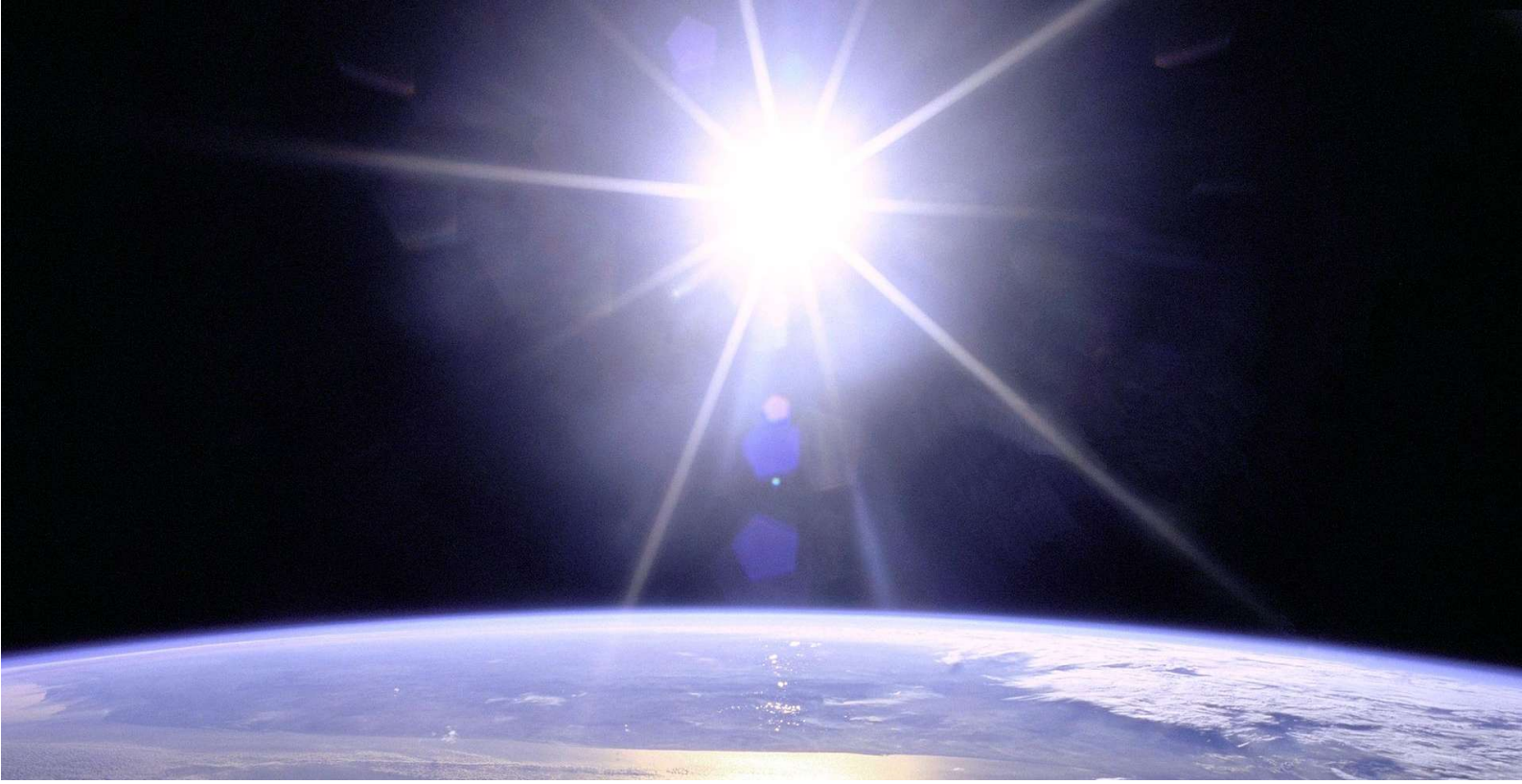

International Bilateral Fund Monitoring & Evaluation

Annex to the Final Evaluation Report

A report for the UK SPACE AGENCY

FINAL

know.space

May 2025

know. */nəʊ/v.*

to understand clearly and with certainty

About us

know.space[1] is a specialist space economics and strategy consultancy, with offices in London and Edinburgh. Founded by leading sector experts, it is motivated by a single mission: to be the source of **authoritative economic knowledge for the space sector**.

www.know.space hello@know.space

Cover image: *Sunburst over the Earth.* Credit to NASA.

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Annexes

A1 Methodology

Approach

Setting the foundations for all our IBF M&E activities, we initially developed an overarching data monitoring framework to establish a robust approach to evidence collection. This framework outlined a comprehensive set of metrics that can be consistently captured over time. We supplemented this with an assessment of initial indicator conditions through baselining, which is critical for understanding net impacts (rather than solely gross impacts). We also identified potential control groups to assess the feasibility of various analytical methods and counterfactual scenarios. Specifically, we aimed to understand what might have occurred without IBF funding, which was represented by a group of successful Phase 1 project teams that did not receive Phase 2 funding. The outputs of this exercise were presented in our Baseline and Data Monitoring Framework report, which was delivered in September 2023.

This was followed by a process and impact evaluation (for UK Space Agency internal use) for IBF Phase 1-funded projects, with findings synthesised in a report delivered in January 2024. Activities to deliver the IBF Interim and Final Evaluations followed a four-stage approach, through which data was collected, analysed, synthesised and then delivered as insight to the UK Space Agency.

The data reporting mechanisms were developed to ensure consistency within the evidence collection and monitoring processes, where comparisons and trends can be identified across Phase 2 and with Phase 1 where feasible.

We ensured that both **quantitative** and **qualitative** sources were included so that the data would be supplemented by important 'softer' contextual information throughout the project, which would help validate our approach as the programme progresses. Additionally, we used a mix of data sources to address any potential gaps in the evidence base. Where relevant, we also explored the counterfactual assessment, leveraging qualitative interviews with UK project leads that were successful and unsuccessful in securing Phase 2 funding, as well as desk-based research, to understand what would have happened in the absence of IBF Phase 2 funding.

Overall, throughout all our M&E activities, the impact of funded projects is collected across four indicator categories:

- **Competitiveness and Reputation**;
- **Innovation and Commercialisation**;
- **Skills and Knowledge**; and
- **Science**.

Data was also collected on the delivery process of IBF, **examining what worked well and less well**, also gathering recommendations for improvement. These were provided separately to the UK Space Agency for internal use.

Framework development

Theory of Change

At the inception of the evaluation, we developed a Theory of Change (ToC), which was designed to serve as a live document through which we would be able to track the realisation of the outputs and outcomes of the programme. The ToC can be found in A5 Theory of Change.

The ToC is designed to capture complex routes to impact for very different projects, which all sit within the IBF. Some categories were strongly relevant to all projects (e.g., UK Space Agency Investment), whilst others are more project-specific. For example, TRL-raising will only be applicable to projects where a technology is being developed. The model is not designed to be read linearly down one column, but the stages of the model are roughly grouped to facilitate ease of use.

Evaluation questions

A key part of the evaluation methodology was the development of evaluation questions, which guided our analysis throughout the study and are reflected in the final report. These evaluation questions were developed across the impact, process, and economic evaluation.

