

*July, 2023*

# Evaluation of the Fund for International Collaboration (FIC)

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Interim Impact Evaluation Report



Final Report

*July, 2023*

## **Evaluation of the Fund for International Collaboration (FIC)**

### **Interim Impact Evaluation Report**

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**Note to draft report:**

The Department for Business, Energy and Industrial Strategy (BEIS) was dissolved on 7 February 2023, with its functions split into three new departments. Responsibility for R&I passed to the newly created Department for Science, Innovation and Technology (DSIT). The report refers to BEIS, as the department responsible at the time.



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## Executive Summary

**The Fund for International Collaboration (FIC)** is a £160m UK Research and Innovation (UKRI) fund to develop strategic partnerships with global research and innovation (R&I) leaders and address a key gap in the national R&I funding portfolio. Its **high-level objectives** are:

1. To enable UK researchers and innovators to collaborate with the best international partners, to carry out world-leading research and innovation which delivers new knowledge and societal and economic impact to the mutual benefit of the UK and partner countries.
2. To support wider Government objectives, including science diplomacy, enabling the UK to strengthen its collective voice in research and innovation policy.

The Fund has awarded £160m to 37 programmes. These are then being implemented by UKRI councils, in various combinations, and in collaboration with overseas funding agencies from 26 different countries. As of December 2022, 596 grants and innovation projects had been awarded by these FIC programmes, alongside several other investments (e.g. in infrastructure).

UKRI has commissioned Technopolis to undertake an **evaluation of FIC**. The aims of this exercise are: (i) to inform ongoing and future improvements to the Fund, in order to maximise the value of public funding, (ii) to demonstrate what the Fund has delivered for taxpayers, and (iii) to help UKRI build the evidence base on “what works” in internationally collaborative R&I.

The evaluation is asked to consider **three broad themes** to address the aims of the evaluation and to understand how effectively FIC has met its objectives:

- **Theme 1: Enabling funding.** Reducing the barriers for accessing and applying for international collaboration R&I funding.
- **Theme 2: Developing partnerships.** Enabling, strengthening, deepening, and broadening relationships: within the UK and internationally; at all levels (funders, institutions, individuals); and both within and beyond FIC.
- **Theme 3: Deepening R&I.** Supporting R&I within new and existing areas of strategic importance across the UKRI international portfolio.

For each theme, and in line with our FIC Theory of Change, we covered **effects at two levels**:



- Tier 1: At the level of programmes and funders (UK councils and their equivalents overseas)
- Tier 2: At the level of projects and participants (researchers and innovators)


The study is taking place in four phases, over the period from 2020 to 2025. This report represents the main output from the third phase, **the interim impact evaluation**.

The report draws on a mix of methods and evidence sources, including: bibliometrics; analysis of secondary data sources; consultation with 54 stakeholders via interview; a survey of the UK leads for 31 of the 37 FIC programmes; surveys of 484 successful and unsuccessful UK applicants to FIC programmes, as well as international participants in UK-led grants; and the development of a series of 7 in-depth case studies that focus on the UK's evolving relationships with international funders across different priority countries that have partnered in FIC programmes.


The figure below presents **headline findings** on the interim progress of FIC in relation to its two main objectives and three headline themes. We find strong evidence that FIC is meeting its two high level objectives. For Objective 1 we find positive evidence of progress towards two themes in particular (enabling funding and developing partnerships). Progress towards deepening R&I (Theme 3) is more evident in the area of international research/ publications, with more mixed results for other R&I outputs. There is also evidence of FIC contributions to supporting international collaboration more widely and science diplomacy (Objective 2).

Figure 1 Key findings on progress to impact

Objective 1	Findings	
<b>Q. To what extent (and how) has FIC enabled collaboration between the UK and the best international R&amp;I partners?</b>		
 <b>Theme 1: Enabling funding</b>	<b>Funders &amp; Programmes</b>	<ul style="list-style-type: none"> <li>• With a budget of £160m, <b>FIC has increased the pool of resources made available via UKRI to conduct projects with international partners.</b> Nearly 600 grants and innovation projects have been awarded by FIC programmes, alongside several other investments (e.g. in infrastructure). (See Section <a href="#">2.1</a>)</li> <li>• As was recognised in the original business case, <b>FIC resources are relatively small in comparison with pre-existing investments made by UKRI</b> for international collaboration with FIC's priority countries (~3% of grant value, 2019-21). However, the Fund's main added value is more a matter of focus than scale, as it is aimed at enhancing funder level relationships that are more strategic and longer lasting. (See Section <a href="#">2.1</a>)</li> <li>• <b>FIC has successfully attracted additional resources</b> to fund international collaboration in research and innovation (R&amp;I). In addition to UKRI's £160m investment, FIC has attracted £208m from programme partners and leveraged £35m through individual projects. (See Section <a href="#">2.2</a>)</li> </ul>
	<b>Projects &amp; Participants</b>	<ul style="list-style-type: none"> <li>• The majority of FIC participants (59%) state via survey that <b>the international collaboration projects supported by FIC would not have gone ahead without the Fund</b> or would have gone ahead but with fewer or no international partners (18%). Similar responses are obtained from unsuccessful applicants (See Section <a href="#">2.1</a>)</li> </ul>
 <b>Theme 2: Developing partnerships</b>	<b>Funders &amp; Programmes</b>	<ul style="list-style-type: none"> <li>• <b>FIC has strengthened partnerships between participating UK and overseas funders</b>, both within FIC programmes and then beyond, demonstrating that successful international collaboration is built over time. Most UK programme leads report significant improvements in mutual understanding and alignment with their overseas FIC partners, as well in their ability to identify strategic opportunities for future collaboration. (See Section <a href="#">3.1</a>)</li> <li>• <b>The highest added value of FIC has been among partnerships that were relatively new</b> (e.g. with particular funders in Canada and Singapore) and where FIC has provided a substantial (funded) opportunity to collaborate. (See Section <a href="#">3.1</a>)</li> <li>• <b>Some funders have already taken concrete actions to carry forward collaborations with their FIC partners (but beyond FIC)</b>, with several examples of new agreements in place and joint programmes under development with priority countries. (See Section <a href="#">3.2</a>)</li> <li>• However, <b>in other cases sustainability is less clear</b>, in large part due to the uncertainty around dedicated UKRI funding to collaborate with those countries. Opportunities for collaboration have been identified that could not (yet) be taken forward. [Fieldwork took place in 2022, before the announcement of the new International Science Partnerships Fund (ISPF) to support international R&amp;I collaboration]. (See Section <a href="#">3.3</a>)</li> <li>• Most FIC programmes (21 of 37) also involve more than one UKRI council. Feedback from programme leads and wider stakeholders suggests that this has supported a more collaborative approach to idea development and commonly led to <b>improvements in cross-council understanding</b> of priorities, agendas, cultures, and ways of working. (See Section <a href="#">3.4</a>)</li> </ul>


 <p><b>Theme 2: Developing partnerships</b></p>	<p><b>Projects &amp; Participants</b></p>	<ul style="list-style-type: none"> <li>• Through FIC-supported projects, <b>UK participants have reported an increase in their ability to access knowledge, facilities, and sources of funding</b> overseas, while also improving their skills and capabilities to work internationally. These were all areas identified at the baseline phase as being strong motivators for applying for FIC funding. (See Section <a href="#">4.1</a>)</li> <li>• UK participants reported that <b>~60% of FIC project partners were from overseas, with the majority of collaborations being new (77%)</b> based on Researchfish data. All of those surveyed reported that this had led to a better understanding of their partners' capabilities. Most also reported improved understanding of their partners' research agendas, priorities and ways of working. (See Sections <a href="#">4.2</a> and <a href="#">4.3</a>)</li> <li>• Where FIC projects have ended (less than half at this stage), <b>the majority (84%) of UK participants have been able to continue their relationship with overseas partners through further grants</b> (twice the rate reported amongst unsuccessful FIC applicants). (See Section <a href="#">4.4</a>)</li> </ul>
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**Q. To what extent (and how) has FIC delivered knowledge impact, economic impact (for the UK and high performing R&I nations) and societal impact?**

 <p><b>Theme 3: Deepening R&amp;I</b></p>	<p><b>Projects &amp; Participants</b></p>	<ul style="list-style-type: none"> <li>• <b>Most FIC projects are still ongoing</b>, with half having experienced delays to their original timetable. However, they report good progress, with three quarters on track to achieve their original objectives. (See Section <a href="#">5.1</a>)</li> <li>• Already <b>over 300 publications have emerged from FIC projects</b>. The rate of publications per £m invested, is nearly double that seen from other UKRI grants involving FIC priority countries over the same period. While most UK participants already co-published internationally before FIC, the Fund has clearly had a positive effect on increasing that degree of collaboration (while not replacing pre-existing levels of activity). (See Section <a href="#">5.2</a>)</li> <li>• <b>It is too early to observe the scientific impact of FIC publications.</b></li> <li>• <b>FIC projects have also started to produce other R&amp;I outputs</b>, particularly new research tools and methods or research databases and models. However, for many projects it is too early to have a full view. (See Section <a href="#">5.3</a>)</li> <li>• <b>FIC projects report good progress (so far) along Technology Readiness Levels (TRLs)</b>, where this is appropriate. Finished projects have advanced nearly 2 TRLs on average since the time of application (compared with 0.6 TRLs progress for unsuccessful FIC applicants over the same period).</li> <li>• <b>The number of FIC projects reaching high TRLs (8-9) is small</b> and there are few examples yet of commercial exploitation. (See Section <a href="#">5.4</a>)</li> </ul>
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Objective 2	Findings
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**Q. To what extent (and how) has FIC strengthened the UK's collective voice in R&I policy?**

