **strategic partnerships** through GSTP.
- Compendia activities facilitated **consortia formation** and **enhanced collaboration** across ESA member states.
- GSTP served as a **gateway for SME integration** with large system integrators (LSIs).



Science and Technology Leadership

- 90% of SME projects developed **novel technologies**.
- 72% of technologies had **cross-sector applicability** (e.g., aerospace, automotive, defence).
- 12 **spin-out technologies** and multiple **spin-in applications** demonstrated wider innovation value.
- 23 new technologies funded were **unique to the UK**, 13 of these are likely to be **unique to Europe** and **6 globally**.



National Space Capability

- 55% of sampled recipients registered **patents or developed IP**.
- GSTP supported **unique UK technological capabilities**, such as electric propulsion for small satellites.
- 82% of recipients pursued **follow-on funding**, indicating **sustained technology maturation**.

Conclusion

GSTP, from the sample of funded companies interviewed for this report, has demonstrably enhanced the UK's technological, economic, and strategic position within the global space sector. The programme fostered innovation, job creation, and international partnerships, particularly benefiting SMEs and supporting national capabilities. Continued investment and expanded monitoring, to understand all funded activity, will be key to maximizing GSTP's long-term value to the UK.

2. Introduction

The UK Space Agency engaged Frazer-Nash Consultancy to undertake an initial impact analysis of successful activities funded through the General Support Technology Programme (GSTP) between 2019 and 2024. This report summarises the evidence of emerging impacts in the context of the programme objectives and the National Space Strategy, to highlight the immediate benefits of GSTP for the UK space ecosystem.

The scope of this report focused on the early impacts from 44 GSTP funded activities between 2019 and 2024, undertaken by 11 organisations. These activities covered 31% of the funding budget of GSTP not allocated to ENDURE and Electrical, Electronic and Electromechanical (EEE) Sovereignty component activities which focus on securing a European supply chain for space components and advancements in radioisotope energy sources. The markets for the activities under EEE and ENDURE were deemed as too immature to include in this review.

This evaluation captures impacts up to the end of 2024, with some activities still ongoing and funding from Council at Ministerial Level 2022 (CMIN22) continued to be allocated through 2025. Information was gathered through semi-structured interviews with each recipient organisation. The evidence in this report provides an emerging understanding of how GSTP has contributed to developing key technologies for future missions, unlocking growth in the sector, building strategic partnerships and enabling national space capabilities.

The results show that for a sample of funded activities, GSTP has had an immediate impact on employment growth, and in advancing the technology readiness level of new technologies. There is evidence to show that GSTP can have a significant effect on company revenue when the technology is developed to an appropriate stage. This is especially evident when GSTP funded technologies are used on commercial or space agency missions. 18 activities were identified to be planning and preparing to enter space or had already made it fully to launch.

The current evidence underestimates the true impact of GSTP. The wider impact on society is likely to occur when the product or service becomes commercialised, once a suitable technology readiness level (TRL) has been reached. In the space sector, it is expected that commercialisation of such technologies occurs several years after a GSTP activity has completed meaning that the full impact of GSTP is likely to be evident over the next five years.

This section includes a synopsis of GSTP policy objectives, aims of the National Space Strategy and the overview of the anticipated impact.

General Support Technology Programme

The General Support Technology Programme (GSTP) is a European Space Agency (ESA) programme designed to develop technology from cutting-edge research to ready for mission selection. GSTP covers developments across ESA's ten competence domains, with the exception of telecommunications payloads, and is mandated to prepare technology that future missions will demand. The UK Space Agency (UKSA) subscribed €124m to GSTP to fund activities between 2019 and 2025 with €26m for ENDURE and €15m for EEE, led by UK based technology companies and universities.

For the UK, GSTP has the following policy objectives:¹

- ▶ To enable activities at ESA and UKSA national programmes by developing technology.
- ▶ To support the competitiveness of the UK and Europe's space industries.
- ▶ To foster innovation and transfer non-space technology (spin-in) to use in the design of new space systems.
- ▶ To enhance European technology non-dependence and the availability of European resources for critical technologies.

There are two routes by which activities are initiated through GSTP. The first is non-compendia activities which are proposed directly by the company or research organisation to UKSA and if they pass the first stage which is a UKSA review panel, they are invited to submit a comprehensive outline business case to ESA which is reviewed by an appropriate technical officer. The second is compendia activities which are statements of work written by technical officers at ESA when they identify a gap in the technology required for a future mission. Compendia activities are released on a triennial basis on ESA's procurement platform, and any entity may bid for activities that have been supported by their member state through a competitive bidding process.

GSTP enables the strategic positioning of the UK within ESA by supporting activities that unlock missions and capabilities that the UK wishes to prioritise. This includes the development of a UK-only electric propulsion system for small satellites and ensures that capabilities, such as image sensors, do not fall behind the development rate globally.