As a starting point, we reviewed the UK Space Agency's existing evaluation question. Refinements to the existing list of were made where questions could be more specific or more closely aligned to the anticipated routes to impact and objectives of IBF that have emerged through refinement of the ToC. We also added sub-questions where relevant, as well as value for money (VfM) questions, which were reworked to focus predominantly on costs and benefits.

Indicators

For the impact evaluation, we developed a series of indicators, which we tracked throughout our assessment to ensure consistent monitoring of effects and processes as the projects and programme unfolded. Notably, several indicators were also key for feeding into the economic evaluation (such as employment and investment). As a starting point for developing our indicators, we reviewed the indicators that were provided by the UK Space Agency in Annexe B of the IBF business case, alongside the list of key performance indicators in Annexe D, and provided a brief overview below.

Taking into account the complexity and scope of tracing the indicators through to impact, and how to link these to the UK Space Agency's IBF funding across the projects, we have developed a varied array of indicators which monitor elements which we view as both **(i) important** and **(ii) feasible to measure.**

Throughout our interviews with stakeholders and the survey, we collected information to feed into our indicators through targeted questions. With each interview, translated insights were added to our data tracker, which took into account insights from across the various phases of the projects. At the conclusion of the data collection phase, we brought together insights through qualitative and quantitative analysis (e.g., processing the regional spread of project teams, number of citations, and grouping responses to new applications and Likert scale questions).

Data collection

Stakeholder engagement

Interviews with relevant stakeholders followed a semi-structured format, enabling **consistent lines of questioning** across all stakeholders while allowing for sufficient deviations in conversations around the specific context of their project.

We held our consultations in four stages across the programme:

- During the August-September period of 2023, we held **32 interviews** across the project teams (i.e. all of the 32 competitively funded projects) to gather insight on the projects' expected routes to impact. This **informed our data monitoring framework report**, helping to refine our expected indicator list as well as the baseline scenario for the different project teams. Additionally, we gathered **insight regarding the Phase 1 application process**, including any challenges and lessons learned for the UK Space Agency that could be applied for the Phase 2 application process and beyond.
- We then re-engaged with the stakeholders after they completed their Phase 1 activities and delivered their Phase 2 application process. Holding interviews through the December and January period, we spoke to **35 organisations in total**, including project team representatives, UK consortium partners, and international partners. These conversations were critical for **obtaining evidence and examples around the tangible impacts of the IBF programme during its first phase**, as well as acting as a validation method for information we had already gathered through desk-based research.
- During the September-October period of 2024, **we held 15 interviews with UK project leads**, including 10 for competitively funded projects and 5 for direct award projects, to gather **insight on the projects' expected (and when relevant, realised) routes to impact**. This helped refine our indicator list (e.g., one indicator added to capture infrastructure developments), as well as the baseline scenario for the direct award projects. We also **engaged with 9 UK project leads, which participated in Phase 1 but were unsuccessful in securing Phase 2 funding**. This was intended to capture insights to inform the IBF Phase 2 counterfactual, notably exploring whether Phase 1 partnerships and activities were still ongoing / planned without IBF Phase 2 funding. Across all the interviews, we **gathered insight regarding the Phase 2 application process and the IBF programme structure in general** (e.g., amount of funding, duration, phased split), including any challenges and lessons learned for the UK Space Agency that could be applied for a potential future new IBF call.
- During the January-March period of 2025, to conduct a final round of interviews with project leads, speaking with all **16 project leads**, as well as **6 UK-based partners** and

10 international partners. Through these interviews, we gathered insights into **each team's progress and identified key obstacles or circumstances that may have affected the delivery of their respective projects**, particularly given the international scope of these initiatives. We also collected feedback on the perceived development of relationships with international organizations and assessed the structure of the IBF program as a whole (including aspects such as funding amounts, duration, and phased splits). Additionally, we noted any challenges and lessons learned by the UK Space Agency that could be relevant for a potential future IBF call. We also consulted with **4 UK Space Agency stakeholders** from the International Relations team and the Exploration team. Our goal was **to gain insights into the internal processes of the programme, inter-departmental communications, and the potential impacts and perceived changes in relationships with international agencies.**

These consultations are crucial for understanding the impact pathways of the various funded projects as well as those which were beginning to emerge. Please refer to A2 Stakeholder engagement for a full list of organisations interviewed.

At the final stage or our evaluation, we also circulated a survey to collect standardised quantitative data to support analysis against the North Star Metric (e.g. external and internal investment, revenues) as well as gather data on employment, TRL raising and Likert scale responses on skills development and relationship and reputational impacts. The survey was sent only to UK-based stakeholders (including project leads and partners). In total, we received 13 survey responses, resulting in a survey response rate of 38%. However, there was a 69% (11 of 16) response rate from project leads. Please refer to A2 Stakeholder engagement for a full list of respondents.

Desk-based research

In addition to stakeholder consultations, we reviewed key project documentation shared with us by the UK Space Agency, which provided important input into our analysis. These documents included:

- **Phase 1 grant application forms:** used to capture data and information such as Phase 1 partnerships and their status at the beginning of the project, expected routes to impact.
- **Phase 2 grant application forms:** used to capture data and information such as Phase 2 partnerships (including whether there are any new ones formed since Phase 1), their status at the beginning of the project, planned activities, and expected routes to impact.
- **Phase 1 deliverables:** used to gather insight into how successfully the team delivered throughout Phase 1, any tangible impacts, and any process challenges.
- **Annex 3 budget templates:** used to identify data such as FTE days and in-kind contribution across the consortium.

Insights from the data collection phase were compiled into an Excel database, allowing us to collate qualitative and quantitative impact data by indicator, and gain insight for the process evaluation through a series of evaluation questions. The approach enabled a bottom-up, robust approach to data collection, and allowed us to easily aggregate information across a wide range of projects. Three **internal workshops** were then held to share knowledge amongst the

team, identify emerging trends, and draw out the key messages and common themes from our research.

Data analysis

The reporting methods outlined above will gather evidence that feed into the development of **quantitative** indicators that are measurable over time. They also provided key contextual **qualitative** and **non-indicator insights**. This ensured a suitable approach and understanding of the broader landscape within which IBF sits, in relation to emerging and anticipated benefits to the UK space sector, and the strategic partnerships which are strengthened or emerging throughout the project.

The data analysis stage compared these indicators to the baseline as a way to identify trends and changes, along with the 'softer' qualitative and non-indicator insights. This ensured that we captured the breadth of impacts, and helped us to analyse variations in trends and changes over time of the impacts.

The analytical methods utilised for the evaluations depended on the indicators and what evaluation questions we were seeking to answer.

Impact evaluation

The impact evaluation was centred around **theory-based evaluation**. Quantitative and qualitative evidence was combined to draw insights and conclusions against the evaluation questions, using **Contribution Analysis** – an approach which analyses the role an intervention has made to observed outcomes and impacts. This involved assessing the additionality and relative contribution of the programmes to intended outcomes relative to wider factors, in turn verifying the routes to impact identified in the Theory of Change (ToC) at the beginning of our study, and providing evidence of alternative pathways which may influence outcomes. Within our analysis, we also paid strong attention to **spillover** impacts (i.e. the unanticipated and unpredictable – but often sizeable – impacts that can occur), evaluating all impacts in line with best practice Magenta Book principles. The process for answering impact evaluation questions involved expert judgement and looking at evidence **'in the round'**.