	<p><b>Funders &amp; Programmes</b></p>	<p><b>Evidence emerging from funder level case studies</b> (at both the baseline and interim impact stages) <b>showcases that FIC is delivering on this objective</b> by:</p> <ul style="list-style-type: none"> <li>• Acting as a platform to systematically identify joint opportunities &amp; capabilities, and strategic areas of collaboration between funders.</li> <li>• Providing an opportunity to increase (or sustain) awareness of the UK as a potential partner.</li> <li>• Providing funding to fulfil / follow on from common aspirations / political commitments.</li> <li>• Supporting further diplomatic efforts.</li> <li>• Leveraging and adding value to other initiatives to support R&amp;I collaboration (in particular the UK Science &amp; Innovation Network, SIN). (See Section <a href="#">6.1</a>)</li> </ul>
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# 1 The evaluation of the Fund for International Collaboration (FIC)

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## 1.1 The Fund

The Fund for International Collaboration (FIC) is a UK Research and Innovation (UKRI) fund that aims to enable the development of strategic partnerships with global R&D leaders and address a key gap in the national research and innovation (R&I) funding portfolio. It sits alongside other cross-UKRI funds and forms part of a package of measures to maintain the UK's global R&D leadership and thereby deliver against the ambitions of the 2017 Industrial Strategy<sup>1</sup>.

FIC was established to serve as a facilitator and enabler of international R&I collaboration, providing long term funding to UKRI councils in order to advance, enhance or expand their international cooperation activities. Its **high-level objectives** are:

1. To enable UK researchers and innovators to collaborate with the best international partners, to carry out world-leading research and innovation which delivers new knowledge and societal and economic impact to the mutual benefit of the UK and partner countries.
2. To support Department for Business, Energy and Industrial Strategy (BEIS, as was) and wider Government objectives, including science diplomacy, enabling the UK to strengthen its collective voice in research and innovation policy.

The Fund emerged in recognition of the importance of supporting internationally collaborative R&I, and the desire to offer funding for collaboration with particular geographies that were not explicitly covered by other UKRI initiatives. As stated in its original Business Case, FIC was intended to complement existing UKRI funds for international partnerships, the Newton Fund and Grand Challenges Research Fund, which were constrained by being Official Development Assistance. It would provide a dedicated UKRI funding mechanism to support partnerships with countries like the US, Israel, or Japan (and support non-ODA eligible activities with China and India). It would not replace or replicate the UK's participation in EU programmes, but rather welcome programmes that include partners from EU Member States and associated countries.

The FIC business case notes that (with a budget of £160m) the Fund would not represent a significant change in the public R&D funding available in the UK, noting that "the research councils spent over £1.1bn on international activities in 2016/17 alone". Similarly, it would not represent a shift in the way that international collaborations are pursued in the UK: "UKRI councils, universities and businesses will still seek new opportunities using existing allocations. Rather, the fund will seek to build off existing strengths and address a clear gap in the research funding landscape where there is no non-ODA funding administered at the system-wide level."

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<sup>1</sup> The Industrial Strategy has since been superseded by the UK Science and Technology Framework (March 2023), in which investment in R&D and the development of international partnerships remain key strands for the achievement of UK's ambition to become a Science and Technology Superpower by 2030.

## 1.2 Study objectives and phases




UKRI commissioned Technopolis to undertake an evaluation of FIC. The aims are: (i) to inform ongoing and future improvements to the Fund, in order to maximise the value of public funding; (ii) to demonstrate what the Fund has delivered for taxpayers; and (iii) to help UKRI build the evidence base on “what works” in internationally collaborative R&I.

The study is taking place in four phases, over the period from June 2020 to January 2025. The planning phase concluded with the delivery of an Evaluation Framework report (December 2020), while the baseline and interim process evaluation phase reported in October 2021. The current report presents the results of the third phase, the interim impact evaluation.

A series of **evaluation questions** were developed for the study, with the FIC objectives and the aims of the Fund in mind. For the impact evaluation, there are three key questions, which require assessment of the extent to which (and how and why/not) FIC has delivered across each of the main areas of intended impact: (i) enabling collaboration between the UK and the best international partners; (ii) delivering knowledge, economic and societal impact; and (iii) strengthening the UK’s voice in international R&I policy. In addition, there are several supplementary areas of investigation, which include: unintended outcomes and impacts; the effectiveness of the approach to supporting internationally collaborative R&I; and if/how FIC has provided insight to support the targeting of future international collaboration.

To address the aims of the evaluation and to understand how effectively FIC has met its high-level objectives, the evaluation is also asked to consider three broad **themes**. These are shown in Figure 2, alongside the FIC objectives and headline impact evaluation questions.

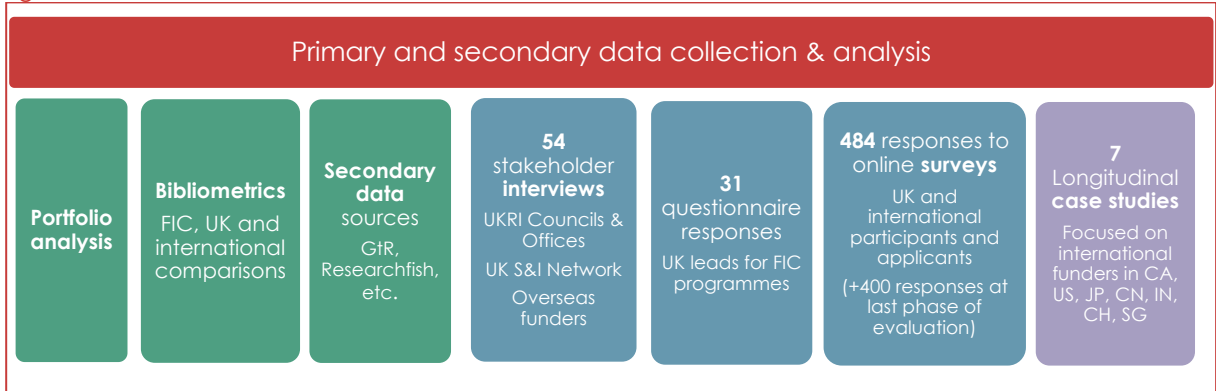
Figure 2 FIC objectives, themes, and key evaluation questions

<p><b>FIC Objective 1: To enable UK researchers and innovators to collaborate with the best international partners, to carry out world-leading research and innovation which delivers new knowledge, and societal and economic impact to the mutual benefit of the UK and partner countries.</b></p>		
<p><u>Impact Evaluation Questions</u> To what extent (and how) has FIC enabled collaboration between the UK and the best international R&amp;I partners?</p>		<p><b>Theme 1: Enabling funding</b> – Reducing the barriers for accessing and applying for international collaboration R&amp;I funding.</p>
		<p><b>Theme 2: Developing partnerships</b> – Enabling, strengthening, deepening and broadening relationships: within the UK and internationally; at all levels (funders, institutions, individuals); and both within and beyond FIC.</p>
		<p><b>Theme 3: Deepening R&amp;I</b> – Supporting R&amp;I within new and existing areas of strategic importance across the UKRI international portfolio.</p>
<p><b>FIC Objective 2: To support Department for Business, Energy and Industrial Strategy (BEIS) and wider Government objectives, including science diplomacy, enabling the UK to strengthen its collective voice in research and innovation policy.</b></p>		
<p>To what extent (and how) has FIC strengthened the UK’s collective voice in R&amp;I policy?</p>		

### 1.3 A mixed methods approach grounded in a Theory of Change

The interim evaluation is based on six main groups of data collection and analysis activities (see Figure 3). These activities took place between May 2022 and February 2023. Key aspects of the methodology are further explained below.

Figure 3 Evaluation methods



A total of 54 stakeholders have been consulted via **interviews** during this interim phase, including leads for international within UKRI councils, programme leads and partners from UKRI councils, representatives for overseas funding agencies partnering in FIC programmes, representatives from UKRI international offices and members of the UK Science and Innovation Network. UK programme leads were also consulted via a written questionnaire (with responses received from 31 of the 37 FIC programmes).

A further 484 individuals have input to the study in 2022 via **surveys** (20% of the population approached). This is in addition to 400+ responses to surveys during the previous phase of the evaluation, which continue to provide important baseline information for the current report.

The evaluation is running a series of different surveys over the different phases of the study.