¹ [General Support Technology Programme \(GSTP\) - GOV.UK](#)

National Space Strategy

The National Space Strategy, published in 2021, aims to make the UK a space powerhouse by bringing together its strengths in science and technology, defence, regulation and diplomacy. Space is a global market estimated to be worth £490 billion by 2030, up from £270 billion in 2019.² In 2021/22, the space sector had a gross value added of £7.7 billion to the UK economy and employed over 52 thousand full time equivalents in productive roles.³ Growing the sector keeps the UK at the front of opportunities and threats in space.

The space sector can be characterised by both long-term, highly planned programmes, and short-term, fast-moving technology developments. Targeted missions can take decades from planning to launch, whereas fast-paced technology developments are needed to meet rapidly changing space standards over short periods of time, typically six months to two years in development. In this context, GSTP funding allows smaller companies or specific niches in larger companies to revolutionise a key component or subsystem.

The National Space Strategy identified five goals to grow the UK's space sector and enhance its global competitiveness, which are to:

- ▶ Promote the values of global Britain.
- ▶ Lead pioneering scientific discovery and inspire the nation.
- ▶ Protect and defend our national interests in and through space.
- ▶ Use space to deliver for UK citizens and the world.

The UK government will achieve these goals by focusing on four pillars of action: unlocking growth in the space sector; collaborating internationally; growing the UK as a science and technology superpower; and developing resilient space capabilities and services. These pillars are used as a foundation for the analysis within this evaluation report.

² [HM Government – National Space Strategy September 2021](#)

³ [Size and Health of the UK Space Industry 2023.pdf](#)

Evaluation questions

The scope of this evaluation focuses on 11 companies and their 44 GSTP funded activities between 2019 and 2024, covering 31% of GSTP's funding budget, not allocated to ENDURE and EEE. The evidence in this analysis provides an understanding of how GSTP has contributed to developing key technologies for future missions, unlocking growth in the sector, building strategic partnerships and enabling national space capabilities. This analysis explores the effectiveness of the programme in contributing to the National Space Strategy pillars amongst a sample of funded activity. The key evaluation questions are:

Technological Development

1. To what extent has GSTP funding led to technology readiness level (TRL) advancement?
 - a. How much of this would have not taken place at all, at a slower rate, or to a lesser degree (less progression through the TRLs)?

Unlocking Growth

2. To what extent, has GSTP funding led to the generation of revenue for recipients?
3. To what extent, has GSTP funding created or safeguarded high value jobs in the space sector?

Collaboration

4. To what extent, has GSTP funding led to the creation and/ or development of strategic partnerships between companies?
5. To what extent, has GSTP funding improved the role of the UK's space sector, both nationally and internationally?

Science and Technology Powerhouse

6. To what extent, has GSTP funding led to the use of spin-in technology or the development of spin-out technology?

Resilient Space Capability

7. To what extent, has GSTP funding led to the development of a unique UK capability or subsystem?
8. To what extent, has GSTP funding led to follow-on research and development projects within the space sector?

Implications for the evaluation

Analysis of the programme to date highlight implications for this evaluation:

- ▶ **Impact on Large System Integrators (LSIs):** The activities that GSTP funds in LSIs covers a small proportion of all the work packages within the organisation. It proved difficult to disaggregate the effects specifically resulting from GSTP compared to other programmes and internal investment as there was no regular capture of this data for each activity between 2019 and 2024.
- ▶ **Project completion:** Approximately 54% of activities included in this analysis were completed at the time of the interviews (December 2024 – February 2025). Therefore, the results presented in this report are the immediate effects that can be evidenced. This will likely be an underestimation of the total benefits of GSTP, specifically on impacts such as revenue generation, spin-out technology and follow-on projects, which by their nature are expected to follow project completion.
- ▶ **Time to market:** GSTP traditionally funds technology development between TRL 3 and 6, taking it from experimental proof of concept to being demonstrated in a relevant environment. TRL 7 onwards occurs when the technology is selected for a mission and sets mission-specific requirements. The duration between technology being selected to the mission launch can be between 5 and 10 years. Whilst GSTP helps to advance technology, the corresponding commercial applications and revenues likely occur in the longer term. Therefore, this impact assessment only captures the short-term benefits and likely underestimates the full impact of GSTP on the recipient companies and UK space ecosystem.

3. Methodology

This initial impact analysis used the National Space Strategy and the programme objectives to form the evaluation questions.⁴ Semi-structured interviews with fund recipients were used to gather evidence of the early benefits from the General Support Technology Programme (GSTP) on supporting the UK to become an innovative and attractive global space economy amongst the sample. The steps taken are outlined below.



Figure 1: The impact analysis approach draws on the National Space Strategy.

Consultation with GSTP funded organisations

This analysis comprised 11 interviews with recipient companies, as these projects provided sufficient grounds for evidence gathering for evaluation. The entities included in this report were selected from a broader pool of participants who responded to an initial knowledge-gathering exercise. This sample was chosen to provide representative insights based on the responses received, key sampling characteristics we represented were level of funding, company type and number of activities. The recordings and transcripts from the interviews were used to answer all evaluation questions relevant to the corresponding activity. For ten of the participating companies, this covered all their GSTP activities from 2019 ESA CMIN19 and CMIN22. One company had 15 ongoing GSTP activities, of which three were covered during the interview.⁵

The interviews captured qualitative and quantitative evidence including TRL improvements, jobs created and additional revenue generated. The interview questions also focused on understanding the narrative behind the technology and its place in the space ecosystem, as well as future plans for development.