We also explored the suitability and feasibility of using a **difference-in-difference (DiD)** method. This is a quasi-experimental approach that would compare changes in outcomes over time between the companies enrolled in the IBF (project teams) and a control group of companies who did not receive IBF funding. Whilst this approach could have added more rigour to results, we were **unable to use DiD due to data limitations**. The key limitation was the early nature of this evaluation[2], though the small sample size would likely also have hindered our ability to find a significant result.

[2] To compare outcomes (e.g. employment, revenues) between the treatment group (IBF funded companies) and the control group, it is necessary to use a secondary data source containing outcomes for both groups of companies. Companies House provides this data, but there can be a lag of up to 18 months between the current date and the date of most recent financial information on a company. As such, it is too early to capture the impact of IBF via these metrics. Future evaluation might be able to utilise DiD methods, but due to the small number of companies funded, the sample size is small and therefore small treatment effects will be very challenging to detect.

Process evaluation

The process evaluation focused on factors such as the application process, efficacy of delivery, what obstacles (and enablers) were encountered throughout the IBF, what should have been done differently, and what worked well. Therefore, the analysis was based largely on qualitative information received from interviews and focus groups. We collated all evidence and used internal workshops to identify themes and the 'so what' from what we heard.

The evaluation considered **relevance** (e.g. did the UK Space Agency's investment aims for IBF meet target groups' needs), **appropriateness** (was the model appropriate to achieve aims), **effectiveness** (were intended results achieved), and **efficiency** (to what extent was delivery to time and budget). This approach aimed to understand what worked well and not so well for future IBF calls / other UK Space Agency programmes where applicable.

Data synthesis

The complexity behind this stage lies in how we outlined the narrative in order to capture the bigger picture of what the data/evidence and their evolution actually demonstrated. It is not as simple as providing an assessment such as 'x indicator increased, therefore it is a good result', since that does not take into account the broader contextual landscape. It was possible, for example, that there were other reasons that were not IBF-attributable as to why an indicator increased; conversely, there could have also been external factors that have limited the progress of an indicator.

Those indicators that were more closely tied with the project team and UK Space Agency-funded International Bilateral Fund activities were often (but not always) simpler to analyse in terms of the factors affecting the changes, since they were more easily attributable to the project and also have closer oversight. For indicators that were not so easily attributable, we provided contextual insight and caveats that helped scope out the impact as much as possible.

As with any evaluation, it was not expected that '1 indicator = complete answer to 1 evaluation question'. In general, we have to draw together the available evidence base to identify the key areas for impact and the potential areas for improvement, reflecting that simplistic, quantifiable metrics may only have offered a blunt indication of overall performance. Therefore, we assessed the progress of several relevant indicators, taken together with contextual insight, to help provide more robust evidence in interpreting the progress of the programme. We recognise that interpreting these findings is an **art as much as a science**; hence, we use a range of sources/indicators to corroborate conclusions and leverage our long-term experience in M&E and Impact assessments.

Recognising the differences in objectives and scope across the portfolio of IBF projects was also a key component of our evidence synthesis. **Collating** findings from across the portfolio is an important part of identifying trends through the portfolio and seeing where impacts were emerging.

We also formed **case studies** that highlighted project success stories, providing details on their routes to impact and the type of impacts that were emerging. We ensured that the selection of case studies highlighted different types of projects, including those that are predominantly

focused on facilitating further partnerships between industry, academia and government; those developing innovative early-stage technologies; those seeking to bring new commercial solutions / products to market; and those involved in forward-looking science missions.

Counterfactual

In any evaluation study, it was essential to consider the potential counterfactual, **what would have happened in the absence of the programme**, in order to accurately assess its impact. To address this, we carefully designed our evidence collection approach to explore the counterfactual scenario in depth. Recognising that other inputs may also have contributed to observed outcomes, we gathered stakeholder perspectives and conducted further analysis to build a nuanced understanding of the specific role played by IBF. For instance, we asked stakeholders to reflect on which impacts would likely not have occurred without IBF funding, helping to distinguish its unique contribution from that of other factors.

In addition to this, we also **developed a Phase 2 counterfactual scenario** by interviewing project leads from initiatives that were successful in obtaining Phase 1 funding but were unsuccessful in securing Phase 2 funding. Through these interviews, we gained valuable insights into the counterfactual outcomes of not receiving Phase 2 support and were able to better understand which types of impacts could be attributed specifically to Phase 2 funding. While these projects had benefited from Phase 1 funding, this distinction was important because it allowed us to isolate the added value of Phase 2 support. By comparing their experiences with those of projects that advanced to Phase 2, we were able to identify the kinds of outcomes, such as project continuation and expanding strategic partnerships, that were more likely to result from Phase 2 investment.

Caveats

As with other research and innovation evaluations, **attribution** is a key challenge in evaluating the impact of IBF. For some indicators, it is difficult to isolate the impact of the programme's funding amongst other factors, particularly given the number of funded projects, the breadth of activities taking place and the differing maturity of project work. Certain projects had received funding from other sources prior to the outset of IBF for related project work, occasionally over a period of many years, and those we spoke to in interviews sometimes struggled to attribute impacts specifically to the IBF. We have worked to determine attribution as best as possible, asking probing questions about the nature of previous funding received and whether impacts would have been realised in the absence of IBF funding. From this, we constructed a detailed counterfactual, broken down by type of impact. This challenge is difficult – arguably impossible – to fully address, however, and we reflect in our reporting where (for example) IBF funding is seen to *contribute to* rather than *solely generate* observed outcomes. We use a **contribution analysis**-based approach, to assess the extent to which the IBF contributed to observed outcomes, amidst the influence of other external factors.

There was significant breadth and diversity across the different IBF projects. These differences mean that **not all projects will (or indeed should) show movement across all indicators** (e.g., space science projects are often unlikely to generate immediate commercial benefits).

Our indicators are, therefore, necessarily wide-reaching. **Lack of movement against many indicators should not be interpreted as a failure of the projects.**

There are also inherent difficulties in aggregating impacts across 16 different projects (as well as the additions Phase 1 projects), especially for more qualitative indicators. Impacts were split by theme and categorised by indicator, to facilitate aggregation, but within each indicator there will **always be some variation in scope and interpretation**. Anticipating these challenges, we developed quantitative indicators where possible, and for key areas of qualitative insight (e.g. reputation), we aggregated opinions through Likert scale (on a 'strongly disagree to 'strongly agree' scale) indicators.

There is a **risk of recency bias**, whereby inputs from the project teams most recently interviewed are overemphasised in results. To counter this, we compiled insights into an Excel database and held an internal brainstorming session, providing an opportunity for the **know.**space team (and our external advisers) to challenge different perspectives.

The **sample size** of data collected is an important consideration for interpreting the findings of this evaluation. In several cases, not all consulted stakeholders provided information on every evaluation question, leading to varying sample sizes across findings. Where sample size is particularly small, individual stakeholder input may disproportionately influence results. To address this, we have clarified the level of stakeholder opinions where relevant and possible (e.g., 'two project teams noted…').