There are three main groups being targeted (UK participants and international participants in FIC-funded projects, plus unsuccessful applicants), with two cohorts within each (an earlier cohort that were un-/successful before March 2021 and a later cohort that were un-/successful since then). There are two different questionnaires for each group (i.e. one per cohort). Both cohorts in each group have now been asked to complete the baseline and early progress survey (Cohort 1 received this in the last phase in 2021, while Cohort 2 received this in the current phase in 2022). Cohort 1 has then also been approached for an interim survey in 2022. A final survey will be addressed to both cohorts for the final phase of the evaluation.

The following table summarises the responses (and response rates) within these different groups and cohorts to the different questionnaires. A response rate of between 19% and 28% was achieved for each of the six groups of participants. These represent good response rates, based on previous experience of surveying UKRI beneficiaries. Nevertheless, the report seeks to triangulate survey results with other sources of evidence where possible (at least at the level of themes and sub-themes assessed, if not individual indicators).

The response rates for unsuccessful applicant groups are lower than their participant equivalents. This was expected, as these individuals have not been supported by the Fund and may therefore feel less obligated or have less interest in supporting the evaluation. Response rates have also tended to fall between the baseline and interim surveys. Again, this is a normal



result, with this being a second request for input and with some individuals having moved roles (or changed contact details) and / or some projects having now finished.

Overall, the majority (89%) of respondents were affiliated to universities and public research organisations (as self-reported by respondents to the questionnaires), while 8% were from businesses and 3% were from other types of organisations. We do not hold details of the affiliation of the overall population contacted for the surveys, as UKRI is unable share information on unsuccessful applicants or participants in IUK projects. However, IUK projects (which account for nearly all business participation in FIC) make up 131 (13%) of the 1,008 UK participants that have been approached for survey during the current phase of the evaluation. Businesses are therefore likely to be slightly under-represented within the responses<sup>2</sup>.

There are 69 responses from businesses overall (across 2 cohorts, 3 groups and 2 surveys). The numbers are therefore too small to present analysis of individual questions by organisation type.

Figure 4 Summary of survey response rates, by group, cohort and questionnaire

	Population		Baseline & early progress survey	Interim survey	Final survey
UK participants Principal Investigators (PIs) and Co-Investigators (CIs) in FIC programmes	Cohort 1	636	151 (24%) In 2021	150 (24%) In 2022	-
	Cohort 2	372	102 (27%) In 2022		-
International participants in FIC programmes	Cohort 1	364	103 (28%) In 2021	84 (23%) In 2022	-
	Cohort 2	182	35 (19%) In 2022		-
Unsuccessful applicants to FIC programmes	Cohort 1	687	146 (21%) In 2021	83 (12%) In 2022	-
	Cohort 2	232	30 (13%) In 2022		-

Sub-groups of the 884 total responses are used in different parts of the analysis presented in the report, depending on their relevance. In each case, the group, cohort and survey are clearly indicated, along with the number of responses (which is sometimes less than the totals below, as not all respondents answered all questions).

Finally, a series of **longitudinal case studies** have been developed, each focusing on a specific international funder in a priority country (and on the FIC programmes in which they are collaborating with the UK). These cases explore, amongst other things, the three main themes for the FIC evaluation (how the FIC has enhanced funding, deepened R&I and strengthened partnerships at the Funder level between the UK and these partner countries).

Case development is following a longitudinal design, involving data collection (desk research and interviews) at three points in time (baseline, interim and final evaluation), enabling the study to provide early evidence, as well as illustrate dynamic aspects and change over time. Originally, five cases were being developed (each focusing on a specific funder in China, the US, Canada, India, and Japan) and a first iteration of each of these cases was summarised within and appended to the Baseline Evaluation Report (2021). For the interim evaluation (2022/23), seven case studies have been developed. This includes an updated view of the original five cases, plus a first iteration of two additional cases (each focusing on a specific funder within Singapore and Switzerland).

<sup>2</sup> The study team will discuss with UKRI how best to maximise business response rates for the next phase of evaluation, including through earlier access to relevant contact details and allowing more time for responses.



During the baseline phase of the evaluation, the case studies proved very useful in demonstrating in more depth particular examples of the findings emerging from elsewhere, offering deep dives into programme level evidence (where there are no programme level evaluations planned). Covering additional funders and countries (through two additional cases) would therefore expand this knowledge base and provide additional examples and insight to draw upon in the analysis.

The case studies are presented in full in the Appendices accompanying this report.

Our approach also includes quantitative and qualitative methods to assess the **additionality and deadweight of the Fund (counterfactual analysis)** to explore:

- What FIC offers that is different from other activities to support international R&I collaboration.
- How outputs and outcomes emerging from FIC programmes and projects compare with a counterfactual scenario, either in a qualitative way (via analysis of results enabled by FIC that would not have been possible by other means) or in a quantitative way (presenting comparisons with benchmarks or control groups whenever possible or relevant).
- How outputs and outcomes emerging from FIC programmes and projects compare with other government interventions, in particular with respect to other UKRI programmes/grants in general and those that include international collaboration.

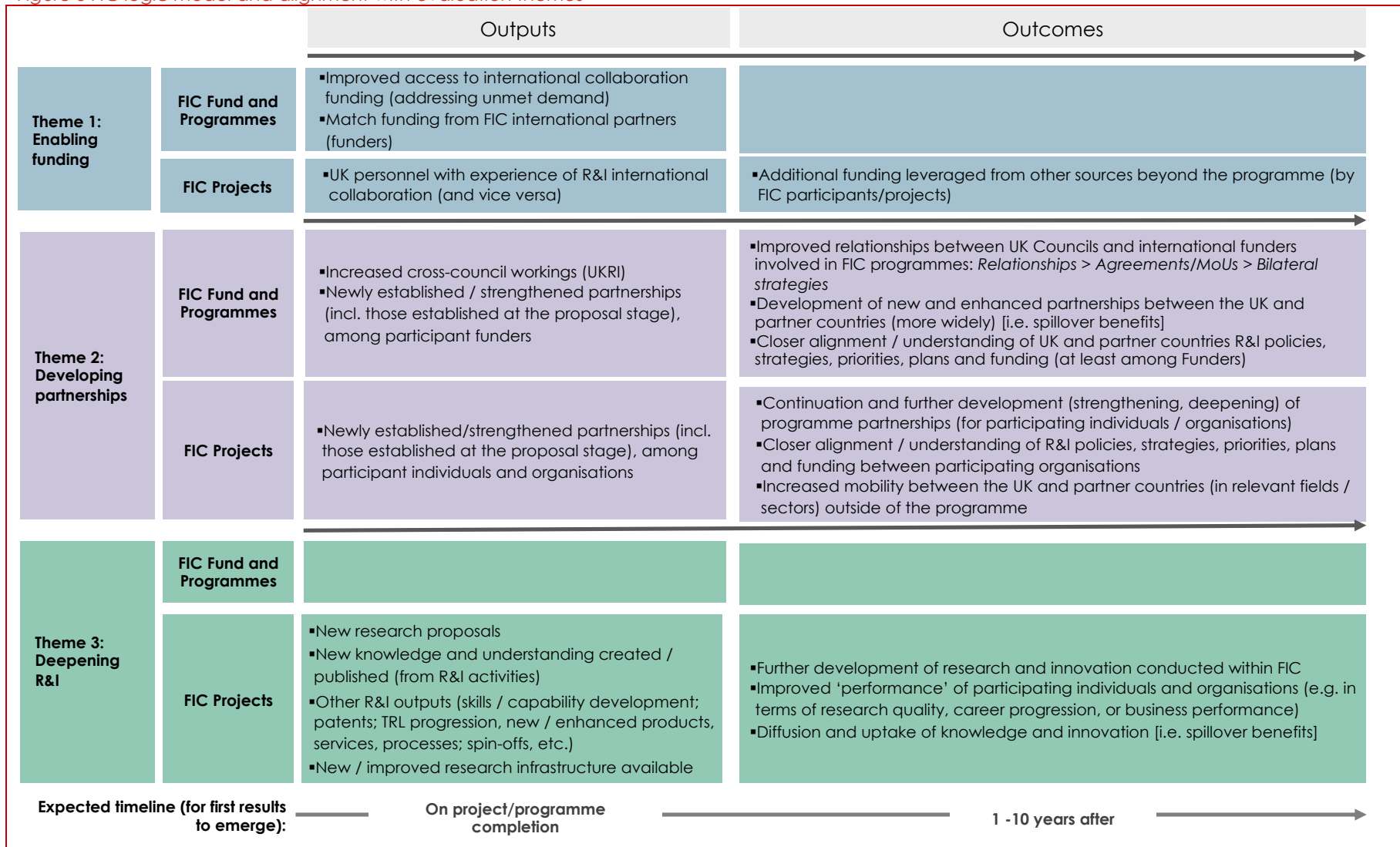
In line with this approach, our analysis focuses on what FIC has delivered in comparison with other means of supporting international R&I collaboration (i.e. Business as Usual). It does not draw comparisons with other specific programmes, since we concluded during the scoping stage of the evaluation (and in the resulting Evaluation Framework report) that there were no appropriate comparators (programmes) for FIC in the UK or internationally. Additionally, comparisons with programmes supporting national collaborations were not deemed appropriate given that, by nature, they are different in scope. Finally, the study does not explore, in a systematic way, what the results would be of delivering FIC in a different way (e.g. different budget or different countries in scope), as this would require a full 'options appraisal' (which is beyond the scope of this evaluation).

