



Evaluation of GSTP 5 and GSTP 6 Element 1: final report

Prepared for

**BEIS and the UK Space
Agency**

28/09/2017 | Version FINAL

DATABUILD CONSULTING LTD TRADING AS DATABUILD



Copyright

This document, and its contents, remain at all times the property of Databuild Consulting Ltd it is not to be disclosed, referred to, copied or transmitted, in whole or in part, without the prior consent of Databuild Consulting Ltd.

Intellectual property

All concepts, ideas, creatives, animations, software, graphics, etc. produced or suggested by Databuild Consulting Ltd as part of this document, will remain the copyright or property of Databuild Consulting Ltd, unless there is express agreement to the contrary.

Project team:

Databuild Consulting and UCL

Written by:

John Fawcett

Approved by:

Michelle Hollier

Executive summary

Method

The General Support Technology Programme (GSTP) is a fund managed by the European Space Agency (ESA). This interim evaluation on behalf of BEIS and the UK Space Agency (UKSA) aimed to (a) provide an impact and process evaluation across GSTP 5 and GSTP 6 Element 1; (b) demonstrate a way in which the effect of longer term space programmes – where final outcomes are not known - may be evaluated.

The evaluation comprised two stages of data collection:

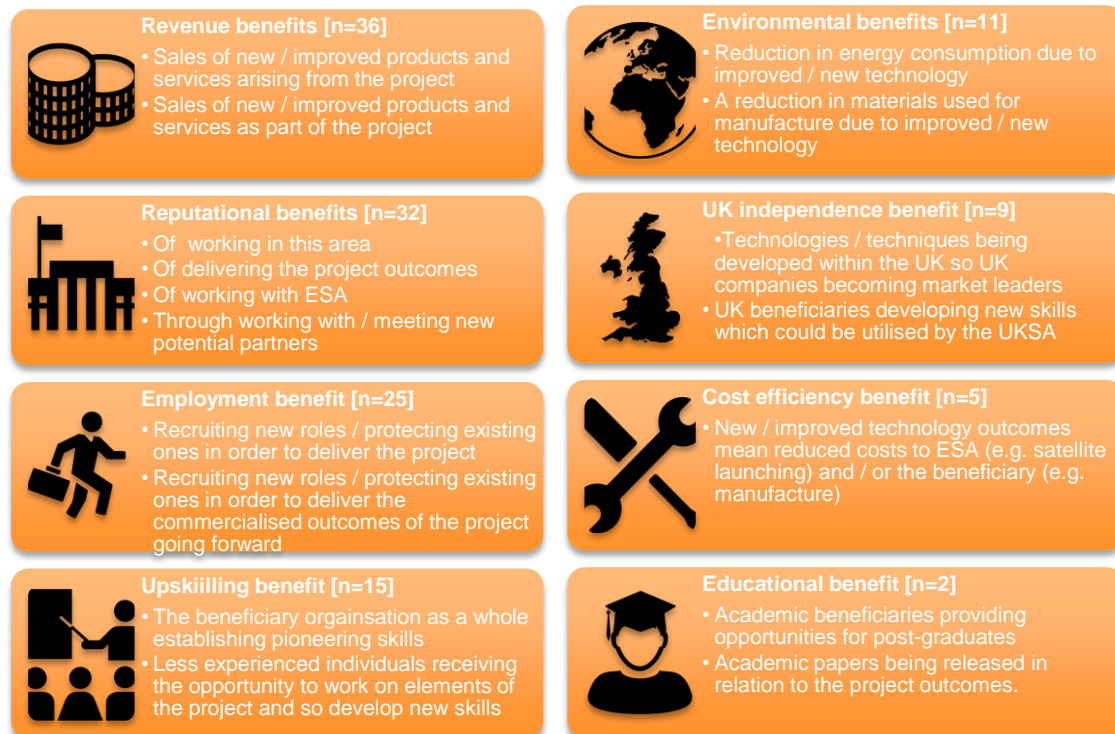
1. Initial telephone and face-to-face interviews with 20 relevant project technical officers within ESA to ascertain both the background to the project(s) and the types of impact observed / predicted to arise from it.
2. Telephone and face-to-face interviews with 40 representatives of the relevant UK beneficiary organisations, exploring the outcomes of the project, impacts (and quantification of these if possible), attribution to the GSTP (i.e. what would have happened in a counterfactual scenario where GSTP funding was not available) and views on the GSTP process.

Impacts

- The total self-reported estimated attributed¹ financial impact of the interviewed UK beneficiaries of GSTP 5 and 6 Element 1 funding – amalgamating both commercial, cost saving and employment outcomes - was **almost £200 million up to 2030**, with greater potential – though currently unquantified - impact after 2030.
- In terms of employment created / safeguarded (including both jobs benefitting from commercialisation and jobs benefitting from the initial GSTP 5 and 6 Element 1 project funding) the total **attributed impact is almost 300 FTEs over the same period up to 2030**.
- In both cases this is likely to be a cautious estimate on the basis that the impacts were restricted to quantified outcomes only and not extrapolated to any projects or beneficiaries where impacts were anticipated but could not be quantified.
- The graphic below shows beneficiary recognition of a range of benefits hypothesised to have been delivered through GSTP-funded projects.

¹ It is worth noting that as attribution is so high, the total (including unattributed) figure is not significantly higher.

Figure 1: The types of benefit arising from GSTP-funded projects (both observed and anticipated) by beneficiaries [n=40]



- The vast majority of beneficiaries had experienced or envisaged commercial, reputational and / or employment benefits arising from the GSTP-funded project; a minority recognised the other benefits. Across the benefits, in a number of cases these were either not yet achieved or not quantified by respondents; therefore figure 1 represents the expectations of respondents as well as the extent to which benefits may have been realised.
- GSTP funding is felt to be instrumental in bringing about the projects. The extent to which beneficiaries attribute projects (and their resultant impact) to GSTP is very strong, with all but five i.e. stating that the project would not have happened without GSTP funding². Most commonly, respondents felt that the technology development supported by GSTP funding was at that time too uncertain to benefit from any other external funding and that internal funds were either insufficient or simply unavailable due to the

² Described as 'full attribution' in our analysis.

speculative / exploratory nature of the project. Many also cited the fact that GSTP is specifically focused upon the middling TRLs (3-7) which made it unique.

- Beneficiaries also cited the fact that ESA technical officers provided a useful steer and guidance on the project, potentially achieving a better outcome for ESA and an outcome than could be more easily commercialised for the beneficiary.

Process

Application

- There was a large degree of consensus amongst beneficiaries and wider stakeholders as to the strengths of the GSTP and how it could be enhanced.
- Many organisations talked about GSTP being relatively straightforward compared to applications for other funding pots, though others said that a straight ITT and bid process would be simpler compared to the negotiations between industry and national agency, followed by negotiations between both and ESA. Even those who felt the process to be relatively easy were keen to highlight their experience in applying for funding and the fact that they have personal links with key decision makers within both ESA and the UKSA. They noted that if an organisation lacked such contacts or were inexperienced in applying, this stage of the process could prove very challenging.
- Almost all beneficiaries felt that the process from initial idea to granting of funding can take much longer than expected, sometimes years and at least multiple months. Whilst respondents felt that some level of bureaucracy was understandable, especially when carrying out due diligence and making careful decisions regarding allocation of taxpayer funding, in the majority of cases respondents felt the process to award had been too lengthy. Few could suggest ways to improve this duration however as few have clear sight of the interim process and what caused the delay. Aside from the uncertainty, respondents could not point to a clear consequence of perceived delay in the funding award process.
- A critique amongst a small number of beneficiaries was around insufficient promotion of the availability of the GSTP.