Our evaluation was undertaken concurrently with project delivery, which also presents issues for the analysis. It means we are at relatively early stages of the impact story, with key **lagged benefits still emerging**. Notably for the IBF, the benefits of international partnerships will typically lie in the full implementation of the funded activities and the follow-on collaboration work catalysed. Commercial benefits also take time to come to fruition, for example, with regard to follow-on investment. To mitigate this challenge, we asked forward-looking questions in interviews and captured early-stage indicators of future benefit, for instance, reporting not just concrete follow-on opportunities but also exploratory discussions taking place. This brings in new challenges such as courtesy and optimism bias, however.

Lastly, there is potential for **courtesy and optimism bias** in results, particularly with regard to the process evaluation. UK leads may be inclined to present the impact of their work in a positive light and avoid making negative comments on UK Space Agency processes, given they received funding. To mitigate this, we were able to consult 10 organisations that were unsuccessful in their Phase 2 funding application, providing a more balanced view of IBF processes. Stakeholders may have also been optimistic when providing insights on potential future benefits. While it is difficult to predict whether these will be realised, we have ensured they are appropriately caveated in the reporting.

Economic evaluation

Our approach to economic evaluation is designed to holistically capture the benefits arising from funding, whilst recognising that the **benefits realisation journey is ongoing** and **our data on impacts is in places patchy**, particularly with regard to monetisable impacts.

At a high level, we compare the UK costs of delivering IBF to UK benefits delivered so far. Costs include UK grant funding and UK Space Agency programme management costs (the public cost) and UK matched funding contributions (the private cost). **The benefits we quantify are leveraged external investment[3,4], internal investment, GVA and the value of job creation for UK organisations**. Evidence on these impacts comes directly from our impact evaluation. We estimate GVA using standard industry revenue to GVA ratios[5]. The value of job creation is estimated using a **wage premia approach**[6] which assumes that in the absence of IBF funding, those in roles created through funding would instead be working in similar roles outside the sector, earning different salaries[7]. A wage premia approach assumes that the economic value of job creation lies in creating new better paid roles, rather than new jobs per se.

Our economic evaluation is focussed on benefits (and costs) to the UK, as per HMT Green Book guidance. However, we note that given the international focus of the IBF, some costs have been incurred abroad (i.e. ASA contributions and the matched funding contributions of international partners) and many benefits are accruing to international partners.

Our analysis covers a five-year period from the beginning of the programme in 2023/24 to 2027/28. This time period chosen to provide a reasonable window for project teams to provide forecasts of potential future benefits, given strong uncertainty[8]. We provide estimates covering just realised benefits from 2023/24 to 2024/25, as well as alternative estimates including confidence-adjusted forecasts from project teams. Project teams were asked to provide estimates of future investment, revenues and job creation, alongside their percentage confidence in these numbers. We multiplied the estimates provided by the stated confidence in each estimate. All costs and benefits are adjusted to **current prices** (2024/25), and **future benefits are discounted** using the standard 3.5% discount rate recommended by the Green Book. We present all totals in discounted Present Value (PV) terms (2024/25).

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[3] Throughout our analysis we treat external and internal investment as benefits to society, reflecting the positive role of investment in creating a pipeline for future economic benefit and the central role of investment in the UK Space Agency's North Star Metric. However, we note that DSIT appraisal advice focusses on quantifying the benefits which stem from investment, which are likely to accrue over the longer term. UK external and internal investment are therefore counted as a cost by DSIT, reflecting the opportunity cost of investment. Foreign investment is not included in the cost-benefit calculation. This methodology will capture the long-term benefit of investment but for the IBF, it is too early to meaningfully calculate net present social value (NPSV) using this approach.

[4] We include private external investment and foreign public external investment (including ESA funding) in our totals.

[5] UK Space Agency (2024). *Size and Health of the UK Space Industry 2023*. Available at: https://www.gov.uk/government/publications/the-size-and-health-of-the-uk-space-industry-2023/size-and-health-of-the-uk-space-industry-2023

[6] See know.space (2023). *Estimation of wage premia associated with UK Space Agency funding* [unpublished]

[7] Using contextual information, job creation is divided into sub-categories of role type and seniority. The wage premia associated with each job type is then taken from know.space (2023). *Estimation of wage premia associated with UK Space Agency funding*. Estimates of wage premia are adjusted to current prices. For a fuller description of the methodology employed, see ibid.

[8] Whilst the HMT Green Book recommends a 10-year appraisal period for many interventions, we chose a five-year period given our reliance on stakeholder inputs. Project teams struggled to provide monetised estimates of future impact even for the next three years and there is a potential trade off in the detail we request and response rates to our survey.

We present results for IBF as a programme, including projects who did not progress past Phase 1, projects who were funded through both competitive phases, and Direct Awards. We also provide a breakdown of totals for each of these subsets of projects[9].

Our data on benefits is in places patchy. For Phase 2 projects and Direct Awards, benefits data is largely sourced from a survey to which 10 of 16 project leads responded[10], as well as some UK partner organisations. Whilst we were able to engage with these project teams at interview, there may be **gaps in our evidence base due to non-responses** to our survey. Additionally, project teams often noted that they expected future revenues, investment and job creation, but chose not to provide quantitative estimates. For example, eight organisations told us that they expect to generate private investment in future, but only half of these organisations provided monetised estimates of future private investment. Lastly, our forecasts only cover the next three years and we would expect impacts beyond this point. As such, we may underestimate the benefits (particularly future benefits) of IBF.

Attribution of benefits is a key challenge to any economic evaluation, with impacts often stemming from multiple inputs in complex ways. Broadly, our approach has been to directly ask project teams for benefits which are linked to their IBF projects. For example, a typical survey question was phrased as follows, "Have you generated any new private investment *as a result of IBF funding*?". During interviews, we asked probing questions about the extent to which benefits could be attributed to IBF[11] and we used our broader contextual understanding of projects from multiple interviews with project teams to inform our understanding of the attribution of key benefits.

We apply a 90% additionality assumption[12] to all benefits to account for deadweight, i.e. a small proportion of economic activity generated would likely have gone ahead without IBF funding. This reflects our impact evaluation finding of high additionality from the programme, but is nonetheless necessarily somewhat arbitrary assumption[13]. Non-UK benefits have also been removed to account for leakage, i.e. the extent to which benefits accrued outside of the UK, such as non-UK jobs and external investment into non-UK arms of funded organisations. Similarly, non-UK costs have also been removed.

The evidence suggests that **crowding out associated with IBF is low**. Crowding out refers to the phenomenon where increased government spending leads to a reduction in private investment. Given the low TRL nature of supported technologies (average starting TRL was 2.7), private investors were unlikely to fund technology development without prior de-risking from government.

[9] We do not provide estimates of the value for money associated with Phase 2 in isolation since the benefits realised in Phase 2 and beyond are attributable to both phases 1 and 2.
[10] Non-respondent lead organisations were: Physical Mind, STFC, the Open University, In-Space Missions, University of Strathclyde and SSTL.
[11] For a detailed discussion of our approach to attribution see the Baseline & Data Monitoring Framework Report.
[12] This means that we include 90% of total reported benefits.
[13] Our evidence suggests that no projects would have gone ahead at the same scale in the absence of IBF funding, but it is likely that some activity would have nonetheless gone ahead, though we cannot know how much. The 90% assumption is designed to reflect this potential activity.