⁴ This report is based on initial observed impacts amongst a sample of funded activities but there is no comparison between a control group.

⁵ The three activities chosen had the most available information and were initiated at least nine months ago.

This report is based on a sample of 44 activities across 11 companies worth €25.4 million, covering 31% of GSTP's budget between 2019-2024 which included seven small medium enterprises (SMEs), two micro-SMEs, one research and development (R&D) organisation and one LSI. All interviewees were UK based and three of the SMEs were UK branches of larger multi-national corporations, the sample also included micro-SMEs. The sample reflected key characteristics of the GSTP recipient population. Most of the R&D recipients were universities, where impacts such as job creation or revenue generated are unlikely to be linked to their GSTP activities. However, one of the SMEs was a spin-out company from research undertaken by a university which shows the potential route to growth from creative innovations. More information is provided in Table 1.

Table 1: Descriptions of the GSTP recipients interviewed.

Company type	Amount of GSTP funding received				Number of activities			
	£0.5-1m	>£1-2m	>£2-3m	>£3-4m	>4	0-5	6-10	11-15
Micro-SME	1	1	-	-	-	2	-	-
SME	1	3	-	1	1	5	1	-
Large	1	-	-	-	-	1	-	-
R&D	-	1	-	-	-	1	-	-
LSI	-	-	-	1	-	-	-	1
Totals	3	5	-	2	1	9	1	1

The following job roles were included in our sample:

- Business Development Manager
- Director
- Senior Engineer*
- Head of Marketing

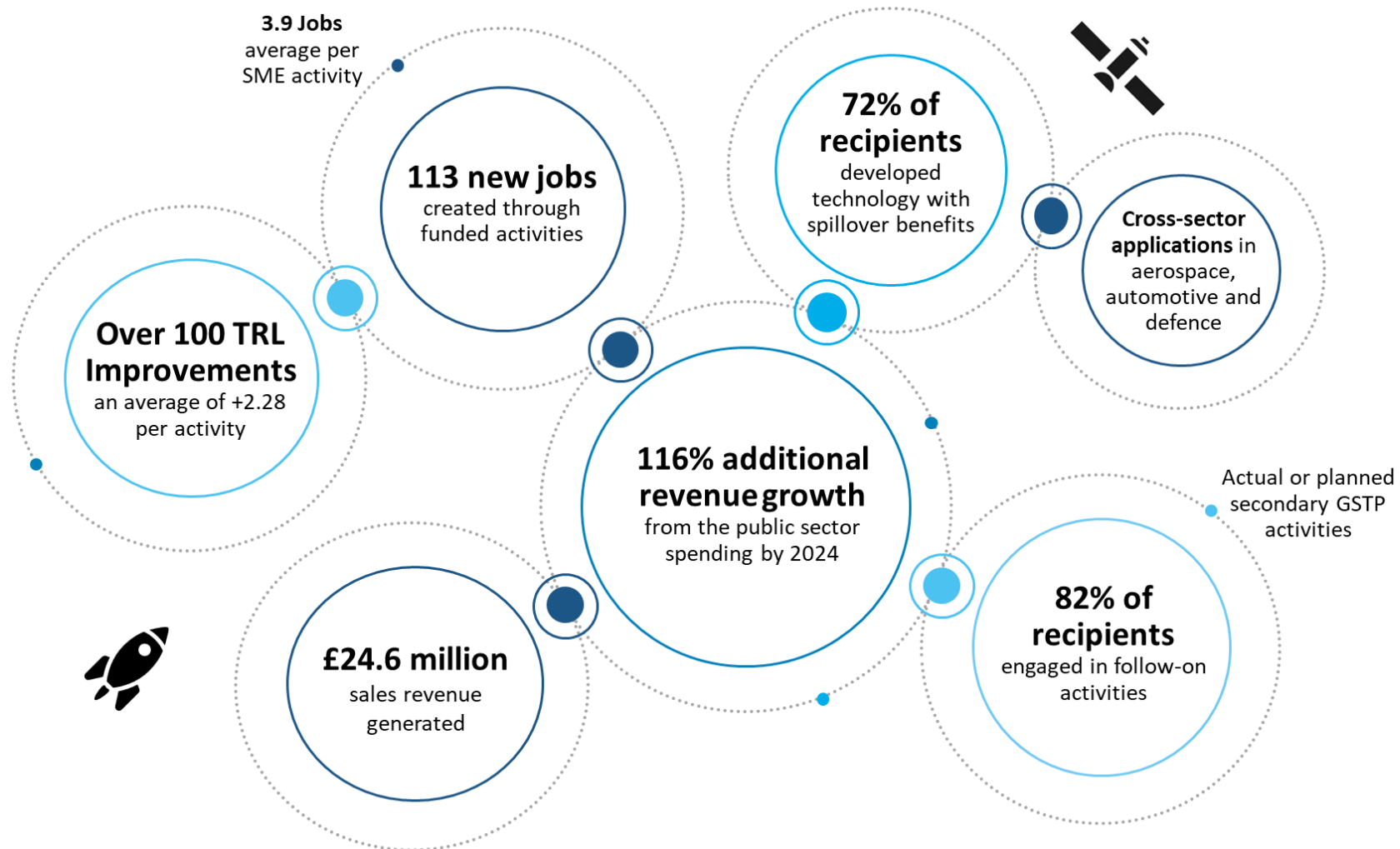
*Senior Engineers were also Directors and Business Development Managers