Allocation of funding

- Respondents felt the areas and technologies targeted by the GSTP were appropriate and were positive about the funding programme's focus upon low-medium TRLs and – commensurate with this – technologies not likely to deliver a short term return on investment / benefit to ESA.

- A commonly held view was that the allocation of funding can be “opaque” and often informal. Linked to this, several respondents commented that the process is weighted towards large, established companies. However, the coverage of projects within both GSTP 5 and 6 indicates that as well as the large global organisations referred to, there are a number of SMEs and academic institutions that have benefitted across a range of project roles – manufacturing, design, consultancy and product testing in different environments.

Project direction

- Providing a steer for the project was almost unanimously welcomed by beneficiaries, who felt that the technical officers had been sometimes instrumental in advising on specific technical details or ensuring compliance with ESA standards, itself very important to the commercialisation of a number of products.
- One issue highlighted was linked by one respondent to ESA bureaucracy in making the initial decision; namely the ability of ESA – and technical officers – to be flexible and agile with projects and respond to changing circumstances.
- There are theoretical effects of elements of the process e.g. delay to funding allocation could allow a competitor outside Europe to push ahead towards commercialisation of a technology. However, few could point to detrimental effects of the elements they viewed negatively.

Conclusions on space programme evaluation

- Interviewing a range of stakeholders – technical officers, organisations with a sector overview, and of course beneficiaries of the funding – is useful in providing a range of perspectives and understanding of the way the GSTP is valued and operates.
- Beneficiaries were more knowledgeable about beneficial impacts achieved and forecast than expected and more open to sharing details than we had anticipated (in terms of describing the scale of impact). We had anticipated that it would be necessary to interview multiple respondents across technical and financial roles to obtain any quantifications, particularly with regards to sales impacts, but named lead contacts proved to be effective both in identifying impacts and in describing the scale of those impacts.
- However, few respondents could provide much authoritative or quantified information on some of the macro-level benefits that were hypothesised in advance of data collection,



especially around educational outcomes and UK – as opposed to European – ability to develop certain technology / pursue missions independently. It may be that the evaluation is focused upon the outcomes which can be quantified and attributed, as opposed to those where at best a correlation with GSTP funding may be observed and no individual / organisation can comment upon causation.

- It may be valuable for future evaluations to include more consultation with individuals involved in ESA decision making as to who to fund, to more closely dissect and understand the process which – to respondents – seems to be unnecessarily lengthy.

Contents

1. Introduction.....	1
1.1. Context: the GSTP.....	1
1.2. Objectives of the evaluation	1
1.3. Report structure	2
2. Method.....	3
2.1. Overall	3
2.2. Assessing impact: points of consideration.....	4
3. Impact evaluation	7
3.1. Benefits to ESA / member states	7
3.2. Estimated attributed impact.....	7
3.3. Types of benefit reported	9
3.4. Attribution: how GSTP helps	16
4. Process evaluation	18
4.1. The process of accessing GSTP	18
4.2. Allocation of funding.....	19
4.3. Project direction	21
4.4. Process elements: limited effects?	22
5. Conclusions	23
5.1. GSTP.....	23
5.2. Evaluation of space programmes	24

Glossary

Term	Definition
Attribution	The extent to which an outcome is due to the programme / intervention of interest i.e. what would have happened anyway / in its absence (the counterfactual)
Beneficiary	In the case of GSTP, a recipient of funding support in GSTP 5 or 6.
Displacement	The idea that an increase in the market share of Organisation A must inevitably lead to a commensurate reduction in the market share of Organisation B, unless either an entirely new and independent market is created or Organisation A's increase results from a growth in overall market size.
European Space Agency (ESA)	ESA is an intergovernmental organisation comprising 22 member states and focused upon space exploration and observation. ESA budgets / programmes include GSTP.
General Support Technology Programme (GSTP)	<p>ESA's GSTP is a funding programme focusing upon converting promising engineering concepts into a broad spectrum of mature products – everything from individual components to subsystems up to complete satellites – right up to the brink of spaceflight or beyond.</p> <p>The GSTP functions to bridge the gap between having a technology proven in fundamental terms and making it ready for ESA and national programmes, the open market and space itself.</p> <p>This evaluation is focusing upon the 5th and 6th wave of this funding programme.</p>
Impact assessment	An investigation of the net benefit of a programme.
Net effect	A range of effects that may apply to an outcome to limit its extent.



DATABUILD

Net Present Value (NPV)	A calculation applied to impacts to note that
Process evaluation	An investigation of the effectiveness and appropriateness of a programme design and delivery, especially from the point of view of the intended beneficiaries.
Project	In the context of GSTP, each separate technology focused project to receive GSTP funding to deliver specific outcomes.
Substitution	The assumption that, when improving an existing technology, or developing new technology which renders old technology redundant, then the gains to Organisation A through sales of Product B must be offset by the elimination of sales of Product A.
Technical Officer	The individual within ESA that manages the individual projects that receive GSTP funding.
UK Space Agency	The UKSA is an executive agency of BEIS (Department for Business, Energy, and Industrial Strategy) and is responsible for all strategic decisions in relation to space-related activity. In terms of GSTP, the UKSA makes representations to ESA on behalf of UK industry to obtain funding.
Terms quantifying the sample	
Most	A majority of the sample
Some	Usually less than half of the sample but a significant minority
A few / several	Less than five respondents

1. Introduction

1.1. Context: the GSTP

Through the General Support Technology Programme (GSTP), the European Space Agency (ESA) seeks to develop space-related technologies across a wide range of areas. The purposes of this are to enable missions generating a range of benefits: improved performance of specific products/missions, versions of existing technology that require less energy/materials or reduce costs, and technologies that lead to environmental benefits. GSTP encourages innovation, and strengthens European industry in the space sector and in associated sectors, and generally aims to reduce European dependence upon external sources of technology.

National space agencies within Europe contribute financially to the GSTP and broadly receive commensurate funding support to distribute to industry within that country for technology development; the area (technology or otherwise) to develop in could originate from ESA, the national agency, or even from industry themselves. The individual projects that receive funding range from initial concept development right up to testing and refinement of technology in a space environment. In some cases, the technology aligns with wider ESA goals / other projects and sometimes it is relatively self-contained.

For each project there may be multiple suppliers, sometimes testing multiple solutions to the same issue, each overseen by a technical officer within ESA, who can provide guidance and assessment of the extent to which the aim of the project is being responded to.

The GSTP has been operating for over two decades; the current round of funding (GSTP 6) has been running since 2012 and will close in 2017.

1.2. Objectives of the evaluation

The UK Space Agency (UKSA) wished to conduct an evaluation of the GSTP funding that has supported UK companies across GSTP 5 and GSTP 6 Element 1. The core objectives of this evaluation are threefold:

1. To enable an impact assessment exploring whether and to what extent the GSTP funding has generated benefits to the UK economy relative to what would have happened in its absence.
2. To generate process evaluation findings i.e. how well the programme as a whole operates for those that interact with it and in delivering its aims.
3. Across both of the above, an assessment of 'proof of concept' for impact and process evaluation that could be rolled out across other UKSA programmes / used in future evaluation.