Displacement (i.e. the extent to which economic activity generated by IBF displaces other activity in the economy) was also considered. **For revenues, external and internal investment, we assume zero displacement**, as the UK is presumed to be capturing a share of emerging global markets which brings new economic activity to the UK. For job creation, our **wage premia methodology (following DSIT recommendations) implicitly assumes 100% displacement**[14], i.e. everyone in a job created by IBF would otherwise be working in a similar job outside the space sector. We believe this is a reasonable assumption, given the economy was operating near full employment over much of the period of analysis.

A2 Stakeholder engagement

Below is an overview of completed consultations with HMG stakeholders, Phase 1 project leads, UK partners and international partners.

Overview of completed stakeholder consultations for Phase 1

IBF ID	Organisation
HMG Stakeholders	
-	Department for Business and Trade
Project Leads for Competitive Awards	
006	University of Glasgow
007	Rolls-Royce
009	University College London
010	University of Leicester
014	Satellite Applications Catapult
016	University of Exeter
034	Frontier Space Ltd
041	Seraphim Space Camp Accelerator Ltd
048	Telespazio UK
050	Earth-I Ltd
051	Vertical Future Ltd
060	University of Bradford / SAC
061	Astroscale Ltd
062	The Open University
070	Iota Technology Ltd
074	University of Surrey
078	AstroMagnetic Systems Ltd
079	Highlands and Islands Enterprise / Orbex
081	Strathclyde University
083	SSTL
084	Frontier Space Ltd
086	University of Southampton
093	CABI
095	Lena Space

[14] See know.space (2023). *Estimation of wage premia associated with UK Space Agency funding*.

097	AstroAgency Ltd
105	University College London
108	Reaction Engines
110	InSpace
114	The Open University
116	University of Leicester
121	D-Orbit
UK Partners	
048	NPL
093	Assimila Biosecurity Limited
International Partners	
014	Satellite Applications Catapult
105	NASA JPL
097	AzureX
Direct Awards	
Direct	Nesta

Below is an overview of completed consultations with UK project leads at the interim stage, including competitively awarded projects, direct awards, and unsuccessful applicants.

Overview of completed stakeholder consultations for Interim evaluation

IBF ID	Organisation
Direct Awards	
COSPAR	The Open University
Inmarsat InRange	Inmarsat Global Ltd
NESTA	Challenge Works
Physical Mind – HiFilm	Physical Mind London Ltd
NASA AMES -STFC	NASA Ames
Project Leads for Competitive Awards – Successful in Phase 2	
007	Rolls-Royce
010	University of Leicester
051	Vertical Future Ltd
062	XCAM Ltd
070	Iota Technology Ltd
081	Strathclyde University
083	Surrey Satellite Technology Limited
086	University of Southampton
110	In-Space Missions
114	The Open University
116	University of Leicester
Project Leads for Competitive Awards – Unsuccessful in Phase 2	
006	University of Glasgow
009	University College London
034	Frontier Space Ltd

041	Seraphim
061	Astroscale Ltd
079	Orbex
084	Frontier Space Ltd
093	CABI
108	Reaction Engines
121	D-Orbit

Below is an overview of completed consultations at the final stage of the evaluation phase with UK project leads, including competitively awarded projects, direct awards, and domestic and international consortium partners, and a selection of UK Space Agency stakeholders from the International Relations team and the Exploration team.

Overview of completed stakeholder consultations for Final evaluation

IBF ID	Country	Organisation
Direct Awards		
COSPAR	UK	The Open University
Inmarsat InRange	UK	Inmarsat Global Ltd
NESTA	UK	Challenge Works
Physical Mind – HiFilm	UK	Physical Mind London Ltd
NASA AMES -STFC	UK	STFC
Project Leads for Competitive Awards – Successful in Phase 2		
007	UK	Rolls-Royce
010	UK	University of Leicester
051	UK	Vertical Future Ltd
062	UK	XCAM Ltd
070	UK	Iota Technology Ltd
081	UK	Strathclyde University
083	UK	Surrey Satellite Technology Limited
086	UK	University of Southampton
110	UK	In-Space Missions
114	UK	The Open University
116	UK	University of Leicester
COSPAR	UK	Imperial College London
051	UK	University of Cambridge
062	UK	The Open University
070	UK	AAC Clyde Space AB
081	UK	The Alan Turing Institute
116	UK	Geospatial Insight Limited
International Partner Organisations		
007	US	BWXT Advanced Technologies LLC
051	Australia	University of Adelaide
062	India	Indian Space Research Organisation
070	US	Twinleaf LLC

081	US	University of Arizona
081	Canada	University of Waterloo
081	Australia	Nominal Systems
083	Australia	The Commonwealth Scientific and Industrial Research Organisation (CSIRO)
086	US	University of Michigan
116	Bahrain	Bahrain National Space Science Agency (NSSA)
UK Space Agency Stakeholders		
N/A	UK	UK Space Agency (US Regional Lead)
N/A	UK	UK Space Agency (APAC Regional Lead)
N/A	UK	UK Space Agency (Australian Regional Lead)
N/A	UK	UK Space Agency (Exploration team)

Below is an overview of received survey responses at the final stage of the evaluation phase with UK project leads and domestic partners. Only UK organisations were sent the survey in line with UK Space Agency North Star Metric reporting.

Overview of survey responses for Final evaluation

IBF ID	Country	Organisation
Direct Awards		
COSPAR	UK	The Open University
NESTA	UK	Challenge Works
Inmarsat InRange	UK	Viasat
Project Leads for Competitive Awards – Successful in Phase 2		
010	UK	University of Leicester
051	UK	Vertical Future Ltd
062	UK	XCAM Ltd
070	UK	Iota Technology Ltd
086	UK	University of Southampton
116	UK	University of Leicester
UK-Based Partner Organisations		
051	UK	University of Cambridge
062	UK	University College London
062	UK	Teledyne e2v
116	UK	Geospatial Insight Limited

A3 Topic Guide

Shared here is an example topic guide we developed and utilised when interviewing the project teams for the final evaluation. To note, variations of the guide were used when speaking to UK partners, international partners, UK Space Agency stakeholders, and any conversations held during previous deliverables. This specific example is for project leads.

Purpose

This topic guide provides a summary of key points we intend to cover in our final Phase 2 Evaluation interviews to help you prepare.

These stakeholder consultations are a critical part of the data collection required for the study, and your participation is greatly appreciated.

Context

know.space have been commissioned by UK Space Agency to carry out Monitoring and Evaluation (M&E) activities for the IBF. These activities will support the UK Space Agency in understanding the effectiveness of the IBF and its impacts, as well as providing evidence to guide the future of IBF programmes beyond the end of the current spending review period.

Data collection activities has taken place in several rounds, monitoring projects as they progress. For Phase 1, initial data collection took place in August-September 2023. In October 2024 we concluded our Phase 2 data collection activities, and we are now conducting a final round of consultations with project representatives, while consulting some international partners as well.

Reflecting the varied nature of stakeholders and the information already provided to us, there will not be a fixed list of questions for all stakeholders. Instead, conversations will be tailored to each individual – though with a common core of key questions to assess progress against our indicators and evaluation questions, and ensure consistency across funded projects.