Limitations of the approach

Sample of the population: Evidence in this report is based on a sample of all GSTP recipients. The funding that the sample received is approximately 31% of GSTP funding over the period. Whilst reasonable efforts have been made to ensure the sample includes key characteristics (different company types, funding levels and number of activities), this approach does not provide a full picture of the impact from all GSTP activities in CMIN19 and CMIN22.

Self-selection and perception: Respondents self-selected information to provide. The views of those not participating or alternative views may remain unobserved. Stakeholder responses represent the opinion, judgement and understanding of what had occurred. Thus, the role within projects, seniority level, exposure to company performance information, and memory of events will differ across respondents and affect the accuracy and level of detail of the insights.

Emerging impacts from a sample of GSTP activities, 2019 – 2024*



This report is based on a sample of 44 activities across 11 companies worth €25.4 million, covering 31% of GSTP's budget between 2019-2024.

4. Initial impacts on technological development

- ▶ GSTP funding progressed activities over 100 TRLs, an average of +2.28 per activity.
- ▶ GSTP de-risk projects supported SMEs to undertake early technology development which would not have otherwise been attempted.
- ▶ GSTP accelerated technological development that would have either not taken place or happened at a slower pace, seeing up to +4 TRL for an activity across only one year of funding.

Progression through technological readiness levels (TRL): The GSTP activities for this analysis started with an average TRL of 3.4, where the proof of concept or a functional verification of the technology has occurred. This is typical for GSTP activities across the programme which funds activities from TRL 3 – 9. The lowest TRL of a funded project started at 1 and the highest started at 6, however following a change in 2022 GSTP funds activities starting at a TRL of 2 for compendia activities and 3 for framework activities. Activities with lower start TRLs are supported by ESA's Discovery and Preparation programme.

Based on the sample captured through interviews, the average ending TRL was 5.4, with a minimum end TRL of 3 and maximum end TRL of 9 captured in interviews. This average means that a model of the technology was verified or demonstrated in a relevant environment. This is an important step as space is a very different environment to terrestrial applications. Technology built for space must not break down over the course of a mission as it is very difficult to repair. By getting an activity to this final TRL, the recipient has met these exacting standards. On average, technology increased by 2.28 TRL, attributed by interviewees to GSTP funding. An increase in TRL means the activity has passed the ISO 16290 standards set out for space system hardware.

Supported SMEs to undertake early technology development which would otherwise not have been attempted: 33% of the sampled projects for SMEs were de-risk activities. These activities have a multi-phased approach aimed at unblocking barriers for a technology which if successful can lead to further technology development in a follow-on activity. De-risk projects are fully funded up to €200 thousand and must be delivered in nine months and de-risk studies are funded up to €80 thousand and must be delivered in six months. Recipients whose activities started with a lower TRL were more likely to stress the importance of GSTP as a reason behind being able to develop the technology.

"All that's [achieved has] come from that initial GSTP funding that enabled us to at least get started, because without that we don't have the money to do that type of work."

In combination with de-risk project funding, recipients highlighted the benefit of access to technical officers at ESA to help answer technical questions and find the root cause of problems. This provided recipients with the environment to accelerate technical development through TRLs, and some companies experienced

progression every four to six months. The rapid acceleration was more common in SMEs that were already active in the space sector.

Accelerated technology development: GSTP is designed to fund leading-edge technologies that naturally exhibit high-risk, high-reward characteristics. For SMEs, these technologies are unlikely to be funded to the same extent or even at all without GSTP, as they reported not having the profit margins to invest in the technologies. For larger companies with multiple offices, they reported using GSTP to fund technologies that their boards had deemed too risky for development. This indicates that the majority of funded technologies would not have been developed without GSTP, and the remaining technologies at a slower rate. The acceleration of TRL progression ranged from 1 to 4, with the maximum improvement of 4 TRLs occurring within only one year of GSTP funding.

"GSTP has proven to be an invaluable resource for promoting technology development in critical areas where high risk does not attract commercial investment."

A rover testing the multi-range guidance, navigation and control system to enable speeds of one metre per second. (Credit: GMV NSL)



5. Initial impacts on growth

5.1 Revenue generation, private investment and commercialisation

- ▶ £24.6 million revenue generated by GSTP funded activities, indicating that the programme leveraged 116% of additional revenue growth from the public sector spending by 2024.
- ▶ GSTP funding led to 36% of recipients benefitting from private investment.