1.3. Report structure

This report comprises the following sections:

- Section 2 provides an outline of the method undertaken for evaluation, and in particular assumptions to inform impact assessment and quantification.
- Section 3 reports the impact assessment element of the research.
- Section 4 reports the findings of the process evaluation element of the research.
- Section 5 provides key conclusions based upon the findings in sections 3 and 4, as well as answering the objective of how a space funding programme with long term outcomes can be evaluated.

2. Method

2.1. Overall

There are a number of methods that can be used to estimate impact. Top-down approaches involve looking at existing macro-level calculations of benefit (i.e. total estimated annualized revenue across the space-related UK sectors) and attempting to apportion those. Bottom-up approaches involve investigating the impact of individual cases and accumulating these. In the context of GSTP, a top-down approach would involve looking at UK space industry revenues and then attempting to isolate the specific impact of GSTP to this; a bottom-up approach would involve looking at the reported effects of individual funded GSTP projects with UK beneficiaries and then accumulating these impacts to assess the programme effect on UK organisations.

Due to the range and complexity of the GSTP-funded projects, this was not envisaged to be a data source which would enable a top-down contribution analysis or similar. In addition, there is difficulty in defining the 'sector' in order to generate a top down figure i.e. in multi-sector organisations, difficulty in isolating the aspects linked to space.

This evaluation was therefore structured as a bottom-up assessment of individual projects; this is key to the third objective (trialing a primary method of evaluation) in particular as a top-down approach may not be possible on a number of programmes.

This section provides a summary of the method undertaken, a fuller or more detailed explanation of the evaluation approach can be found in the method report linked to this evaluation. The evaluation comprised:

- A method development stage for the building of tailored impact logics which outlined the approach to ascertaining and quantifying benefits for each funded project. This was informed by both secondary research of sources relating to the project and interviews with the relevant technical officers (and where required supplementary conversations with the UKSA and or wider sector experts)³. 20 Technical Officer (TO) interviews were completed, incorporating visits to ESTEC HQ in Amsterdam and covering the vast majority of projects; it should be noted that where a TO interview did not take place, secondary information (e.g. project reports or UKSA project summaries) could be used to research the project.
- The main data collection stage consisting of interviews with GSTP funding beneficiaries. The aim of these interviews was to explore their perspective on the intended purpose and

³ The interviews also provided insight into the process evaluation element of the evaluation i.e. what may have worked particularly well and what could have worked better.

anticipated outcomes of the project (both qualitative and quantitative), whether those anticipated impacts and benefits of the project were achieved and to what extent, establish any further benefits (especially around less tangible outcomes), establish the level of attribution to the GSTP funding (i.e. what would have happened without it), and explore the process in greater detail. These interviews were supplemented by conversations with wider sector representatives⁴. Overall 45 funded projects have been covered across GSTP 5 and 6⁵.

- In terms of who to speak to within individual organisations, both ESA technical officers and the UKSA made recommendations as to lead – and sometimes secondary - contacts for each beneficiary within each project.
- The current analysis and reporting stage; this draft report is anticipated to be built upon and finalised in August and be used to inform both an infographic and presentation slides in order to publicise the results and be used in a presentation in Paris in the Autumn.

2.2. Assessing impact: points of consideration

The process of calculating impact was as follows”

1. All respondents were asked to estimate the observed and anticipated financial and employment impacts of the GSTP-funded project and the extent to which these impacts were attributable to the GSTP. Therefore both impact and attribution are self-reported. Where employment benefits arose from commercial benefits, the value was discounted as they effectively represent double counting. An average salary per job estimate was used to monetize jobs safeguarded and created.
2. If respondents struggled to provide an exact number, they were encouraged to provide a likely range on the number or as a last resort an order of magnitude i.e. tens of thousands, hundreds of thousands, millions...etc.
3. Where a range had been provided, the minimum of that range was used in analysis as a conservative estimate. Similarly, where respondents had given an order of magnitude, the lowest possible figure had been used e.g. if a respondent said the impact had been in the tens of thousands, we would allocate £10,000.
4. The figures were entered into a spreadsheet which showed impact by year; it was assumed that attributed impact would persist for a maximum of five years on the basis of both increasing chances of the technology being superseded and increasing likelihood of the outcome occurring anyway eventually. Even where respondents had forecast the impacts for longer in their business plans these were often speculative rather than based upon order books.

⁴ This included some discussions with wider stakeholders in order to obtain a more neutral overview of the programme and its value and process.

⁵ In terms of individuals interviewed, some interviews covered multiple projects. Conversely, an individual project sometimes covered multiple funding rows in the GSTP database.

5. Where respondents had been unable to provide a year in which the impacts started, these were taken from the end point of the GSTP project in question.
6. Exchange rates were applied where necessary taking those reported as of 14th July 2017.
7. All annualized impacts were then subject to NPV, factoring down based upon attribution as outlined in the attribution sub-section below (though in most cases for GSTP this was not the case) and net effects where applicable.
8. These adjusted figures for individual beneficiaries were then aggregated to estimate total self-reported attributed impacts.

Defining a 'UK economy' benefit

Any projects without a UK funding beneficiary were not included and only UK beneficiaries were explored within the remainder. It could be argued that the outcomes of ESA-funded projects could still benefit UK plc in some way regardless of UK involvement, but the links become increasingly tenuous and hard-to-measure.

Even for those projects with a UK funding beneficiary, care was taken as to the extent to which the UK benefits from any wider outcomes. For some projects, the UK funding beneficiary had a limited role; this affected the benefits arising (e.g. they may not have IP on the eventual product or any component / contribute little to the wider UK economy).

Impact data focuses upon the direct benefits to the UK beneficiaries involved in a given project. The existence of wider benefits and outcomes of the projects were not ignored in the beneficiary interviews but relatively little time given in terms of attempted quantification or similar.

What outcomes can beneficiaries quantify?

We did not expect that beneficiaries would be able to quantify all potential metrics / benefits, though we were expecting respondents to at least be able to refer to their motivations for involvement when projecting future impact e.g. with reference to business plans, albeit with varying degrees of certainty / accuracy.

Returns on investment

There are a number of project 'rows' across the two GSTP funding streams that essentially comprise the same project with the same end-goal but both should be taken to account. It remains an inevitable limitation that some benefit from GSTP 1 – 4 may be inherently tied up in what is reported.

In addition, there may be projects subsequent to GSTP 6 Element 1 which advance a field. Therefore, our study will be reflecting upon and predicting the benefits from a point which may soon be 'out-of-date'. This is an accepted risk of evaluating something at an interim phase. However, we suggest that as part of the reporting review process GSTP / UKSA

sense-checks the claimed benefits to highlight any clear instances where we need to take account of further developments.

Net effects

Exploring net effects – substitution and displacement in particular - is essential to a full and accurate understanding of benefits arising from a project. Net effects are not always fully understood, or known, as this would require knowledge of the market specific to a product / service type and competitor performance in that (e.g. a respondent may not be aware of or in a position to quantify displacement of sales in a competitor organisation). Interviews with sector representatives will provide an opportunity for collation of wider market data to inform the scale of that.

Net Present Value has been applied at a declining rate of 3.5% per annum on the basis that £1m this financial year will be worth slightly less next financial year, and so on.

There was little anticipated or realised conflict in terms of benefits to UK beneficiaries going to non-UK parent companies.

Exchange rate

Some beneficiaries reported impact in euros rather than pounds. In order to equalise the impact data we have used pounds throughout and taken the following exchange rate based upon the rate as of 16th July 2017: approximately £0.88 in a euro.