The evaluation has been guided by a Theory of Change (ToC) developed for the programme. This is a programme theory that explains how an intervention is expected to produce its results. It has a logic model as a starting point, which sets out how the various inputs and activities of FIC are expected to result in a series of outputs, which then lead to a series of intended outcomes, which in turn contribute to wider and longer-term impacts.

The logic model (see Figure 5) follows a two-tier structure, to distinguish between the activities, outputs and outcomes of the Fund and its programmes, and those of the individual FIC projects. This version also shows alignment with the main themes guiding the evaluation. The focus of the evaluation is Fund-level results. However, some key results of the Fund will materialise at project level, and so the evaluation will also collect evidence in this second tier.



Figure 5 FIC logic model and alignment with evaluation themes



## 2 Enabling funding (Theme 1)

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Our 2018 study for BEIS on the main drivers and barriers to international collaboration identified that there was demand in the UK to do more collaboration with strategic partner countries, but that individual research organisations and businesses do less than they would wish to because of a number of different types of barriers and transaction costs, including principally financial barriers and internal resource constraints, but also availability of collaboration frameworks and information about partners, as well as issues related to mobility and recruitment.<sup>3</sup> This was confirmed at the baseline stage of the FIC evaluation, where financial considerations, the existence of collaboration frameworks, and information about overseas markets and actors appeared as the top 3 barriers reported by UK participants in FIC programmes<sup>4</sup>.

Our 2018 report to BEIS also identified at least three areas where the government could influence and facilitate international collaboration: improving the frameworks for international collaboration; further funding for collaborative R&I; and improved information about international programmes and potential partners. FIC seeks to tackle all these areas (to some extent), including by reducing the barriers to accessing and applying for international R&I funding. This section presents evidence of progress and achievement in relation to this theme.

### 2.1 FIC has increased the funding available in the UK to conduct research with key priority countries, but to a limited extent

**With a budget of £160m, FIC has increased the pool of resources made available via UKRI to conduct projects with international partners.** As of December 2022, 596 grants and innovation projects with a total value of £110m had been awarded by FIC programmes, alongside several other investments (e.g. in infrastructure).

The evaluation has found that many of the projects that have been supported are unlikely to have gone ahead, at least with international collaborators, were it not for the Fund:

- Over half of UK participants in FIC programmes (59% of 253 respondents from cohorts 1 & 2) stated via the baseline survey that they would not have continued with their project idea at all in the absence of FIC funding. Another 18% said that they would likely have continued with their project through other means, but with fewer or no international partners.
- In line with this, 60% of 176 unsuccessful applicants (cohorts 1 & 2 consulted through baseline surveys) reported (shortly after being unsuccessful) that they had not continued with the project ideas proposed to a FIC programme, while 12% had carried on with fewer or no international partners. When we followed-up with cohort 1 unsuccessful applicants ~1 year later, 54% (of 89) still reported that they had not continued with their FIC project idea at all.

These results show the importance of FIC funding to pursue the ideas put forward by applicants, and that suitable alternative sources of funding were not identified in many cases. This aligns with evidence presented in the FIC business case that “there were over 700 international project proposals put to the UKRI councils in 2016/17 that met the quality threshold but were not funded due to limited budgets... [demonstrating] a large excess of demand.”

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<sup>3</sup> Technopolis (2018) Drivers and Barriers for Collaboration, prepared for BEIS (not published yet).

<sup>4</sup> Based on the baseline survey of UK participants, cohort 1. More recent participants (cohort 2) pointed to the same three top barriers, alongside internal resources (i.e. internal resources and skills to establish international cooperation) in their baseline survey.





**FIC resources are relatively small, however, in comparison with pre-existing investments made by UKRI** in relation to priority countries (reflecting expectations established in the business case).

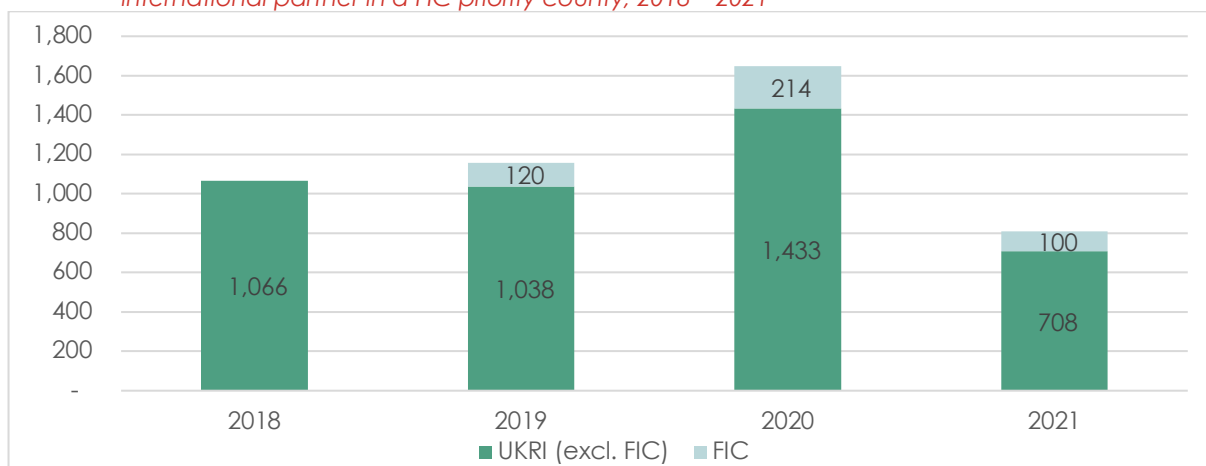
FIC focuses on collaboration with global R&D leaders. UKRI (in consultation with BEIS) identified a list of key target partner countries<sup>5</sup>, which then guided programme development and selection for FIC. The resulting portfolio of 37 programmes involve partners from across 26 different countries, but they all include at least one of the 13 “priority countries”.

As shown in Figure 6 and Figure 7, in the three-year period 2019 to 2021, UKRI (excluding FIC) awarded a total of £2.8bn to 3,179 projects with the participation of at least one partner from a FIC priority country (as reported in the grant information in GtR). In the same period FIC awarded £95.6m to 434 projects<sup>6</sup> (3% and 14% of the UKRI figures respectively). This is a reflection of the size of the FIC investment, but also of the UK research and innovation system (and its active participation in international collaboration). It is also important to note that the level and intensity of collaboration with FIC priority countries will vary. In particular, it is likely that some wider UKRI grants will have only limited priority country involvement within wider consortia.

The average value of FIC grants is also considerably lower than the average value of UKRI grants with FIC priority countries (£220k versus £861k, 2019-2021). This reflects in part the features of certain programmes within the FIC portfolio (e.g. the UK-Canada Globalink PhD exchange Scheme, which has awarded over 150 grants, mostly of £5k to £15k) or intentions to support initial engagements that could help to cement future collaboration (e.g. AHRC partnership development and networking grants).

Despite the relatively small investment made through FIC, however, the data does show that since 2019 the Fund has added resources to a declining pool of funding available for collaboration with FIC priority countries.

*Figure 6 Number of FIC grants and number of UKRI grants (excluding FIC) with at least one (named) international partner in a FIC priority country, 2018 – 2021*



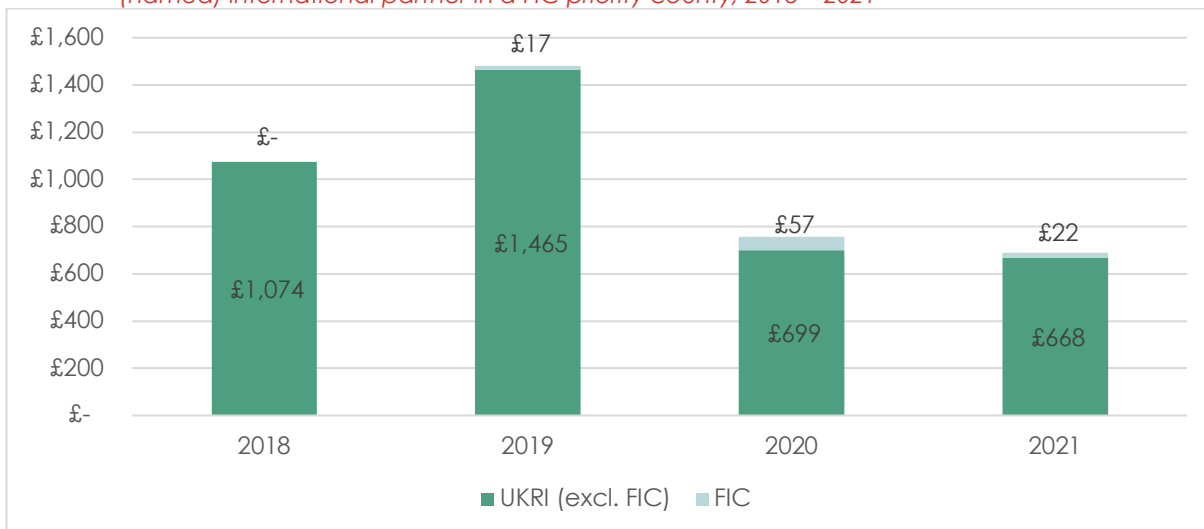
Source: GtR. Based on start year. Excludes FIC programmes with no grants.