Consultation questions

Note: this question list is intended to be used as a **semi-structured guide**, with interviews conducted according to the needs of your organisation. Where some lines of enquiry prove more fruitful than others, these will be explored in greater depth.

We recognise that outcomes such as investment events tend to be a function of multiple ingredients rather than solely due to UK Space Agency funding alone. Within these questions, we are keen to explore the role of UK Space Agency funding in this regard.

Introduction to project

1. Why we are speaking and how the information will be used

2. Open question: how has your project evolved since we last spoke?

Route to impact

3. Have there been any unexpected benefits from the IBF since we last spoke? (i.e. lead organisation, partners, sector-wide, wider society)

    a) To what extend can these be attributed to IBF support?

4. What are your plans beyond your IBF project? Do you intend to continue project work through additional collaboration or funding?

    a) Do you have any follow-up plans to work together with international partners after Phase 2 of this project? Are you having any exploratory discussions regarding potential collaborations?

    b) If you intend to pursue future funding, what sources are you considering?

Indicators and data collection

These questions will be used to collect data on a number of indicators which will be used to evaluate the success of IBF as a whole. Not all questions are appropriate to every organisation and questions will therefore be tailored accordingly. Please note that this round of interviews is being conducted shortly after the previous one in September, making it essential to align closely with our earlier notes.

Innovation and commercialisation

5. Looking at the IBF programme as a whole, how effective was it at accelerating the commercialisation of your product or services (e.g., number of new products, services, or systems brought to market)?

    a) What are your expected timelines for bringing new products or services to market?

6. Based on your future objectives, are you planning to access any new international markets as a result of IBF support?

    a) Are you considering establishing an overseas subsidiary or presence to support this expansion?

7. Has any new intellectual property been developed and registered as a result of IBF since we last spoke?

International and UK collaboration

8. Has your UK-based team changed since we last spoke?

9. Has there been any change in your international team (e.g. new partners) since we last spoke?

    a) Are you aware of any non-UK companies establishing or expanding UK presence as a result of IBF activities?

    b) Have partners provided any new in-kind contributions since we last spoke? If yes, what is the monetary value of this contribution?

10. Have you been approached by any non-ESA members for bilateral/multilateral projects beyond the IBF since we last spoke?

Outreach and wider engagement

11. Have any public engagement activities been delivered by UK project team members as part of or related to IBF since we last spoke? Have any STEM engagement programmes been undertaken for UK students?

12. Since we last spoke, have you participated in any events showcasing the results of your IBF project?

    a) Who was the event aimed at? (i.e. industry, academia, students, general public)

    b) Can you estimate the approximate audience size of these events? (i.e. 10 or 500?)

13. Have any outreach events been undertaken for a student audience since we last spoke?

    a) What level were events pitched at? (i.e. postgraduate, undergraduate, A-Level)

    b) Can you estimate the audience size of these events?

14. Have any papers been published in relation to your IBF work since we last spoke? (e.g. academic articles, conference papers). Any papers being published?

    a) How many of these have a UK author? How many of these are internationally collaborative?

15. Has your project team received any prizes/awards with a link to IBF work since we last spoke?

Process evaluation questions

Interactions with the UK Space Agency

16. How would you describe your overall experience of working with the UK Space Agency throughout the IBF programme?

17. Was the level and type of support provided by the UK Space Agency sufficient for achieving your objectives? Are there areas where support could have been improved?

a) Were the monitoring activities proportionate to the grant size and project scope?

Challenges in delivery

18. What were the main challenges you encountered in delivering your project, and how were they addressed? (e.g. subsidy control mechanisms, partner agreements, technical or administrative issues, budget-related challenges)

19. Were the Phase 2 grants sufficient to achieve your project objectives? Was grant funding the most effective mechanism for your project?

20. Do you have any recommendations for improving processes, communication and coordination between your organisation, your partners and the UK Space Agency moving forward?

International context

21. What lessons have you learned from working with international partners? Were there any specific issues or successes worth highlighting?

Other recommendations for approach

22. What are your key recommendations for improving the processes, communication, and coordination between your organisation, partners, and UK Space Agency in similar programmes moving forward?

23. Now that we have conducted multiple interviews with you, what are your thoughts on our monitoring and evaluation activities? Do you feel there is anything that could have been improved?

We will soon send you a **survey** to support our economic evaluation by helping us collect and consolidate data, such as revenues, exports, and jobs created. It will take no more than 10 minutes to complete and will be our final request for this evaluation. Should you have any questions or encounter any issues, please do not hesitate to reach out.

A4 Survey

Included here is a Word format version of the survey we provided to the project teams. It is important to note that this was then coded up on Smart Survey before being shared with participants.

Purpose

This survey aims to gather insights into the impact of IBF funding. Your participation is crucial in contributing to the evaluation of the IBF. This evaluation is a critical activity to ensure that public funds are spent optimally, identify lessons to inform future programme and policy design, and maintain accountability and transparency. We also include mandatory UK Space Agency North Star Metric questions, which capture progress against the UK Space Agency's principal metric of success.

This survey will feed into the final evaluation of the IBF. This is not intended as a means to assess individual project-level performance, but to inform our overarching evaluation of programme-level impacts.

Questions are designed to capture **organisation-level impacts** of funding. This survey will be distributed to both project leads and selected UK partner organisations.

All responses will be kept confidential, and only aggregate results will be used in reporting – for more information please consult our privacy notice.

Instructions

Completing this survey should take you around 10-15 minutes. Please answer each question to the best of your ability. Please fill out the areas highlighted in green (where applicable). If you encounter any difficulties or have questions, feel free to contact **know.**space (eloise@know.space) for assistance. Thank you for your participation!

Innovation impacts

1. Are you developing any technologies as part of your IBF project?

☐	☐
Yes If *yes*, proceed to **question a**	No if *no*, proceed to **question 2**

a. What is the primary technology being developed through IBF funding?

b. Please indicate how IBF funding is facilitating progression along the Technology Readiness Level (TRL) scale.

Note: we recognise that sub-components may have differing TRLs. Where this is the case, please focus on system-level TRL.

Please select the TRL of your technology *at the beginning* of your IBF project:

☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6	☐ 7	☐ 8	☐ 9	☐ **N/A**

Please select the *current TRL* of your technology:

☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6	☐ 7	☐ 8	☐ 9	☐ **N/A**

Please select the expected TRL of your technology *by the end of your IBF project*:

☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6	☐ 7	☐ 8	☐ 9	☐ **N/A**

c. Are you developing any other technologies as part of your IBF project?

☐ Yes If *yes*, proceed to **question d**	☐ No if *no*, proceed to **question e**

d. Please select the TRL of your technology *at the beginning* of your IBF project:

Note: we recognise that sub-components may have differing TRLs. Where this is the case, please focus on system-level TRL.

☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6	☐ 7	☐ 8	☐ 9	☐ **N/A**

Please select the *current TRL* of your technology:

☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6	☐ 7	☐ 8	☐ 9	☐ **N/A**

Please select the expected TRL of your technology *by the end of your IBF project*:

☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6	☐ 7	☐ 8	☐ 9	☐ **N/A**

Please can you tell us about the other technologies being developed

a. Please provide additional detail on how IBF has supported TRL progression in your project.