Attribution

Beneficiaries and wider sector representatives were not always able to link a particular project – or GSTP funding as a whole – to observed benefits in certain areas. For example, organisations were sometimes able to comment on an increase / decrease in sales or employment but have too much wider activity to be able to say the GSTP-funded work had any significant influence upon that. Correlations can still be reported even where causation is not known / certain but not as part of attributed impacts.

Weighting

The quantified impact responses from beneficiaries have not been extrapolated to other beneficiaries; neither:

- a) the population of respondents who could not quantify;
- b) the wider population of GSTP 5 and 6 beneficiaries who did not participate (around 10 unique projects);
- c) beneficiaries from GSTP 1 – 4. This is on the basis that each project is so distinct and therefore extrapolating reported results on the assumption that the wider population of projects is the same as those interviewed is not sensible.

3. Impact evaluation

3.1. Benefits to ESA / member states

The investigation of projects explored the intended purpose / benefit of the project, which included improved satellite components, mission outcomes, mission cost reduction, and new options around mission launch⁶.

3.2. Estimated attributed impact

The total estimated self-reported attributed⁷ financial impact of the interviewed UK beneficiaries of GSTP 5 and 6 Element 1 funding – aggregating both commercial, cost saving and employment outcomes⁸ - was **almost £200 million⁹ up to 2030**, with greater potential – though currently unquantified - impact after 2030.

This means that set against a rough GSTP 5 and 6 Element 1 funding of around £40m there will – if predicted impacts are realised - be a *minimum* ROI of around £7 for every £1 invested, although likely much higher.

It should again be noted that this figure assumes the minimum of any ranges provided by beneficiaries, excludes unquantified benefits and any impacts from non-interviewed beneficiaries, and excludes any potential double counting e.g. from employment created by commercial successes as the value has already been factored in, albeit the employment could create further added value.

The only note of caution on this is that almost no beneficiaries recognised net effects from project outcomes. This was on the basis that either:

- The project outcomes would grow the affected markets, and therefore in theory no organisation operating in this area need lose out.

⁶ Whilst many beneficiaries could discuss and estimate a beneficial impact to ESA of these projects – which could then in principle be felt at a UK level – it was decided not to include these in the impact calculation as this should specifically focus upon benefits to the UK beneficiaries and so economy.

⁷ It is worth noting that as attribution is so high, the total (including unattributed) figure is not significantly higher.

⁸ The latter calculated by utilising ONS Employment and Labour Market statistics for 2016; it was assumed that taking an average of all roles could misrepresent the type of jobs being created in the often technically demanding space sector, therefore an average of ‘associate professional and technical’ and ‘skilled trades’ was taken. This was felt to be realistic but cautious based upon respondent reports of the various types of role created or safeguarded. This equated to £28,600 a year.

⁹ £197,325,129

- The beneficiary are the only ones – certainly within the UK or Europe – operating within the market.
- The beneficiary has developed an entirely new market.
- The beneficiary is not a commercial entity as such and therefore do not see themselves as having achieved a commercial outcome beyond receipt of the project funding.

Of this projected estimated total attributed financial impact, it is estimated that around a quarter (c. £45m) will have been achieved by the end of the 2017 calendar year, with the majority (c. £150m) being projected / anticipated impacts from 2018 onwards, though usually based upon either promised contracts or signed off business plans / cash-flow forecasts¹⁰.

As a sense check of this attributed impact, the UK Space Industry Size and Health report (2016)¹¹ shows the sector being worth £13.7 billion in 2015-16. Therefore, our conservative estimate (e.g. it assumes a minimum where a range is reported and excludes cases where respondents could not quantify impact) seems within a sensible order of magnitude.

In terms of employment created / safeguarded (including both jobs benefitting from commercialisation and jobs benefitting from the initial GSTP 5 and 6 Element 1 project funding) **the total attributed impact is almost 300¹² FTEs over the same period up to 2030.**

The UK Space Industry Size and Health report (2016) shows 39,855 jobs in the space sector in 2015-16, up just over 10,000 from the 2009-10 figures. Again, bearing in mind the limitations on quantification on this evaluation (e.g. no extrapolation), the total above seems within a reasonable order of magnitude.

Both headline impacts are explored in greater detail in section 3.3.

¹⁰ Regarding predicted impacts, especially the more distant, it should be noted that these are less reliable, though despite the vested interest of beneficiaries to be positive about future benefit, most are based upon existing business plans, therefore there is no more robust source.

¹¹ <https://www.gov.uk/government/publications/uk-space-industry-size-and-health-report-2016>

¹² 295 FTEs

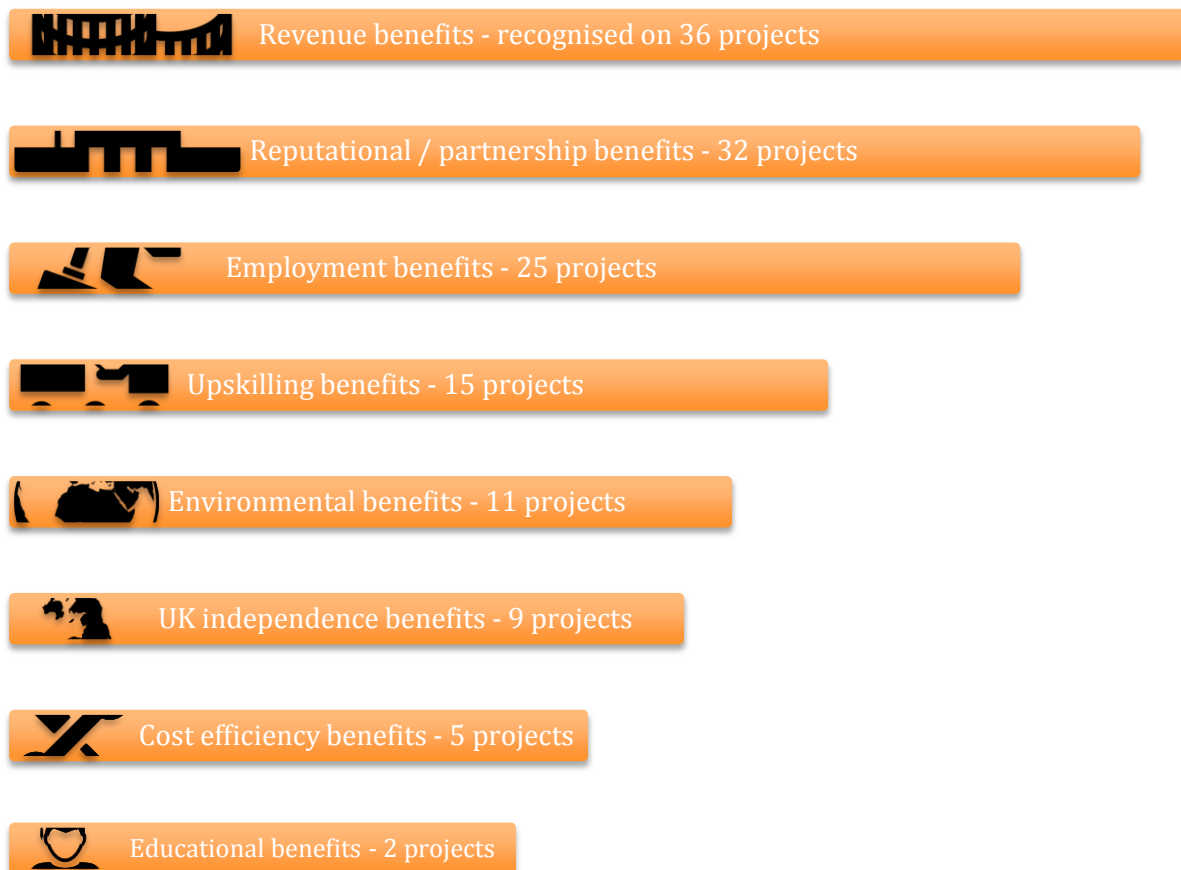
3.3. Types of impact reported

Overall incidence

As indicated in section 3.2, whilst £200m is a cautious estimate of achieved and likely projected impact to 2030, the actual impacts of the GSTP 5 and 6 Element 1 investment are likely much larger.