<sup>5</sup> Currently: Australia, Canada, China, India, Ireland, Israel, Japan, Singapore, South Korea, Sweden, the US and EU Associated Countries (Norway and Switzerland)

<sup>6</sup> Of the 596 grants recorded in the December 2022 FIC tracker, 90 could not yet be found in Gateway to Research and are excluded from this analysis. The analysis presented in this section also excludes the most recent year (2022), as data is likely to be incomplete. There are 72 FIC grants (with a total value of £14.6m) currently found within Gateway to Research with a start year of 2022.



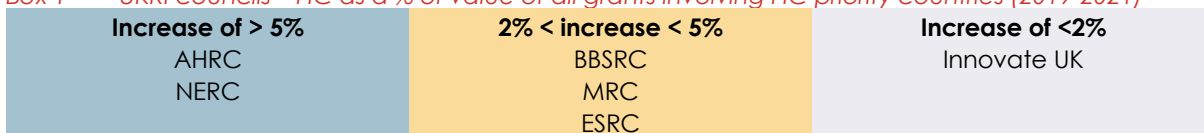
Figure 7 Value (£m) of FIC grants and value (£m) of UKRI grants (excluding FIC) with at least one (named) international partner in a FIC priority county, 2018 – 2021



Source: GtR. Based on start year. Excludes ~£40m in FIC programmes with no grants.

The additional FIC resources have most substantially increased (in relative terms) the value of grants for international collaboration with FIC priority countries for AHRC and NERC (FIC accounted for 9.9% and 5.8% respectively of the value of grants with FIC priority countries during the 2019-2021 period). The increase for BBSRC, MRC and ESRC is a little smaller, though not insignificant (between 3% and 5%), while for Innovate UK FIC accounts for just under 1% of grant value with these countries during the period.

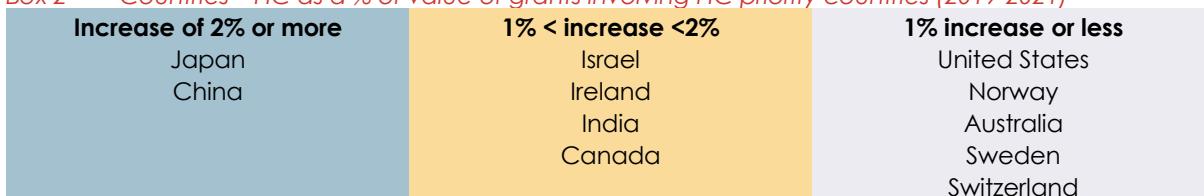
**Box 1 UKRI councils – FIC as a % of value of all grants involving FIC priority countries (2019-2021)**



Source: Technopolis (2022) based on data from GtR. Note: STFC and EPSRC not included as they have no grants issued via FIC programmes during this period recorded within GtR.

In terms of geographic spread, the Fund has meant a most substantial relative increase in resources (grant value) available for collaborations with partners located in Japan and China (2.0% and 3.6% respectively of grant value during 2019-2021 relates to FIC), with smaller increases for other FIC priority countries.

**Box 2 Countries – FIC as a % of value of grants involving FIC priority countries (2019-2021)**



Source: Technopolis (2022) based on data from GtR. Note: South Korea and Singapore not included as they have no grants issued via FIC programmes during this period recorded within GtR.



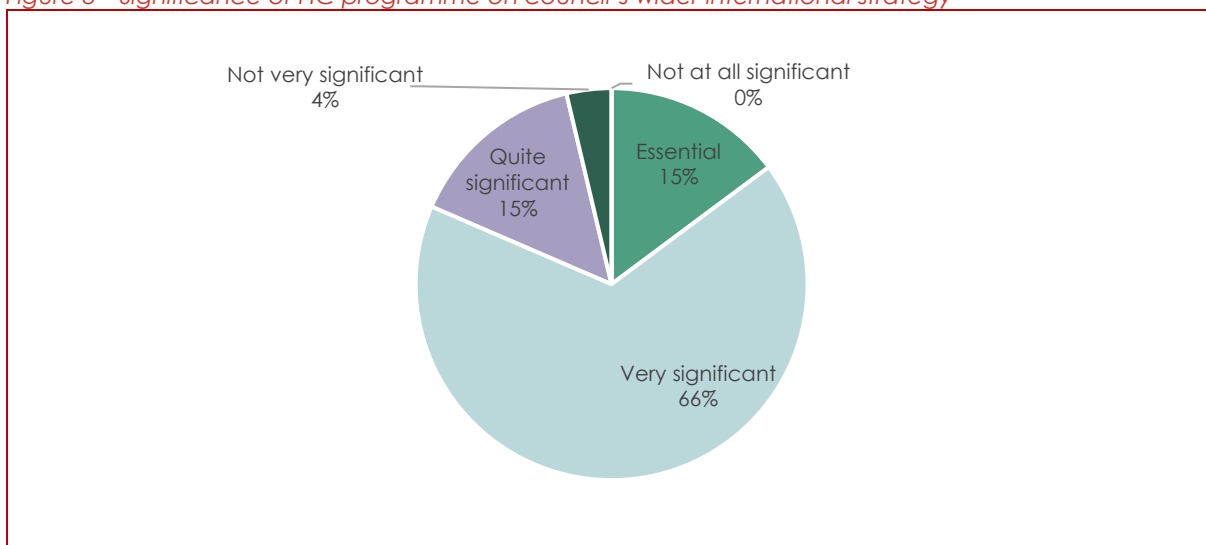
These various analyses provide evidence of the relatively small investment made through FIC, compared with wider UKRI. However, **the Fund's added value seems to be more a matter of focus than scale.**

Interviews with the International Leads from UKRI councils highlighted the fact that FIC is geared towards supporting funder level relationships, which are expected to be more strategic and long-lasting. No other UKRI fund (except Official Development Assistance Programmes) is dedicated to developing relationships at the *funder* level (i.e. between one or more UKRI councils and their counterparts abroad). This offers the opportunity to build deeper, more stable and longer-lasting relationships for UK research and innovation communities than may be possible through (bottom-up) relationships being developed amongst individual researchers and innovators. It should also enhance the ability of respective funders to steer resources (top-down) towards areas of (mutual) strategic importance.

The top-down approach means being able to provide more strategic steer to the R&I activities conducted with key partner countries, focusing on areas of common interest and potential mutual benefit (including climate change & health, healthy ageing, and business internationalisation, to name a few). As such, FIC provides the opportunity to target efforts to deliver on funder objectives, as well as identify opportunities for medium to long-term collaborations (rather than one-off or dispersed efforts), helping to initiate, consolidate, strengthen and / or expand funder-to-funder relationships. The FIC top-down approach also provides a platform for setting up frameworks to facilitate collaboration between researchers, maximising opportunities identified bottom-up (via researcher-to-researcher links). Establishing those relationships may be of growing importance in the future, as countries increase efforts to link up with international partners.

As such, FIC is a relatively small investment compared to wider UKRI expenditure on international collaboration, but it could be catalytic if it manages to solidify funder-level relationships (which are discussed in more depth under Theme 2), and if funding is available to support the opportunities identified. This is reflected in the views of the FIC programme leads, 81% of whom claimed that their FIC programme had been 'very significant' or 'essential' to their council's wider international strategy.

Figure 8 Significance of FIC programme on council's wider international strategy



Source: Programme lead survey 2022. N=27

## 2.2 FIC has successfully delivered and attracted further additional resources to fund international collaboration in research and innovation

**FIC has awarded £160m to 37 programmes** (31 via two waves of competition, plus 6 via the Strategic Opportunities Stream<sup>7</sup> or as follow-up initiatives). At bid stage, these programmes had attracted match funding commitments from overseas partners (in cash or in kind) of £223m<sup>8</sup>.