Generated additional revenue growth: Over half the organisations generated additional revenue from the sale of products or services developed through GSTP. The total revenue generated across the sample was £24.6 million between 2019 and 2024 and ranged from £400 thousand to £11 million per recipient. The additional revenues generated were leveraged through £21.2 million of public spending, indicating that the programme leveraged 116% of additional private sector revenue growth from the public sector spending by 2024.

A small number of companies used the GSTP funded technologies as a basis for further development for a specific purpose or added an additional capability using internal investment to sustain their position as leaders within the market. This additional development also generated revenue for the recipients which would have not occurred without the original technology being developed through GSTP.

Increased benefit from private investment: Apart from revenue generation, GSTP enabled private investment in recipients because it has a reputation in the space and wider technology sphere as producing high-quality, innovative solutions. A third of companies received private investment, with two undergoing funding rounds which on average generated £18 million. These companies attributed around two thirds of the private investment to GSTP.

An activity funded through GSTP signalled to the market that the company and product development were relevant to the future of the space sector. A successful activity garners respect from investors as ESA is known for applying high standards to the outputs. GSTP is a good opportunity for UKSA and ESA to highlight key outputs on their websites. When this occurred for a recipient, it increased the audience reach for the technology and interest from those outside the sector who do not follow all developments.

"Best funding source that we have used... ideal for new ideas. The most useful fund for the space industry [except for telecommunications payloads]."

5.2 Job creation and safeguarding

- ▶ GSTP funding created 113 new full-time equivalents (FTEs) across 44 activities, or approximately 3.9 per SME activity.
- ▶ GSTP funding supported and retained existing high-value jobs in the UK, whilst upskilling and training through internships, academic sponsorships and international knowledge share.

Created new full-time equivalent jobs: As a result of GSTP funding, 113 new jobs were created over 44 activities across the 11 interviews conducted, averaging 2.5 FTEs per activity or 3.9 FTEs per SME activity, as LSI GSTP activities led to no additional employment. These figures only account for the number of jobs measured directly, which are an underestimation of wider job creation in the UK. Further employment benefits, although unquantified at this stage, are anticipated to arise from:

1. The construction and use of testing facilities in the UK, often removing the costly requirement to conduct testing overseas.
2. The strengthening of space and sector-adjacent clusters, such as aerospace, automotive and defence – fostering collaborative innovation hubs at the Harwell Campus, South-West and South-East space clusters.
3. Short-to-long term subcontracting or outsourcing of labour, building UK demand in sectors such as manufacturing, accountancy, design engineering, legal, etc.

“GSTP was seminal in helping us expand and grow.”

Supported upskilling initiatives for existing employees: Pivotal to unlocking growth, interview responses highlighted that GSTP enabled the expansion of upskilling programmes for employees and safeguarded existing roles as companies scaled in size. This was particularly important when training high-value employees that were otherwise new to the space sector, for example one recipient brought subject matter experts from their international offices to the UK to facilitate knowledge sharing.

Furthermore, several recipients informed that GSTP had allowed them to shift focus to a broader hiring pool, often direct from university and from differing academic backgrounds. Companies also established their own initiatives, such as Master’s and PhD sponsorships, alongside existing schemes such as the UKSA Space Placements in Industry (SPIN) annual internship, where students contributed directly to GSTP technology and activity outputs.

6. Initial impacts on collaboration

6.1 Strategic partnerships

- ▶ GSTP funding supported the formation of strategic partnerships between 73% of recipients and key space market companies.
- ▶ GSTP compendia activities increased the formation of new consortiums for full system applications in space, enabling technologies to be proven through a collaborative national input to ESA missions.

Raised partnerships between new entrants and established companies: 73% of sampled recipients reported forming strategic partnerships with key players in the space sector through GSTP. Around half were formed because of technology adoptions by an LSI after introductions facilitated by UKSA and ESA following positive activity results. Most GSTP activities focus on improving a specific component within a subsystem, meaning that for commercial success and growth to occur, an LSI or subsystem lead must adopt this component in a mission's planning phase for the technology to be used and flown. The ESA technical officers play a key role in forming these partnerships as they inform the key players about relevant GSTP activities during this phase, especially if the SMEs are new to the market and are not yet recognised for their products.

Other partnerships were formed as the GSTP funded technology performed well which attracted interest from other space companies. Furthermore, collaborations were formed to use the original hardware or software developed, or to work together on an applicable version for the client. Building these connections are key in the sector as different missions require different characteristics from their components and subsystems because of the mission's duration, environment, purpose or launch vehicle.

Increased formation of space consortiums: Strategic partnerships also develop through GSTP compendia contracts. GSTP compendia activities are released through competitive tender which nations sign up to allowing recipients from their countries to bid for. Due to the competitive nature, companies form consortiums or engage with subcontractors to improve their chance of winning. Formal introductions by UKSA and ESA can accelerate collaborative efforts, where matching technologies and applications lead to shared growth and innovation.