The graph below shows the frequency with which different benefits were realised / will be realised across the evaluated GSTP-funded projects (up to a maximum of 40 projects). Again, as per section 3.2, all of these benefits are attributable to the programme:

Figure 2: Frequency with which different beneficial outcomes were acknowledged / realised by project beneficiaries [n=40¹³]



¹³ Whilst each benefit was prompted where relevant, it was deemed in some cases that the project was unlikely to have led to this outcome. Therefore, especially where respondents were time-pressed, certain benefits were treated with lower priority.

All respondents recognised at least one benefit and the vast majority had experienced or envisaged commercial, reputational and / or employment benefits arising from the GSTP-funded project. Even this chart is conservative in the sense that in instances where respondent hoped for a future benefit but could not point to any tangible evidence that this might occur, the recognition was excluded.

A number of these benefits were either not yet achieved or not quantified by respondents; figure 1 represents the expectations of respondents and often their motivations for becoming involved in the project / applying for it.

This section explores the nature of each type of benefit in greater depth in turn and attempts to unpick the incidence and effect of each in a more qualitative way.

Commercial benefits

Commercial benefits could be realised in two main ways:

1. The direct revenue benefits of the achieved / intended project outcome i.e. product or service / gained expertise; some organisations had already started to both sell the product arising from the project or had future orders in place to do so. Several organisations have created a licensing of the IP to larger manufacturers and so developed a revenue stream.
2. Revenue benefits from spin-off applications of the achieved / intended project outcome. Many respondents reported that whilst the space application of the developed technology may be years away, the organisation had already managed to – or expected to – sell the product / service into other markets, especially aerospace / commercial airlines and defence.

These represent the vast majority of the quantified benefits discussed in section 3.1, partly on the basis that these were amongst the more straightforward indicators for respondents to quantify, but also because this type of benefit often formed the focus of any business planning prior, during or after the project. There were some beneficiaries that could not quantify claimed commercial benefits; these were either:

- Because the benefits were projected and not yet confirmed in terms of size / duration.
- Because the benefits are tied up with other products (e.g. a component) which made it difficult for the beneficiary to disaggregate in terms of added value / impact to the specific product.

The vast majority of beneficiaries are able to share the IP along with ESA and therefore enjoy effectively sole advantage in their respective markets.



Most revenue benefits are ongoing and although a 5-year limit was placed on forecast benefits, several respondents cited business plans predicting sales continuing for over 15 years.

Reputational benefits

These are a subset of commercial benefits in that beneficiaries felt that the GSTP-funded project had, or would, enhance their organisations reputation.

In many cases this was felt to be the case due to the organisation demonstrating that they could deliver to ESA standards, with the GSTP providing credibility for both their product and business.

In some cases – particularly with smaller businesses – the GSTP project made a wider range of potential customers aware of their activities and ability to deliver a certain product / service type, whilst simultaneously endorsing the quality of that product / service: *“The project demonstrated that UK SMEs can [deliver the project outcome] for a reasonably small investment. The fact that we’re doing this has piqued interest from other organisations. It hasn’t led directly to contracts as of yet, but it might do - there are lots of possibilities on how this can be modified / tailored. Before such potential clients did not even realise this kind of investigation was even possible at such a low cost. We’ve presented at a European symposium, have some international conference papers and this can continue to be exploited.”*

In a few cases the organisation may have already possessed a good reputation but the GSTP project enabled them to sustain that when they otherwise may have seen a decline i.e. safeguarding reputation.

Another facet of reputational benefits were those gained within ESA and the UKSA, especially where it was the first time the organisation had worked with either agency or bid into GSTP in particular. A number of respondents could point to both existing and potential follow-up due to the evaluated GSTP project; these arose through the trust gained from successfully delivering the original project outcome and ‘putting their name on the map’. Linked to this, where secondary beneficiaries were delivering elements of a project outcome to the primary beneficiary, the latter have continued to go to them outside of the GSTP project.

In a number of cases, the project resulted in talks and presentations at events and conferences and published papers, both standalone and in sector journals. Across all these, outcomes and performance could be disseminated. This also means a separate knowledge dissemination benefit to the wider sector as well: *“This project enabled us to keep their heritage going and keep being at the forefront by presenting in various conferences and getting to discuss potential collaborations with new people.”*

All respondents who cited reputational benefits were asked whether this had led to any tangible benefit in terms of gained or promised contracts that they otherwise may not have won. Some respondents could highlight specific contracts they believe they have won as a result of the GSTP project as they believe they would not have had much chance prior. Some have had inquiries and envisage there may be potential future contracts arising from this: *“There have been a lot of enquiries during the course of the project and there is a lot of interest in what we are doing. We have a much better supplier list now. Throughout the space community in Europe it is now known that there is now viable competition in the UK.”* The remainder felt that there had to have been reputational benefits – especially where the project was high profile, resulted in multiple conference talks / presentations / papers, and they are a relatively small organisation that has had the ESA and wider European market opened up – but could not yet point to specific tangible outcomes of this that they would not have gained anyway. A small number of beneficiaries felt there may have been reputational benefits arising from the project but could not point to any concrete reason why this may be the case and so were discounted.

Partnership benefits are a subset of reputational benefits, in that the project enabled working together with a new organisation either as a pre-planned consortium or through introductions made during the GSTP process: *“We had never previously worked with x. When we talked to them about our capability they were fascinated. They were also able to inform some other bids with information that was shared with them through this partnership.”* Regardless, the effect is that the beneficiary can – and sometimes is – working with the partner organisation(s) on future collaborations.

Furthermore, this partnering can lead to exponential growth of topic areas that the beneficiary can work in: *“With a consortium you learn about a lot about things we are on the periphery of; we have partnered with some of these members for new projects and it's made it easier to win further projects.”*

In addition, beneficiaries become known for delivering in areas which they may previously have not been considered: *“We would be equal contenders for anything that comes along whereas prior to this we wouldn't have had a chance. The international community is now aware of our consortium e.g. we have had talks with Lockheed.”*

These potential synergies were often not very well explored and so not quantified, but over a quarter of beneficiaries felt the GSTP project had led to this outcome.

Employment benefits

Employment benefits covered both instances where the original GSTP funding had supported jobs, or where commercialisation arising from the project would do so. The latter was counted as a by-product of financial impacts in section 3.1 so double counting was avoided, but does count towards realisation of employment benefits. This indicates that some organisations predict financial growth without any commensurate growth in employment, though often in such cases respondents simply found it difficult to predict what might be necessary / possible in this regard.

Employment benefits encompassed both safeguarding of jobs and creation of new jobs (recruitment); in terms of both technical specialists and more generalist project managers. In two cases the respondents commented that the GSTP contract was essential to the maintenance of the entire business whilst the project was being delivered.