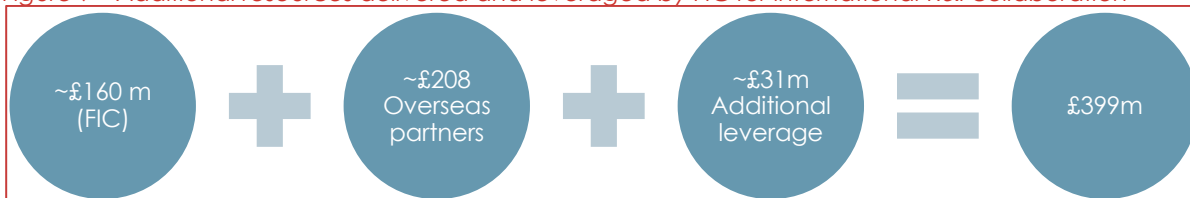
As of December 2022, there had been 57 calls and competitions by FIC programmes where awards had been made, with a total value of over £140m<sup>9</sup> (alongside a small number of other direct awards and several investments in infrastructure). Information recorded by programmes suggests that **£208m of match funding** has been awarded to active / completed grants<sup>10</sup>, although there are also other contributions (in-kind) that have not been monetised. This means that with data on 86% of programme budgets being awarded to grants/projects, the programmes have almost reached the original match funding commitments (93% of £223m).

Additionally, 32% of UK participants in FIC programmes (cohort 1, n=150) stated via the interim survey that they have **leveraged additional resources for their FIC project**, beyond the value of the grant and any match-funding required by the rules of the call. The 150 respondents reported an **average £52.5k in additional leveraged funding** per grant, which had been obtained (on average) from the following sources: 13% from their own organisation; 43% from UK-based funding sources; and 43% from Overseas funding sources.

If applied to the full portfolio of FIC projects (n=596), this would suggest **total additional leverage to FIC projects of £31.2m** (£52.5k per grant based on the survey, applied to all 596 awards). This assumes that the experiences of the 150 respondents to the survey are broadly representative.

All in all, this would mean approximately £399m in resources for international research and innovation collaboration as a result of FIC. This has increased slightly (+4%) since the last evaluation (2021), when additional resources delivered and leveraged by FIC totalled £384m.

*Figure 9 Additional resources delivered and leveraged by FIC for international R&I collaboration*



Source: FIC tracker December 2022 and interim survey of UK participants (cohort 1).

In addition, where projects have finished, the relevant UK participants (cohort 1) were asked through the interim survey whether they had secured further funding or investment afterwards to develop their project idea further (i.e. beyond FIC). One third (35% of 57 respondents) said that they had, quoting a figure of £405k on average, with 28% coming from overseas sources. Data reported in Researchfish suggests an even higher figure. Excluding one outlier (£133m in additional leverage reported by the NeuroNex project, MR/T046759/1<sup>11</sup>), 84 FIC grants have reported a total of £47m in further funding to continue or advance their research.

<sup>7</sup> A separate FIC mechanism, set up for opportunities that did not fit with the timescales of the standard waves.

<sup>8</sup> Where figures were not recorded in GBP, these were converted based on the exchange rate on 21<sup>st</sup> February 2023.

<sup>9</sup> Temporary estimate based on September 2022 FIC tracker. Updated call total values are being validated by UKRI.

<sup>10</sup> Note that the match funding figure (of £0) for one programme is still being validated by UKRI.

<sup>11</sup> The £133m relates to a large European Commission grant for a project involving 100 institutions.

### 3 Developing partnerships between funders (Theme 2)

FIC seeks to enable, strengthen, deepen, and broaden relationships: both within the UK and internationally (with the best international partners); at all levels (funders and institutions, as well as research and innovation communities); and both within and beyond FIC. In this section we explore the development of partnerships at the funder level. Section 3 then looks at the development of partnerships within projects and between individuals and teams.

#### 3.1 FIC has strengthened existing partnerships between UK and overseas funders, demonstrating that successful international collaboration is built over time

Evidence from this and the previous phase of the evaluation has shown that FIC has supported the development and strengthening of partnerships in the following ways:

The continuation of partnerships via follow-on funding into new or existing areas of collaboration

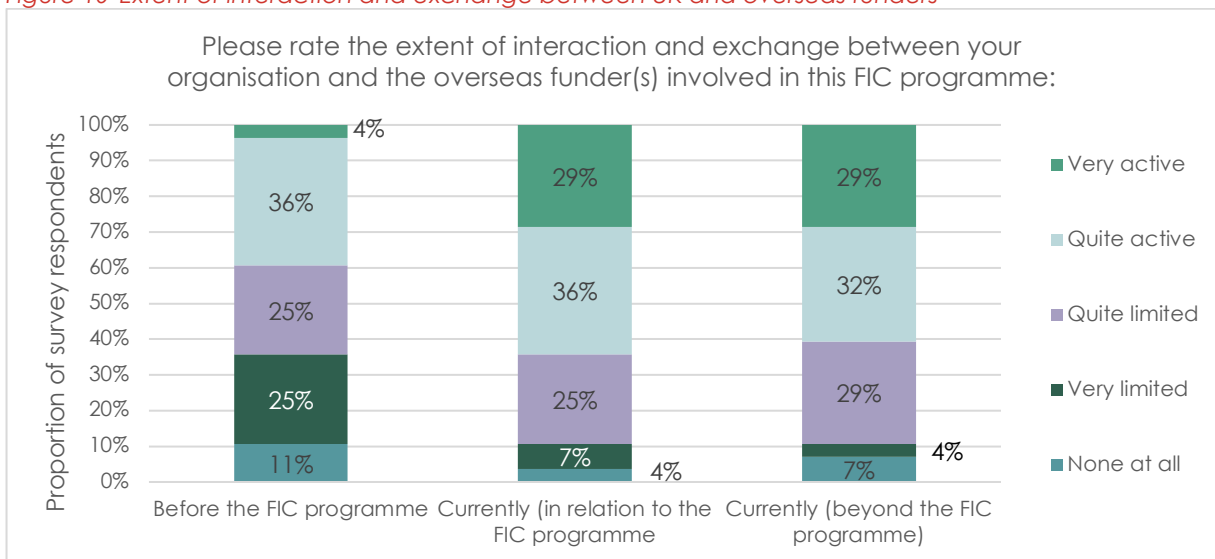
A first opportunity to have a concrete (funded) opportunity to collaborate

Bringing together organisations that had not collaborated before

In the survey of UK leads for FIC programmes that was undertaken for the interim evaluation, we sought to understand the past **level of interaction and exchange between their council and the overseas funder(s)** involved in their FIC programme. The results (see Figure 10) show a broad spread of situations across the portfolio, although it is notable that only one programme lead reported a 'very active' prior relationship with their overseas partner.

The leads were also asked to reflect on how their relationships had developed, and specifically to rate the current level of interaction and exchange with these overseas partners, both in relation to the relevant FIC programme, but also beyond this. The results show a positive shift, with around two-thirds of the leads now reporting a quite or very active level of interaction with their FIC programme partners (65% in relation to the FIC programme, 61% beyond the FIC programme), compared with 40% before FIC. Importantly, the response was similar in relation to interactions *beyond* FIC, demonstrating the importance of the Fund (and individual programmes) as a means to enable and encourage wider discussions.

Figure 10 Extent of interaction and exchange between UK and overseas funders

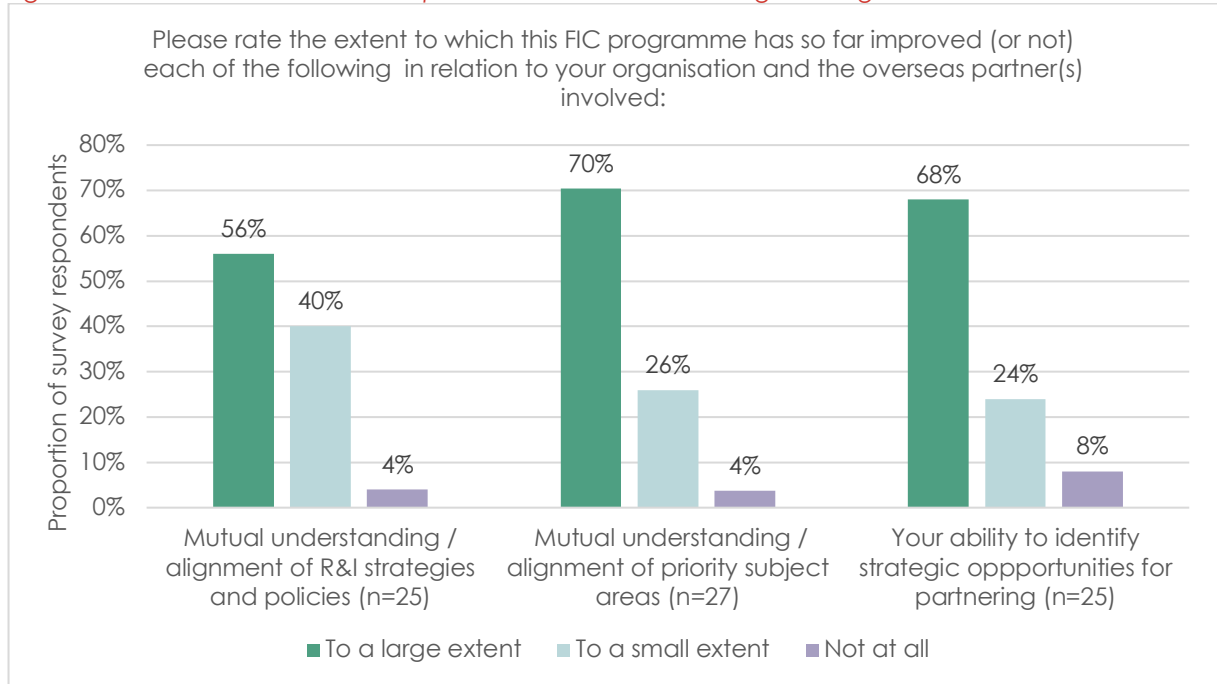


Source: Programme Lead survey, 2022. N=28. Only includes respondents providing all 3 ratings.