Investment impacts

2. Have you generated any new **private** investment as a result of IBF funding?

Private investment includes equity, prizes, debt and alternative sources of finance as a result of funding received.

☐ Yes If *yes*, proceed to **question a**	☐ No if *no*, proceed to **question 3**

a. How much **private** investment has been generated as a result of funding received (total £)?

Note: Q1 2024/25 refers to April to June 2024, etc.

Quarter	Private investment (£)	Percentage from non-UK source (%)
2023/24		
Q1:		
Q2:		
Q3:		
Q4:		
2024/25		

Q1:		
Q2:		
Q3:		
Q4:		

Comments or examples:

3. Do you expect to generate new **private** investment in future as a result of IBF?

☐	☐
Yes If *yes*, proceed to **question a**	No if *no*, proceed to **question 4**

a. How much **private** investment do you expect to generate in the next few years (total £)?

Year	Private investment (£)	Confidence (%)
2025/26		
2026/27		
2027/28		
Beyond 2027/28		

Comments or examples:

4. Have you secured any further **public** investment as a result of IBF?

Public investment includes grant funding and contracts from public organisations such as the UK Space Agency and ESA. This does not include your original IBF funding.

☐ Yes If *yes*, proceed to **question a**	☐ No if *no*, proceed to **question 5**

a. How much further **public** investment has been secured as a result of IBF funding received (total £)?

Note: Q1 2024/25 refers to April to June 2024, etc.

Quarter	Public investment (£)	Source – funding body (e.g. ESA)
2023/24		
Q1:		
Q2:		
Q3:		
Q4:		
2024/25		
Q1:		
Q2:		
Q3:		
Q4:		

Comments or examples:

5. Do you expect to secure further **public** investment in future as a result of IBF?

☐ Yes	☐ No

If *yes*, proceed to **question a**	if *no*, proceed to **question 6**

a. How much further **public** investment do you expect to generate in the next few years (total £)?

Year	Public investment (£)	Confidence (%)
2025/26		
2026/27		
2027/28		
Beyond 2027/28		

Comments or examples:

6. How much **internal** investment of funds have you made as a result of IBF funding (total £)?

Internal investment includes capital deployed from existing reserves to further R&D, equipment purchases, investment in people and tools to develop intellectual property. It does not include match funding contributions.

Note: Q1 2024/25 refers to April to June 2024, etc.

Quarter	Internal investment (£)
2023/24	
Q1:	
Q2:	
Q3:	
Q4:	
2024/25	
Q1:	
Q2:	

Q3:	
Q4:	

Comments or examples:

7. Do you expect to make further **internal** investment of funds in future as a result of IBF?

☐ Yes If *yes*, proceed to **question a**	☐ No if *no*, proceed to **question 8**

a. How much **internal** investment do you expect to make in the next few years (total £)?

Year	Internal investment (£)	Confidence (%)
2025/26		
2026/27		
2027/28		
Beyond 2027/28		

Comments or examples:

Employment impacts

8. Have you hired anybody specifically as a result of IBF funding?

☐ Yes If *yes*, proceed to **question a**	☐ No if *no*, proceed to **question 9**

a. How many additional Full Time Equivalent (FTE) positions have been created as a result of funding received?

Note: Q1 2024/25 refers to April to June 2024, etc.

Quarter	FTE equivalent (#)
2023/24	
Q1:	
Q2:	
Q3:	
Q4:	
2024/25	
Q1:	
Q2:	
Q3:	
Q4:	

b. What types of jobs were created? How senior were the new roles?

9. Do you expect to hire anyone in future as a result of IBF funding?

☐ Yes If *yes*, proceed to **question a**	☐ No if *no*, proceed to **question 10**

a. How many new Full Time Equivalent (FTE) positions do you expect to make in the next few years?

Quarter	New hires (#)	Confidence (%)
2023/24		
Q1:		
Q2:		
Q3:		

Q4:		
2024/25		
Q1:		
Q2:		
Q3:		
Q4:		

Comments or examples:

10. Have any early career workers (i.e. under 25) been involved in your project within your organisation?

☐ Yes If *yes*, proceed to **question a**	☐ No if *no*, proceed to **question 11**

a. What is the Full Time Equivalent (FTE) and role(s)? Are they UK-based?

11. Please indicate the extent to which you agree with the following statements regarding skills development in the context of your IBF project?

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	N/A
'New or enhanced project management tools or processes have been developed'	☐	☐	☐	☐	☐	☐
'New project management	☐	☐	☐	☐	☐	☐

skills to manage international partnerships have been developed'						
'Understanding and processes relating to export legislation, regulation and practicalities have been improved'	☐	☐	☐	☐	☐	☐
'Our technical skills (e.g., software or data science skills) have been improved or developed'	☐	☐	☐	☐	☐	☐

Please provide comments or examples:

UK competitiveness and reputation

12. Please indicate the extent to which you agree with the following statements regarding competitiveness, reputation and partnerships in the context of your IBF project?

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	N/A
'Our reputation and leadership within relevant sub-sectors has increased.'	☐	☐	☐	☐	☐	☐
'Our competitiveness has improved.'	☐	☐	☐	☐	☐	☐

'The strength of our international partnerships has increased.'	☐	☐	☐	☐	☐	☐
'The strength of our UK partnerships has increased.'	☐	☐	☐	☐	☐	☐
'The international reputation of the UK space sector has increased.'	☐	☐	☐	☐	☐	☐

Please provide comments or examples:

Capturing market share

13. Has your organisation generated any additional revenue from goods or services developed through IBF?

☐ Yes If *yes*, proceed to **question a**	☐ No if *no*, proceed to **question 14**

a. Additional revenue generated from goods or services (total £)

Note: 2024/25 refers to April 2024 to March 2025 etc.

Quarter	Additional revenue (£)
2023/24	
Q1:	
Q2:	
Q3:	
Q4:	
2024/25	
Q1:	

Q2:	
Q3:	
Q4:	

Comments:

14. Do you expect to generate additional revenues in future as a result of IBF?

☐ Yes If *yes*, proceed to **question a**	☐ No if *no*, proceed to the end of the survey

a. How much additional revenue do you expect to generate in the next few years (total £)?