Comments from beneficiaries who employment benefits included the following, illustrating the different roles and scales affected:

- *“Having projects like this safeguards jobs – we did recruit one highly specialised person in anticipation of this work.”*
- *“We have increased our capability in this specialist area by 3-4 people; all highly skilled roles that would not have been there without the project.”*
- *“We hired a new programme manager to manage the ESA work. If commercial projects are successful we will hire extra people.”*
- *“The project has enabled us to grow [quadruple in terms of FTEs] as a business over the last five years. The sales from the product may also lead to more jobs/salary increases, but this would be encompassed in the overall growth of the business so nothing direct.”*
- *“We now have a new PhD student, and we have to hire people to make the stuff which might cause some indirect employment benefits. Overall this project has created about 5-6 part time roles (though each varies from 70% to 10% of an FTE). Once the new test facility is complete, we will need maybe 3-4 FTEs to operate the facility.”*

Upskilling benefit

This benefit comprised one or more of the following three outcomes:

1. Due to managing the project, beneficiary organisations being able to promote or even allow individuals to advance their careers elsewhere, though the latter would not be of obvious benefit to the beneficiary: *“For younger members of the team there is an issue about when they will be able to take control of a project / element. This GSTP project enabled that.”*

2. Developing new specialist skills in a particular area specific to the technology field: “[The project] keeps the level of skills up; some really advanced techniques were developed [which] can be applied in other mechanisms. It is a very core skill that is not widely available. It is not a direct measurement, but half of our electronics work is in this area, so the direct revenue from this work is going to be £1-2 m a year. We had the skill base before the project, but the project has supported and strengthened this skill base.”
3. Investing in infrastructure as part of the project which then increases the abilities of the beneficiary organisation – or teams within it - as a whole: “Now we have the facility we can do more research, and doing this sort of project helps when we write funding applications.”

Almost no respondents could provide quantification of the results of this up-skilling, but for the latter two types of up-skilling benefit in particular, the respondent felt that these would lead to financial and reputational benefits from being able to do new things and or do things more efficiently than previously: “It has moved us up the value chain from being a subsystem supplier to satellite supplier - we are now selling to end users rather than the people who build the products for end users.”

Environmental benefits

Benefits include reduced energy use and raw material use through newly designed product design and creation processes, reduced impacts from space weather, reduced emissions / energy use from the completed product, increased product lifetimes, and better information about (and so responses to) air and ozone quality.

This type of benefit was always likely to be limited on the basis that not all projects were intended to have a direct – or even indirect – impact upon environmental outcomes. However, around a quarter of respondents cited environmental improvements arising from the GSTP-funded projects. Obviously these are not solely applicable to the UK, but are a valuable element of some projects that are recognized by respondents.

Making the UK / Europe more resilient / independent

The evaluation identified a number of instances where as a result of the GSTP-funded project, a UK company now owns the IP for a particular product and so market advantage on a branch of the space industry. As ESA co-owns the IP in almost all instances, these benefits are at a European rather than UK level.

Where this benefit was reported, the respondent was referring to the establishment of a UK / European supply chain and being able to deliver something that was previously only possible from the US, Russia, or China.

Cost saving benefits

A number of respondents reported that the projects delivered cost saving benefits to ESA by developing techniques / technologies that enable missions to perform more efficiently / using fewer resources than the previous approach. In some cases, this was the primary aim of the project. However, these cost saving impacts are not within the scope of assessing benefits to the UK economy, except indirectly through either reducing ESA member state commitments or receiving more money back in funding, but this cannot currently be quantified.

Where respondents cited applicable cost saving benefits; these were because the project had enabled them to develop an engineering or manufacturing approach to a technology which reduces inputs into the process.

Educational benefits

This benefit specifically pertains to increased take up of space-related courses and graduate expertise in related fields: *“We are working on teaching workshops with some of the industrial partners which benefits our students. This sort of project also helps to attract students because it is space agency and exciting.”* On this basis, the benefit was likely only achievable by educational institutions.

3.4. Attributing impact to GSTP

As indicated in section 3.2, the level of attribution to GSTP is very strong relative to most programmes. All but five respondents stated that the project would not have happened without GSTP funding - in our analysis, this has been regarded as the highest level of attribution and has meant that 100% of the project impacts have been attributed to the GSTP.

The remainder have acknowledged that GSTP has supported the project to at least some extent i.e. the outcome may have been achieved, but slower / less effectively - in our analysis their impacts have been factored down by 50% in acknowledgement of this.

The main way in which the project was deemed to be attributable to GSTP was due to the lack of availability of other funding. Several reasons were given by respondents for this.

Most commonly, respondents felt that the project / technology development was too uncertain in terms of potential success to benefit from any other external funding and that internal funds were either insufficient or simply unavailable due to the speculative / exploratory nature of the project: *“Without GSTP it would not have been done. At that time the only people interested in this idea were ESA.”* This was especially the case where ESA had helped to initiate the project with industry and where the beneficiary in question was a less proven SME: *“There was a business case but we needed GSTP to actually make it happen. UK venture capital is non-existent for small companies; the UK investment community like to invest in certainties. We were new to this and not a safe bet. GSTP gives funding and authenticity / credibility.”*

Some cited the fact that GSTP is specifically focused upon the middling TRLs (3-7) which makes it unique from both TRP (for the very early TRLs) and private investment that may enable the finalisation and commercialisation of tested products (the final TRLs). These were not always the case, in that some projects utilised both TRP and GSTP, whilst others drew in private investment and GSTP, but the GSTP element was always deemed crucial to the delivery of the project: *“There was always a perceived need from industry for [the technology] but I don’t think it would have been funded by industry - they would only want a developed product, not to spend money of research.”*

The time it would take to obtain other sources of project investment was also cited. Even where respondents felt that private investment could have been explored as an option, the availability of GSTP meant that they did not need to spend time and resource on a potentially unreliable funding source that may take a long time to obtain (thus affecting the realisation of project outcomes and potentially losing market leading position). One respondent clearly stated that obtaining private finance would be longer because understanding of the potential benefits of the technology would be lower than ESA’s.

Finally, where beneficiaries were able to draw in additional external funding, respondents sometimes reported that this was due to GSTP, through the fund providing other investors with the reassurance that the project was ESA-supported, so worth funding.

Beneficiaries also cited the fact that ESA technical officers provided a useful steer and guidance on the project, potentially achieving a better outcome for ESA and an outcome than could be more easily commercialised for the beneficiary: *“GSTP made a huge difference...It was very important that ESA were strongly involved.”*

Several respondents also mentioned the value of working to ESA GSTP timelines and having a structured approach to delivering the project and so the resultant outcomes.

4. Process evaluation

There was a large degree of consensus amongst beneficiaries and wider stakeholders as to the strengths of the GSTP and how it could be enhanced. For context, overall beneficiaries were keen to emphasise the importance of, and their satisfaction with, the funding programme (especially post-award office input), but most had suggestions for ways in which it could be enhanced.

4.1. The process of accessing GSTP

Most respondents had critiques on the process of applying for and obtaining funding. This was even the case where they / their organisation had not personally encountered any meaningful issues.

Many organisations talked about GSTP being relatively straightforward compared to applications for other funding pots, though others said the opposite and that a straight ITT and bid process would be simpler. Several also talked about ESA helping them through the application process: *“Massive support from ESA in what we needed to put in the initial expression of interest forms, and throughout the contract negotiations.”*

However, even those who felt that the process was relatively easy to complete were keen to highlight their experience in applying for funding and the fact that they have personal links with key decision makers and people involved in the process within both ESA and the UKSA. These respondents noted that if an organisation lacked such contacts or were inexperienced in applying, this stage of the process could prove very challenging: *“The first time you go through these forms it is not immediately obvious what they are after.”*

Almost all beneficiaries felt that the process from initial idea to granting of funding can take much longer than expected. Whilst respondents felt that some level of bureaucracy was understandable, especially when carrying out due diligence and making careful decisions regarding allocation of taxpayer funding, in the majority of cases respondents felt the process to award had been too lengthy. Whilst different organisations had different tolerances in this regard, almost all were talking about a process that took longer than twelve months. Few could suggest ways to improve this duration however as few have clear sight of the interim process and what caused the delay.