We also asked the UK programme leads specifically about three areas of understanding and alignment with their overseas FIC partners, and the extent to which these had improved through their programme. The responses (see Figure 11) suggest **widespread improvements to mutual understanding and alignment** with their overseas partners, with a majority reporting a large improvement in each of the three areas shown.

Figure 11 Extent to which FIC has improved mutual understanding and alignment between funders



Source: Programme Lead survey, 2022. Number of respondents varied by question, as indicated below the relevant graph.

We have looked in more detail at a selection of the funder-to-funder relationships through a series of longitudinal case studies being developed for the evaluation, covering funders in seven different priority countries. The full cases can be found in the separate Appendix.

The table below shows an assessment of FIC's **additionality** for funder-level relationships in each case, as well as a summary of progress so far in terms of further strengthening these partnerships (which in many cases has evolved further since the last phase of the evaluation, as indicated in the final column).

This assessment demonstrates that FIC's additionality is varied and also suggests that it is often higher when the partnerships (extent of collaboration before FIC) are relatively new, as is the case in relation to funders examined in Canada and Singapore for example.

Table 1 FIC additionality in relation to the development and strengthening of funder-level partnerships

Case study	Maturity of partnership (prior to FIC)	National joint strategies	Intensity of FIC additionality	Progress so far	Change in progress so far (in comparison with the baseline)
Enterprise Singapore	<b>Relatively new</b> Started in 2019	<b>No</b>	<b>High</b> FIC funding has allowed first opportunity to collaborate (via Eureka), and test appetite for collaboration between Singaporean and UK firms. This has led to a new 3-year bilateral programme that will provide funding and continuity to FIC programmes	<ul style="list-style-type: none"> <li>New 3-year-bilateral agreement signed in 2022 to fund joint R&amp;I projects in priority areas through annual calls (one general call opened in 2022 and one sector-specific joint call (Net Zero) to be open in June 2023).</li> <li>UK-Singapore Business Forum planned for June 2023, and the next forums will alternate its host and location between countries over the next three years.</li> </ul>	Improvement
Canadian Institutes for Health Research	<b>Relatively new</b> Extent of cooperation with UK has increased gradually in recent years	<b>Yes.</b> STI MoU between BEIS and Department of Foreign Affairs, Trade and Development of Canada, 2017; High-Level Agreement between the Canada Research Coordination Committee and UKRI, 2019	<b>Medium / High</b> Limited resources to collaborate before FIC. FIC funding has provided the ability to participate in an international initiative (with various countries) with a greater overall scale of funding. Increase of 1.3% in UKRI funding with Canada (overall) due to FIC	<ul style="list-style-type: none"> <li>Increased scale and strength of the relationship.</li> <li>Aligned intergovernmental priorities.</li> <li>MRC and CIHR having ongoing discussions on timing and focus of future collaborative programmes.</li> <li>UK expected to be a key priority partner in CIHR's Internationalisation Plan.</li> <li>The Research in Climate Change Adaptation and Mitigation 5-year-joint initiative was launched in January 2023, with involvement of the UK, The Wellcome Trust, and other worldwide partners.</li> </ul>	Improvement
Japan Science and Technology Agency	<b>Relatively new</b> Extent of cooperation with UK has increased gradually in recent years	<b>No</b>	<b>Medium / High</b> Collaboration between countries is driven by FIC and the possibilities of alignment with existing priority areas for Japan. Increase of 3.6% in UKRI funding due to FIC	<ul style="list-style-type: none"> <li>Increased awareness of commonalities in their institutional and national strategic priorities around AI research.</li> <li>Confidence of partners in the continuity of their collaborative work hampered by lack of clarity of funding for future collaboration.</li> <li>ESRC, JSPS and AHRC programme on the impacts of COVID-19 launched in 2021, which has funded 10 projects.</li> </ul>	Similar to baseline



Case study	Maturity of partnership (prior to FIC)	National joint strategies	Intensity of FIC additionality	Progress so far	Change in progress so far (in comparison with the baseline)
<b>United States</b> National Science Foundation	<b>Mature</b> Long history of collaboration in supporting research through bilateral and multilateral arrangements	<b>Yes.</b> UK/USA Agreement on Scientific and Technological Cooperation (2017); UKRI-NSF MoU (2013, renewed 2018)	<b>Medium / Low</b> Enabled development of a model for collaboration at the funders' level which will facilitate the design and implementation of future joint programmes. Increase of 1% in UKRI funding due to FIC	<ul style="list-style-type: none"> <li>Consolidated model for the design and implementation of thematic collaboration programmes.</li> <li>Ongoing discussions about future calls for programme proposals involving additional NSF directorates/divisions/UKRI councils.</li> <li>Clearer understanding of research priorities of partner divisions.</li> <li>Helped identify areas of expansion for Lead Agency opportunities and streamlined operational processes.</li> </ul>	Improvement
MOST – Department for Biotechnology <b>India</b>	<b>Mature</b> Long history of collaboration in supporting international research	<b>No.</b> However institutionalised dialogues have taken place via the India-UK Science & Innovation Council (SIC) (2006), and UK-India Science & Innovation Task Force (2014)	<b>Medium / Low</b> FIC has allowed collaboration in research areas of common interest non-ODA focused (e.g., UK-India Covid-19 Partnership Initiative). Increase of 1.6% in UKRI funding due to FIC	<ul style="list-style-type: none"> <li>New forms of collaboration and topics beyond Sustainable Development Goals tested.</li> <li>Strengthened understanding of the R&amp;I ecosystem, priorities, and capabilities.</li> <li>Intention to launch Global Incubator Programme between IUK and India (beyond FIC, but based on FIC-funded pilots with Canada, USA and Singapore).</li> </ul>	Similar to baseline
<b>Swiss National Science Foundation</b>	<b>Mature</b> Long history of collaboration in supporting research through bilateral activities and multilateral arrangements	<b>Yes.</b> UKRI-SNSF MoU (2022).	<b>Medium / Low</b> Other sources of funding available to progress similar activities (e.g., Scientific Exchanges). FIC allowed a first collaboration between the research agencies	<ul style="list-style-type: none"> <li>Increased familiarity and ongoing conversations on how to progress the partnership.</li> <li>Strategic areas of collaborative work identified for future collaboration.</li> <li>UK and Swiss government signed an MoU in 2022 to endorse their support to further collaboration.</li> </ul>	NA
National Natural Science Foundation of <b>China</b>	<b>Mature</b> Long history of collaboration in supporting international research	<b>Yes.</b> UK-China Joint Strategy for Science Technology and Innovation cooperation, 2017	<b>Low</b> Other sources of funding available to progress similar agendas (e.g., ISCF). Increase of 2% in UKRI funding due to FIC	<ul style="list-style-type: none"> <li>The continuation of collaborative activities.</li> <li>For Chinese partner, opportunity to fund interdisciplinary collaborative research (and opportunity to test and learn from application and assessment processes).</li> <li>One joint project with the NSFC in collaborative UK-US programme on EEID.</li> </ul>	Similar to baseline

Source: Technopolis analysis of case studies, 2022.





**Barriers and facilitators** to the development of the partnerships between funders in the UK and overseas have remained broadly the same since the baseline evaluation in 2021, as most of the factors highlighted related to the pre-FIC context or the processes involved in the early set up of FIC programmes.

Across the case studies (Table 2), pre-existing funder-level relationships have been flagged as an enabler, providing further evidence that successful partnerships take time to materialise and are developed over time. There is often a trade-off, however, where strong pre-existing relationships tend to lower FIC's additionality, but facilitate programme design and implementation.

The support received from the FCDO Science and Innovation Network (in particular in the cases of Japan and Switzerland) has also been highlighted as a facilitator for initial mediation with overseas partners and for the identification of collaborative opportunities. In the case of India, the support from UKRI India was also highlighted as an enabling factor. This office played a central and important role in providing mediation between the UKRI councils and MOST – Department for Biotechnology (DBT), and also prepared the ground for more substantial discussions directly with the UKRI councils. Through their long-standing relationship with DBT, UKRI India has a portfolio of options for collaboration in areas of mutual interest that can be mobilised when funding is available.

The existing and good relationships mean not only having well-established points of contact, but also an alignment of processes and values. Good funder-level relationships also make it easier to manage certain barriers or challenging aspects of the collaboration under FIC (such as the risk of raising expectations with overseas partners through the FIC process requiring involvement from overseas partners already at the bidding phase).