Without GSTP funded compendia activities, there is a significant likelihood that collaboration of this kind would not occur, despite existing funds and programmes to catalyse innovation between companies. Compendia activities are released when ESA technical officers identify a gap in the technology required for a mission and use compendia to stimulate interest from the market. These activities and partnerships would not have occurred without GSTP.

"If you compare the GSTP with other funding schemes, it's brilliant. It has all the advantages of fully funded work with high profile companies, ESA and you retain the IP."

6.2 Sectoral influence and global impact

- ▶ GSTP funding developed novel and critical technologies that have furthered the UK's presence on planned international space missions.
- ▶ GSTP funded activities raised the competitiveness of the UK, developing unique capabilities within Europe that increased sector reputation and access to future business opportunities.

Furthered development of unique and mission critical technologies: GSTP developed novel technologies across 90% of SME activities providing leverage for the UK to contribute to ESA and NASA missions over the next decade. 21 activities have interacted with international organisations, through partnerships, collaborations, or as potential clients resulting from GSTP. Continued GSTP funding signals that the technology is applicable to space and has potential to unlock new capabilities. Successful progression or completion are used by the technical officer at ESA to advocate for the component to be used in a mission or introduce the activity to an LSI for commercial purposes.

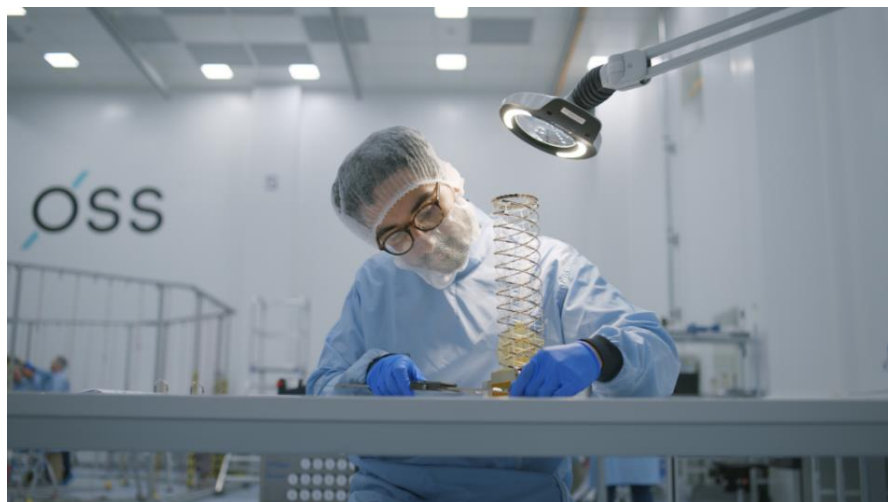
Raised international competitiveness of the UK space sector: GSTP can target areas where the UK has a comparative advantage over other countries. The majority of the 44 activities were categorised as competence domains: 2 – Structures, Mechanisms, Materials, Thermal or 7 – Propulsion, Space Transportation and Re-entry Vehicles.⁶

GSTP funded 23 new technologies which are unique to the UK, 13 of these are likely to be unique to Europe and 6 globally. The immediate benefits of these innovative technologies are shown as products were exported to Europe, North America and Asia. This occurred mostly for the activities focused on stepwise innovation for standard components with an improvement in capability. The route to market for these components is shorter as previous iterations were included in missions.

Technologies focused on disruptive innovation to create entirely new products require being flight tested and reaching TRL 7 or 8 but result in the UK experiencing larger benefits as fewer countries will offer these technologies. These products have a longer route to market and are at risk of not being adopted onto regular missions. Once adopted, the recipient company becomes a global leader in the technology and will attract commercial opportunities with space agencies and private companies.

⁶ [ESA - ESA Competence Domains](#)

A CubeSat helical antenna for Internet of Things providers which would not have been developed without GSTP funding. (Credit: Oxford Space Systems)



7. Initial impacts on wider science and technology

7.1 Spin-in, spin-out technology and cross-sector applications

- ▶ Some sampled GSTP recipients utilised spin-in technologies or processes adopted from terrestrial industries to share the benefit of these innovations.
- ▶ GSTP funding enabled 12 spin-out technologies and design tools that iteratively improved development and analytical processes.
- ▶ 72% of sampled GSTP recipients referred to potential cross-sector applications for developed technology in aerospace, automotive and defence.

Increased spin-in technologies and capabilities carried over from adjacent industries: GSTP activities applied technologies or processes from terrestrial industries to gain similar benefits in the space sector. Innovations were studied and adapted, particularly through de-risk activities, to ensure the technology or process worked for space. 45% (5 of 11) of sampled companies utilised spin-in technologies from other sectors. Technology and knowledge spillovers can aid in expanding a company's potential, as adapted and improved products may spin back out into the original industry.