Linked to timing, some respondents commented upon the UKSA being open and willing to represent them at ESA level in order to obtain GSTP funding but being under-resourced to do so. A number of respondents commented that their key contact within the UKSA was excellent and helpful when reached, but was difficult to obtain: *“One of the issues with the GSTP programme is that there is not a huge amount of capacity within the UKSA to understand whether an activity would be supported by them or not. Getting an indication from*

the UKSA is particularly hard and it takes time. Perhaps they are under-funded or under-staffed. Resources to the UKSA could be increased.” Conversely, one respondent pointed out that no grants process is “frictionless”.

Aside from the uncertainty, respondents could not point to a clear consequence of perceived delay in the funding award process, though the fact that beneficiaries are often seeking to develop technology ahead of competitors – within and without Europe – means that the delay is viewed as detrimental: *“This way they run risks, because the technology might have moved on.”* One respondent also pointed out that the variance in exchange rates between application (including costing) and funding award could mean lost funding.

The perceived delay in funding award was felt to be exacerbated in several cases by ESA then placing a challenging timetable upon the beneficiary and requiring short term milestones to be met. *“From the funding bid being approved by the UKSA it was over 2 years before ESA granted it, and then suddenly action. It would be good if it averaged out a bit.”* Another noted that: *“you suddenly get permission and only have short time to start the project and get resources in place.”*

A final critique amongst a small number of beneficiaries was around insufficient promotion of the availability of the GSTP: *“The programme is not well advertised. You have to be fairly familiar with ESA to know that this exists.”*

Tangential to GSTP, several respondents discussed the fact the other GSTP member states have national funding of the equivalent of GSTP and that this allows a greater flexibility and safety net should the approach to ESA be unsuccessful.

A few respondents saw this situation as indicative of the necessity of continued GSTP funding; several others were concerned that the effects of Brexit could lead to isolation from particular ESA missions and so particular projects/technologies, therefore indicated the necessity of building an equivalent national funding programme and even a bigger independent space sector presence and national space programme.

4.2. Allocation of funding

Most projects (in theory) received GSTP funding for 100% of the project cost. In many of these cases, beneficiaries noted that they still carried some associated costs that were not budgeted in the GSTP award, but all were satisfied with the amount received, as indicated by the high attribution ratings reported by beneficiaries.

Respondents felt the areas and technologies targeted by the GSTP were appropriate and were positive about the funding programme’s focus upon low-medium TRLs and –

commensurate with this – technologies not likely to deliver a short term return on investment / benefit to ESA: *“it is the only funding that bridges the gap between TRP levels and TRL8-9.”*

However, several suggestions for improvement were made. A commonly held view was that the justification behind the allocation of funding can be “opaque” and that it feels allocation is secured (or certainly initiated) via informal conversations with the right people than a truly formal and transparent application process. Respondents usually recognised that the nature of the sector meant lone organisations are sometimes the only ones appropriate for certain technologies sought by ESA. Despite this and the fact that mission statements provide some sense of ESA priorities, most felt that the process could / should be more transparent: *“A more of a top-down approach would be interesting, where they would have a list of active tenders as well as a list of potential tenders, so organisations could gauge more accurately...a list of potential tenders would be more helpful.”* In a similar vein, several respondents noted that they couldn’t comment on GSTP allocation because they were unaware of the way in which the fund is allocated.

Linked to this, several respondents commented that ESA have preferred organisations / organisations that are embedded in the system and these tended to be the large, well-recognised companies, compounded by the perceived difficulty in applying: *“fund allocation seems to be guarded, and you need to be around the system to get the funding. It could become more available to smaller organisations.”* Another noted that *“it should be made easier for such companies to get involved because it can be scary and daunting.”*

However, the coverage of projects within both GSTP 5 and 6 indicates that as well as the large global organisations referred to, there are a number of SMEs and academic institutions that have benefitted across a range of roles – manufacturing, design, consultancy and product testing in environments: *“Offering £xm to [us] must have caused a lot of shaking of heads. A lot of these projects fail, and are therefore risky. That was very brave on their part.”* In addition, one SME specifically praised ESA for allowing invoicing in advance on the project, thus alleviating what would otherwise be excessive cash-flow pressure on small businesses.

Several respondents noted that projects with greater longer term outcomes should be focused upon by ESA. Linked to this, there was a view that ESA should be less risk-averse: *“One has to have the appetite for failure; some projects won’t deliver an immediate economic benefit but could be long term and needed for the eco-system of space industry”*. There was also a suggestion that the funding was still too focused upon technologies that are likely to achieve a strong commercial outcome as opposed to more strategic outcomes, despite the acceptance of all respondents that a key aim of GSTP is achieving European independence on key technology areas: *“commercial satellites seem to get quite a large proportion of UKSA support. Though it is understandable, more effort should be made for the space exploration*

side as well. Space exploration technology requires some seed funding to be realised, because the commercial applications might not be obvious to begin with, as opposed to telecom or observation satellites. This way attracting money from venture funds would be easier.” In contrast, one respondent noted that ESA could initiate project ideas and encourage industries to petition their national agencies to bid. The respondent noted that this would in theory be fine, but the UK in particular looks to national economic benefit when assessing bids, whereas this is not a key priority of ESA or GSTP allocation.

A final critique was of the need for ESA to equalise the national contributions of member states to the funding issued out through GSTP. Not only did some respondents feel this meant sub-optimal funding choices, but several also felt that this was the reason for the substantial delay in a number of cases: *“There are 22 countries which have to get approval from their own governments, and I do not know how this could be made more efficient. It is painfully slow.”*

4.3. Project direction

The most commonly cited strength of the process was the involvement of the ESA technical officers which was almost always viewed by beneficiaries as having a positive effect upon the project, in:

- Providing a steer for the project; this was hypothesised as being a potential issue due to perceptions of technical officers interfering in the project direction, but this was almost unanimously welcomed by beneficiaries, who felt that the technical officers had been sometimes instrumental in advising on specific technical details or ensuring compliance with ESA standards, itself very important to the commercialisation of a number of products. As part of this, many respondents liked the reputational and project steering opportunity to present at ESA and at various other events / conferences. Several also talked positively about technical officers steering a project direction in order to better allow commercialisation:
 - *“ESA’s project officer was interested, accommodating and understanding. They are not subtle or shy, and say the things that need to be said...but in a positive way. Their input was useful, and they are knowledgeable, they can even make recommendations.”*
 - *“Feedback is provided very adequately by ESA. They have been very willing to contribute to solution of technical problems as well.”*
 - *“The person from ESA was very good, very supportive, very helpful, they’ve made knowledgeable suggestions and comment, realised it is early-stage research and offered flexibility.”*
 - *“The ESA contact met with us regularly, sat in all project meetings and was very supportive. The monitoring was good, they set milestones so that we could be paid throughout the project.”*

- Introducing new partners and potential customers; this could be attributed to both the technical officer (who sometimes made specific introductions) and simply being part of the ESA / GSTP process: *“they help you meet suppliers and customers and introduce you.”* And in a few cases advising on how additional funding might be obtained to progress the development of technology – or spin-offs – further after the GSTP funding is used.