Year	Additional revenue (£)	Confidence (%)
2025/26		
2026/27		
2027/28		
Beyond 2027/28		

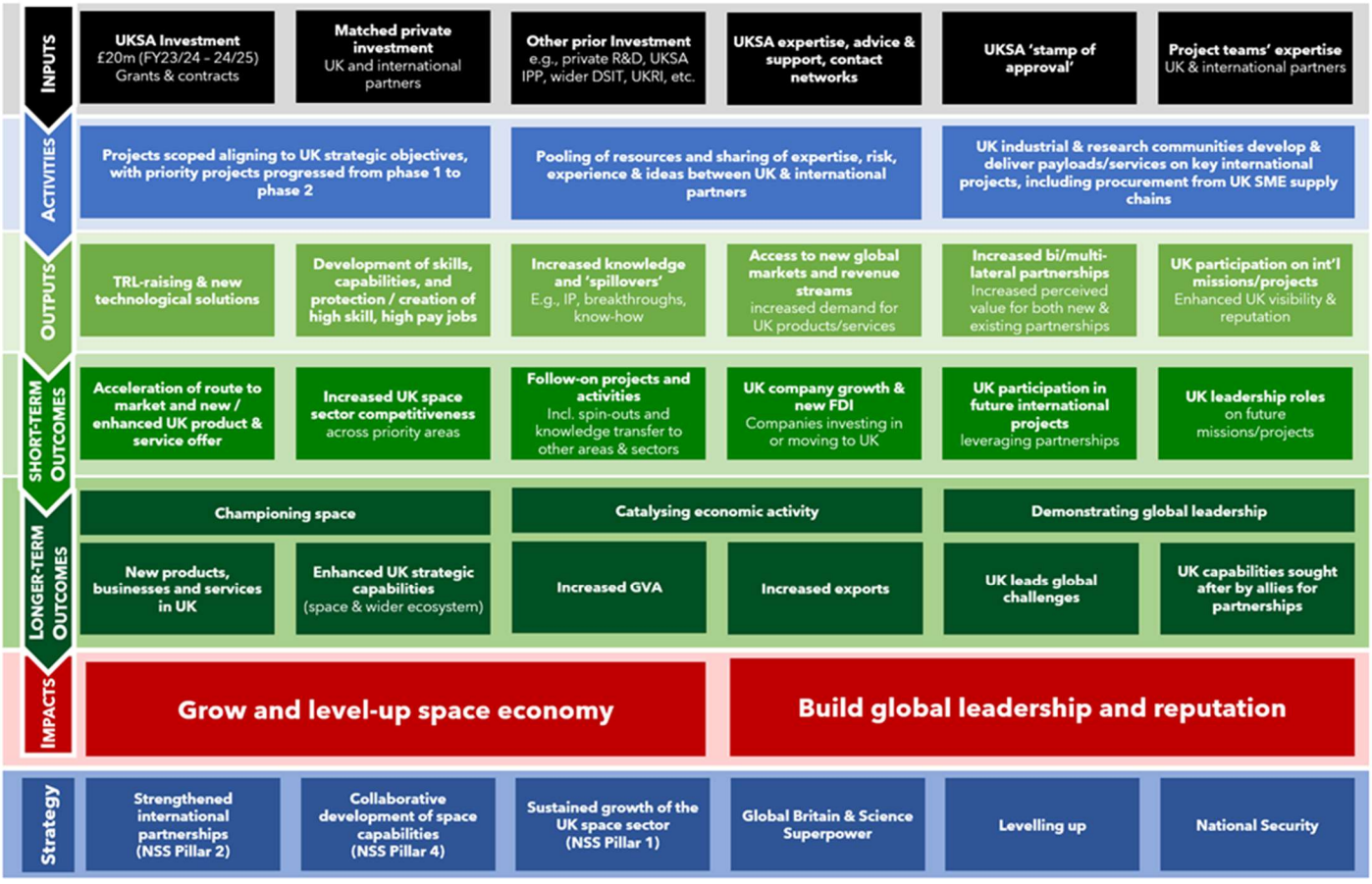
Comments or examples:

Thank you for completing our survey! Please save your responses and send back the completed document to **know.**space.

A5 Theory of Change

We developed a logic model to capture the sequence of events associated with IBF, which has been iterated throughout the evaluation process to include insight from stakeholder engagement and other activities since the inception report. We included the anticipated causal pathways to impact, through inputs, activities, outputs, short- and long-term outcomes, and impacts, as well as relevance to strategic areas across government.

Logic model



When developing the theory of change, we also further outlined the **assumptions, enablers, barriers and external drivers** that may influence the outcomes emerging from the IBF programme. We have provided a table including the key considerations below, developed in this data monitoring framework design stage. This table has helped to inform the evaluations across Phase 1, Phase 2, and Direct Awards.

Assumptions, enablers, barriers, and external drivers

	Inputs & Activities	Outputs	Outcomes	Impacts
Assumptions	• Organisations would not have secured the same investment via other means • Relevant expertise within the project team • Project activities unfold as envisaged in applications forms, including to time, budget and scope • There is successful coordination between actors	• There are sufficient resources and funding to catalyse new activity • New opportunities lead to new interest, investment and entrants, including from overseas • There is capacity to disseminate new/better products & services • There is interest in UK investment from overseas	• Solutions are aligned to market need and demand • Alignment with original strategic objectives • International customers and collaborators willing and able to engage with UK space sector and supply chain • UK organisations in wider sector and beyond adopt and use new solutions • Capacity to market and disseminate new / improved products & services	• No wider barriers to adoption in sector and non-space • Information and knowledge is shared widely to facilitate wider rollout • Companies have scale-up motivation and ability • Process exists to feed new knowledge back into decision making process
Enablers	• Knowledge-sharing activities • Proactive management & communication between partners • Good overall governance & project mgmt., including risk management • Availability of staff with necessary skills	• Availability of staff with necessary skills • Knowledge-sharing activities • Scale-up and / or investment-readiness by involved actors • Easy supply chain / sector access for non-UK firms & organisations	• Availability of staff with necessary skills • Supporting activities translate outputs to wider rollout • Common standards (where relevant) • Effective processes / structures for wider community engagement, including internationally	• Willingness from organisations to innovate • Support for rollout • Effective communication of outcomes to wider stakeholders
Barriers	• An understanding that activity would have happened anyway • Poor programme management and governance • Insufficient skills and resource to deliver expected activities to time and quality	• Tension between desire for IP protection and effective knowledge transfer • Skills shortages • Insufficient funding to achieve aims • Investment not materialising, or materialising with delay	• Niche solutions may have limited wider rollout potential • Investor community / wider sector not interested in offer • Insufficient activity to support and catalyse wider uptake • Lack of business growth & marketing skills to push uptake of solution / service	• Barriers to adoption processes in wider sector(s), e.g., attitudes, skills/capabilities, finances, risk aversion, ability to integrate, digital infrastructure • 'Silo' nature of activity leads to poor knowledge-sharing
External Drivers	• Economic conditions (in the UK, for international partners) • Local conditions (e.g. infrastructure) • Supportive local and national governance ensuring favourable environment for research and innovation	• Trends in space sector and investor community • Skills availability	• Economic conditions / ability to invest • External shocks, e.g. lack of trade agreements, inability to travel to a country	• Political, regulatory and economic drivers in the sector, and beyond

A6 RAG-rating scale

To evaluate the success of the IBF programme in addressing our questions, we developed a five-tiered RAG (red, amber, green) system.

Colour rating	Description
Dark Green (DK) Fully Addressed	• Clear evidence that the programme effectively considers and responds to relevant factors. • Impact / processes and actions align well with expectations, showing consistent delivery.
Green (G) Mostly Addressed	• The programme addresses key aspects, though some areas may need further attention. • There's general alignment with expectations, with minor gaps.
Amber (A) Partially Addressed	• Some consideration is evident, but actions are inconsistent or incomplete. • Certain aspects align with expectations, while others are lacking.
Light Red (LR) Minimally Addressed	• Limited evidence of consideration or action, with noticeable gaps. • Alignment with expectations is weak and requires significant improvement.
Red (R) Not Addressed	• No clear evidence that relevant factors have been considered or addressed. • Impacts, processes and outcomes show little to no alignment with expectations.

... now you **know.**