The use of spin-in technology reduces risk and development costs for the technology or process. With the technology already proven to work, the major cost relates to applying it to space. Given the cost and risk of innovations, this route may be preferable for entrants to the space industry. GSTP is well structured with the design of de-risk projects and access to ESA technical officer expertise. Recipients commented directly on the positive impact, availability and continued support offered by their technical officer. This support encouraged SMEs to diversify from a single sector, strengthening their resilience. The fast-paced nature of space can lead to faster commercial success.

Increased spin-out technologies and capabilities carried over to adjacent industries: Spin-out technologies provide a pathway to commercial success outside of the space sector, opening additional commercialisation routes and investment. Spin-out applications can be timed to enter new industries during scheduling gaps whilst their technology is waiting to be selected for missions, or they are in the process of applying for programme funding. GSTP qualifies the technology to a high level due to the need for subsystem resilience in a high-risk, high-cost space environment. This also infers that the same product in testing may meet the lower requirements for commercial use in other industries.

"Space is a tough proving-ground for technologies."

Developed or unlocked potential for cross-sector applications: Integration of spin-out technology was more effective when cross-sector learnings or spillover had already benefitted the technology in its development. This was common across interviewed recipients that were founded as start-ups in adjacent industries, before discovering potential applications in space, and therefore already had rooted connections and subject matter expertise associated with national security technology with multiple applications. GSTP funding supported 12 known cross-sector applications and planned spin-out from recipient technologies, primarily applied in the aerospace, automotive and defence industries. Spin-out applications from GSTP resulted in spillover benefits which promote multi-sector innovation and opened new opportunities for commercial success and private interest. For example, one activity focused on an improving a manufacturing process to save significant costs and reduce reliance on imports. Spin-out applications for this manufacturing design and process are applicable in numerous industries, with gains to efficiency being most easily integrated with existing cross-sector infrastructure.

8. Initial impacts on the UK's space capability

8.1 National capability and capacity

- ▶ GSTP funding advanced revolutionary technology to build unique UK capabilities.
- ▶ 55% of sampled GSTP recipients registered patents or developed IP, adding to the UK's innovation portfolio.
- ▶ GSTP funding fostered the development of UK supply chains through building and introducing test facilities and manufacturing operations that would otherwise be outsourced globally.

Advanced revolutionary technology to build national capability: GSTP supported the development of capabilities otherwise unavailable outside of the UK, with the potential to generate significant long-term benefits to UK competitiveness in the space sector. Recipients frequently referred to their technology as the only version of its kind, either nationally or globally, and emphasised the importance of the programme funding in developing UK capability. Once technically proven, these products, processes and IP were often supported through multiple rounds of GSTP funding. This ensured that the novel technologies progressed, and highly skilled jobs and knowledge were retained in the UK. For example, a miniaturised electronic propulsion system for CubeSats in deep space was developed by a consortium of UK space companies, each providing key technical elements and placing the UK in a globally unique position to develop this technology.

Increased registration of IP and patents: The development of intellectual property (IP) and patents ensures the scientific and technological innovations are kept domestically and encourages demand from foreign investors, as buyers or licensees. 55% (6 of 11) of sampled recipients registered patents or developed IP, providing evidence that the programme supported commercialisation of IP:

- ▶ Companies registered patents and design rights for their GSTP supported technology.
- ▶ Sold technology IP matured during GSTP activities.
- ▶ Protected industrial process of the manufacturing of the technology.
- ▶ Incorporated a different GSTP funded and patented technology into their future designs.

Fostered development of the UK supply chain and national facilities: GSTP funding contributed to the costs of testing the technology developed within the projects. Testing is completed at specific facilities which can be located anywhere in Europe and North America. There was evidence to show that the use of the growing national testing capability has been in part supported by GSTP activities. For example, GSTP activities have made use of the UKSA co-funded propulsion testing facility based at Westcott in the UK and designed to reduce the monetary and time cost of testing.

Four companies reported increased investment in developing their own manufacturing and clean room facilities, either because of GSTP or because of their larger portfolio which GSTP is part of. Recipients widely agreed that the greatest benefit to their company was the programme's strong support for low TRL developments.

"These projects would not be able to scale or commercialise effectively without the funding, shared facilities, and expertise provided by the programme."

Notably, for 82% (9 of 11) of companies in our sample, the growth experienced after GSTP investment led to the development or improvement of the UK supply chain. This enabled the production of technology on a commercial scale, including increases in domestic purchases, exports, and private investment.

8.2 Follow-on research and development

► 82% of sampled GSTP recipients were engaged in follow-on activities or at application stage for future programme funding.

► GSTP activities developed new or strengthened partnerships between industry and leading UK universities, combining the research base with practical technology applications.