Criticism of ESA involvement post-award was on occasions where there had been turnover of technical officers responsible for the project, which could bring challenges around new technical officers needing to get up to speed, having differing opinions from their predecessors, or lacking the context for certain decisions made.

One respondent also raised the issue of ESA agility in terms of them being so rigidly bound by the original project objectives: *“The Statement of Work became too large and detailed and prescriptive. We understand they want a project to be defined but it's a huge management burden and a bit more trust might be a good idea; less on admin, more on engineering. The QA feels excessive for this level [of TRL] where the nature of it is that unanticipated stuff happens! We don't want to get bogged down in the minutiae of requirements.”*

The only other issue highlighted was linked by one respondent to ESA bureaucracy in making the initial decision; namely the ability of ESA – and technical officers – to be flexible and agile with projects and respond to changing circumstances / project avenues not producing optimal / expected outcomes by adjusting the project objectives.

4.4. Process elements: limited effects?

Respondents tended to feel that there were both positive and negative elements of the GSTP process from initiation of the project idea to project completion. However, all respondents tended to struggle to quantify the effect of either set of elements or how they balanced.

There are theoretical effects of elements of the process. For example, good support from the technical officer could lead to successful project completion and improved commercialisation (through both introducing third party contacts and ensuring the project outcome meets ESA standards). Equally, a delay to funding allocation could allow a competitor outside Europe to push ahead towards commercialisation of a technology. However, whilst respondents could highlight anecdotal examples of the former, few could point to detrimental effects of the elements they viewed negatively having actually occurred.

5. Conclusions

5.1. GSTP

Two of three key objectives for this evaluation were to assess both the impact of the GSTP-funded projects to the UK economy and assess the process of the GSTP.

Impact

- Based on this research, the programme has already achieved substantial attributed impacts across revenue generation, cost savings and safeguarded / created employment. From 2017-18, the evaluation has found further projected impact which is at least 7x the size of impacts achieved to this point.
- In addition to the relatively strong ability of beneficiaries to quantify impacts, the evaluation has identified a wide range of further achieved and anticipated benefits arising for interviewed GSTP beneficiaries. More of these should be quantifiable as GSTP 6 projects in particular are completed, outcomes realised and beneficiaries have a clearer picture of likely benefits. There are also likely to be further impacts from non-interviewed beneficiaries.
- The figures in this evaluation represent a conservative estimate and yet are many times larger than the GSTP funding provided to UK beneficiaries. The only note of caution is that no respondents recognised any substantial detrimental net effect on the benefits they were able to quantify, insisting that the outcomes represented growing or new markets.
- Attribution to the GSTP programme is very strong; the basis for this often lay in GSTP targeting middling TRLs that may not appeal to other potential sources, as well as the expertise and credibility that ESA bring. When asked about obtaining GSTP as opposed to alternative funding, beneficiaries noted one of the following:
 - They were unaware of other significant funding pots for them to access at that time (especially the case where the project was still at a fairly early stage); the availability of other funds was often something respondents had investigated.
 - Some thought there were potentially other pots they could have gone for (and they sometimes did investigate these) but such streams may have been less reliable or provided far less funding than GSTP, so would have made the project slower / less effectual.
 - Some said there were other funding pots out there and these may have been of similar value financially, but GSTP was essential due to (a) the additional ESA / UKSA expertise that comes with the funding; (b) the importance of ESA

involvement throughout the process (milestones keeping the project on track etc.); (c) the significance of GSTP being seen to fund the project, which then reassures other potential funders / stakeholders and better guarantees the success of the project.

- Across the above, any alternative issue which would have created additional delay in progressing the project may have been detrimental, as several companies talked about the loss of revenue if another company had ‘got there first’.
- Overall, the evidence suggests that GSTP is a valuable fund for UK beneficiaries on medium-long term projects.

Process

- It is important to note that the strong attribution to the GSTP fund, the preference of beneficiaries to seek it over many other sources, and positive responses on the management of projects post-award, all indicate that the GSTP process is generally well regarded.
- However, there were suggestions for improvement on the process; these included acceleration in the time taken to make decisions on the award of funding, greater transparency in how this is done (particularly so organisations do not misinterpret why they are not involved / were unsuccessful) and greater support on promoting project outcomes. Despite this, very few respondents could point to any tangible effect of these issues; few seemed to have affected the project in any meaningful way.
- Overall, the GSTP process is felt to work sufficiently well; all stakeholders (including technical officers) feel there are ways in which it could operate more effectively, but the evaluation did not find any clear way in which these areas for improvement are affecting outcomes.

5.2. Evaluation of space programmes

One of the key objectives of the evaluation was to generate insight into how evaluation of a longer term, strategic space support programme could be conducted within a limited budget and timescale. There are a number of observations that we would make as a result of having delivered this evaluation, across method development, data collection and analysis.

- Interviewing a range of stakeholders – technical officers, organisations with a sector overview, and of course beneficiaries of the funding – is useful in providing a range of perspectives and understanding of the way the GSTP is valued and operates.

- Technical officer conversations are useful in clarifying the intended purpose of projects, how organisations are allocated funding, beneficiary sensitivities and contacts, and assessing what the quantifiable impacts of the project might be in advance of beneficiary conversations.
 - Wider stakeholders provided a useful insight as to how ESA funding more generally supports the UK space sector and – where they were more familiar with it – the particular strengths and weaknesses of the GSTP funding process. Where stakeholders were less able to meet expected benefits were in commenting upon macro-level benefits such as increased uptake of space related degrees. This may indicate a need to refine who is approached for these discussions.
 - Beneficiary conversations are essential to any evaluation as the respondents provide authoritative information on how the project came about, the purposes of the project, impact across multiple indicators, potentially applicable net effects, attribution (i.e. what would have happened anyway), and GSTP process comments.
- Beneficiaries were less reticent and more knowledgeable about beneficial impacts achieved and forecast than expected. We had at least anticipated that it would be necessary to interview multiple respondents across technical and financial roles to obtain any quantifications, but named lead contacts proved to be effective in both regards. Although business cases are sometimes quite vague – especially where the organisation were not aiming for short-medium term commercialisation of a particular product – respondents were still usually able to discuss an anticipated order of magnitude.

It was valuable to obtain technical officer and UKSA insight into who to interview prior to commencing beneficiary data collection, as the contacts provided could differ from – or be more diverse than – those on the original applications.

- It may be valuable for future evaluations to include more consultation with individuals involved in ESA decision making as to who to fund, to more closely dissect and understand the process which – to respondents – seems to be unnecessarily lengthy.
- Few respondents could provide much authoritative or quantified information on some of the macro-level benefits that were hypothesised in advance of data collection, especially around educational outcomes and growth in the UK – as opposed to European – space sector independence. Neither a per case or top-down approach seems to suffice in clarifying attribution of any change to the GSTP specifically, and it may be that the time is not used up on investigating some of these hypothesised outcomes where at best a



correlation may be observed and no individual / organisation can comment upon causation.

- Agreeing in advance the factors that will be used for monetisation. A particular example is employment, where it has been necessary to look at average salaries in technical / engineering roles rather than within the business population overall.



T: +44 (0)121 285 3800

E: research@data-build.co.uk

www.data-build.co.uk

Databuild Consulting Ltd trading as Databuild

Registered address: Baskerville House, Broad Street, Birmingham, England, B1 2ND.