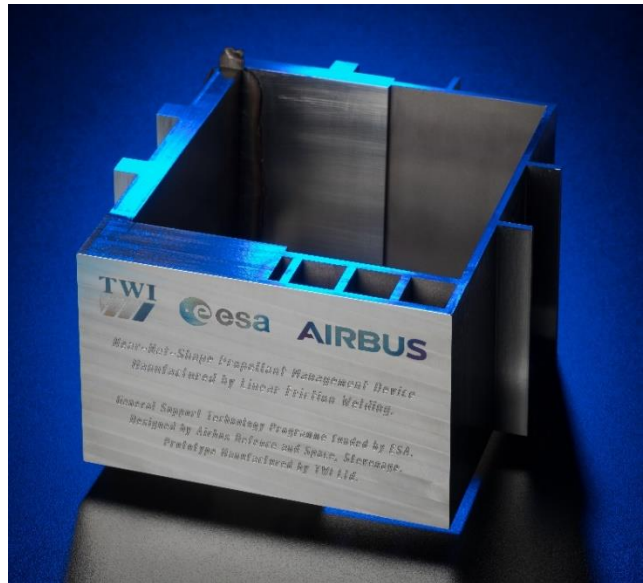
- **Advanced development of space technologies through follow-on funding:** 82% (9 of 11) GSTP recipients in our sample pursued follow-on activities or were actively in application, indicating the success of the programme in continually advancing TRLs and encouraging progression to commercial or mission applications beyond early design and de-risk activities. Evidence showed that the appetite to pursue follow-on GSTP funding stemmed from the valuable support eco-system surrounding the programme funding, which included access to technical officer support, ESA expertise, laboratories or testing facilities, and commercial enablement through in-orbit missions. This eco-system, unique to GSTP in this sector, provided a vital incubator for SMEs (and small teams with larger companies) who would otherwise not have easy access to such support.

"Hugely helpful in guiding our development... you get a robustness with ESA that you don't always (get) nationally."

"Having GSTP involved directly allows access to expertise, resources and laboratories to support projects."

Enabled and progressed academic partnerships: Of those interviewed, GSTP funding furthered partnerships and academic outreach with 14 UK universities. Collaboration between industry and academia also help raise awareness of the opportunities in the space sector for incoming graduates via outreach activities. This highlighted UK education quality and encouraged a future workforce to pursue qualifications and remedy a space sector skills gap.

The demonstrator for linear friction welding, a joint project between TWI Ltd and Airbus UK to reduce the amount of material and lead times required for large forging.
(Credit: TWI Ltd)



9. Conclusion

This report evaluated the early impact of the UK Space Agency's activities under the General Support Technology Programme (GSTP) over the CMIN19 and CMIN22 funding rounds, 2019-2024. The findings from this evaluation report represent quantitative and qualitative evidence from surveys and interviews conducted in late 2024 and early 2025. Several project activities are ongoing, therefore the full extent of impact on the UK space sector stemming from GSTP funding will be underrepresented in these results and will likely be seen in fuller time.

Evidence from this analysis, which included a sample of activities covering 31% of GSTP funding,⁷ showed that the programme has led to benefits against the National Space Strategy pillars:

- ▶ **Unlocking Growth: £24.6 million of additional revenue was generated** from sale of products or services developed during GSTP. GSTP enable new technologies for stepwise innovations and improved reputation of the recipients of disruptive innovations, which resulted in interest and investment from private funds. The additional revenues generated was leveraged through £ 21.2 million of public spending, indicating that **the programme leveraged 116% of additional revenue growth from the public sector spending by 2024.**

113 new space sector jobs at SMEs were created across 29 SME activities. GSTP recruited FTEs for highly productive jobs as the commercialisation of successful products and services required SMEs to scale up their internal capacity for production.

- ▶ **Collaborating:** GSTP provides a route for SMEs and LSIs in the space sector to work in a collaborative nature to qualify the new technology for space, and ensure it becomes a standard component or process. **72% (8 of 11) of sampled companies formed a strategic partnership** through GSTP. GSTP led to collaborations between European countries however, this is not typical as it requires the national space agencies for all companies involved to approve and fund their in-country spend.

There are opportunities to strengthen the nature of the programme to promote greater knowledge sharing between industry and academia. This could enhance the overall quality and impact of the research and development efforts and accelerate collaborative benefits in the sector by facilitating and integrating diverse perspectives and expertise.

- ▶ **Science and Technology Powerhouse:** GSTP resulted in an average **2.28 TRL improvement** per activity which is key to qualify and evidence that the technologies work in the space environment. This improvement was supported by technical officers at ESA which results in trusted products and processes. GSTP used spin-in technology and produced spin-out technology for non-space sectors with **72% (8 of 11) of sampled companies producing technology with cross-sector applications**, maximising investment in technological innovations in the UK.

⁷ Funding allocated to ENDURE and EEE activities have been excluded from this calculation.

- ▶ **Developing Space Capability:** GSTP improved the UK's space capability by focusing on moving the technological frontier and creating unique products in areas with historic capability, such as propulsion. The success of an initial GSTP activity meant that **82% of sampled recipients applied for additional funding** (or planned to apply), to further develop the TRL of the technology.

This report used findings from interviews with 11 companies with activities funded by €25.4 million, roughly 31% of the UK's GSTP budget. Future reports should focus on collecting data from a wider sample to strengthen the evidence base as well as conducting annual data collections to provide a clear understanding of the longer-term impacts of GSTP. Future research should capture quantifiable evidence of commercialisation, use on space missions, and spillovers into use cases outside the space sector.

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