Short proposal times (for the initial FIC programme bidding phase) and restrictions imposed by the response to the COVID pandemic (across all countries) have also emerged as barriers to collaboration, along with the need to reconcile different ways of working.

*Table 2 Enabling factors and barriers to strengthening funder-level partnerships*

Case study	Enabling factors	Barriers
<b>United States</b> National Science Foundation (Geosciences)	<ul style="list-style-type: none"> <li>• <b>Pre-existing relationships</b> and established collaboration processes between NSF and UKRI.</li> <li>• Another enabler was that NERC joined a call of an existing research programme with annual calls for proposals.</li> <li>• Scale of funding made available by FIC which incentivised engagement at the funder level.</li> <li>• Support of UKRI North America Office in early phases of the programme.</li> <li>• <b>Flexibility</b> of the FIC vis-a-vis extensions for research projects.</li> <li>• Complementary funding agency regulations and processes (e.g., UKRI's ability to convene and fund researcher workshops and NSF providing travel budget as part of the research grants).</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Short proposal times</b> hinder extending participation to additional NSF directorates/divisions and other US research funders.</li> <li>• <b>COVID-related delays</b> to the start of research and travel restrictions precluding face-to-face meetings</li> </ul>



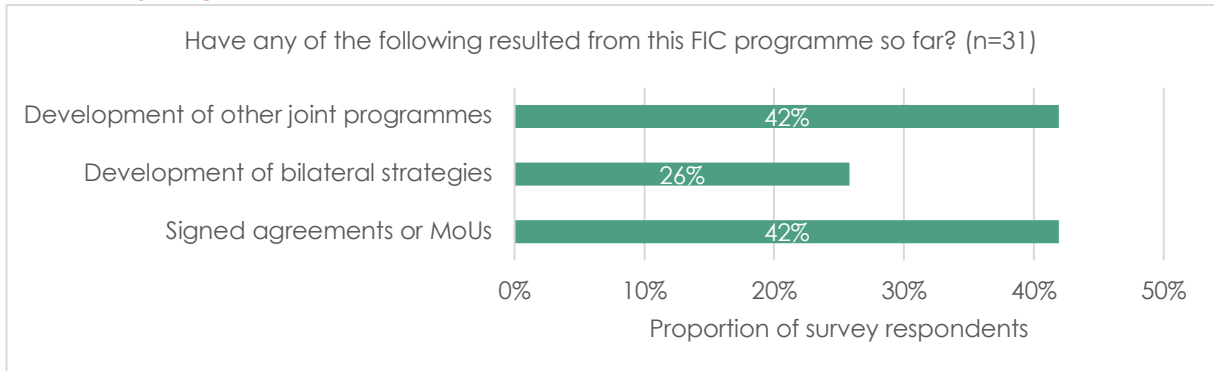
Case study	Enabling factors	Barriers
National Natural Science Foundation of <b>China</b>	<ul style="list-style-type: none"> <li>• <b>Well-established relationship</b> and collaboration processes.</li> <li>• Similar remit and ways of working.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Short proposal times.</b></li> <li>• <b>Challenges around negotiating co-funding</b> before knowing if FIC funding would be available.</li> </ul>
<b>Japan</b> Science and Technology Agency	<ul style="list-style-type: none"> <li>• High level of engagement and communication between programme managers.</li> <li>• Support from SIN officer in Japan</li> <li>• FIC Wave 2 (building on Wave 1 success).</li> </ul>	<ul style="list-style-type: none"> <li>• Language.</li> <li>• <b>Reconciling different systems for reviewing</b> open calls (overcome).</li> <li>• COVID.</li> </ul>
<b>Canadian</b> Institutes for Health Research	<ul style="list-style-type: none"> <li>• <b>Alignment of research values, operational process</b> and strategic priorities at funder and national level.</li> <li>• <b>Pre-existing relationships</b> through multilateral partnerships.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Short proposal times</b> and FIC spend profile (time limit).</li> </ul>
MOST – Department for Biotechnology (DBT) <b>India</b>	<ul style="list-style-type: none"> <li>• <b>Well-established and trusted partnership</b> with DBT.</li> <li>• Support from UKRI India (mediation and identifying collaborative opportunities at an early stage).</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Risk of raising expectations</b> on partner side due to FIC process which requires involvement from overseas partners already at the bidding phase.</li> <li>• <b>Uncertainty about long-term funding</b> is a risk to further consolidation and development of partnerships.</li> <li>• Partnership relies heavily on specific key individuals, whose departure risk success of the joint activities.</li> </ul>
Enterprise <b>Singapore</b>	<ul style="list-style-type: none"> <li>• Eureka Framework.</li> <li>• Interest of both countries to deepen their relationships.</li> <li>• <b>Demand:</b> Positive response of Singaporean firms to calls showing interest in collaborative R&amp;D projects with the UK.</li> </ul>	<ul style="list-style-type: none"> <li>• COVID.</li> <li>• Underestimated level of response from both UK and Singaporean firms to both programmes, reducing the available funding per firm.</li> </ul>
<b>Swiss</b> National Science Foundation (SNSF)	<ul style="list-style-type: none"> <li>• <b>Commitment from SNSF to the partnership</b> to match funding.</li> <li>• <b>BBSRC's prior experience in running Partnering Awards calls.</b></li> <li>• Fluid communication throughout the process between UKRI International Office (including SIN representatives) and SNSF officials.</li> </ul>	<ul style="list-style-type: none"> <li>• Administrative due to undergoing organisational changes affecting timeliness of the agency's response.</li> </ul>

Source: Technopolis analysis of case studies.

### 3.2 Concrete actions have already been taken to carry forward some funder-level collaborations (beyond FIC)

All UK FIC programme leads were asked whether there had already been any follow-on activities from their programme, in terms of joint agreements, strategies or programmes with overseas funders. In each case (see Figure 12) between a quarter and a half of all programme leads could already report a result.

Figure 12 Whether joint agreements, strategies or programmes with overseas partners have resulted from FIC



Source: Programme Lead survey, 2022.

Where leads pointed to FIC having already resulted in a follow-on agreement, strategy or programme, they were asked to provide further details. The following examples were provided.

Table 3 Examples of follow-on agreements, plans and programmes between funders

Programme	Example
FIC21 -UK-China Creative Industries Collaboration	<ul style="list-style-type: none"> <li>The <b>Shanghai Theatre Academy</b> have served as a project partner on several large research grants within the programme, providing an opportunity to partner with UK teams on joint research and innovation projects. The programme has served to strengthen <b>AHRC's</b> existing relations with the Academy and they are now working together to develop the concept of a joint UK-China Creative Industries R&amp;I Hub in Shanghai.</li> </ul>
FIC2-19 -UK-US Business Innovation Bridge	<ul style="list-style-type: none"> <li><b>Innovate UK</b> are discussing 2 follow-on programmes with 2 separate entities in the US, as a direct result of this partnership:               <ul style="list-style-type: none"> <li>- A second collaboration on offshore wind with the existing FIC partner (<b>NOWRDC</b>).</li> <li>- A new collaboration with <b>ARPA-E</b>, which is in an advanced stage of discussions.</li> </ul> </li> </ul>
FIC12 -Breakthrough Technologies to Advance Crop Breeding	<ul style="list-style-type: none"> <li>The programme has allowed for a deepening of relationships with US funders and was the first activity to be delivered under the <b>BBSRC-NIFA</b> MoU. As a result, BBSRC is currently developing a call that involves the organisations from the FIC programme (NSF and USDA), plus an additional funder from Germany. The call scope and the activity itself are direct outcomes from the increased interaction with the US funders and the interaction with the research community. Due to this follow-up activity, the funders will continue working closely together, while the researchers will have the opportunity to access further funding in the area and continue their joint work.</li> </ul>
FIC-STR-03 -UK-Switzerland (SNSF) Partnering Awards	<ul style="list-style-type: none"> <li>A joint MoU was signed between <b>UKRI</b> and <b>SNSF</b> before the call was launched, to signal their intent for bilateral collaboration. On the back of this there will be a UK-Switzerland Government-to-Government MoU signed.</li> </ul>

Programme	Example
FIC-08 -Supporting business-led multilateral collaboration through the EUREKA framework	<ul style="list-style-type: none"> <li>Following Singapore's participation in the Eureka GlobalStars Rd 2 call, <b>Innovate UK</b> has signed an MoU with <b>Enterprise Singapore</b> on future bilateral co-innovation collaboration and agreed to run 3 annual bilateral calls (the first was run in 2022).</li> </ul>
FIC20 -UK-US Collaboration for Digital Scholarship in Cultural Institutions	<ul style="list-style-type: none"> <li>A new MoU is currently in the process of being signed between <b>AHRC</b> and the <b>US National Endowment for the Humanities (NEH)</b>. It is anticipated that this MoU will cover post-FIC activity between the two research funders.</li> <li>Through the programme's workshops, calls and wider engagement activity, AHRC has also started to build relationships with the <b>US National Science Foundation</b> and the <b>Getty Conservation Institute</b>.</li> </ul>
<b>FIC2-20 Global Incubator Programme</b>	<ul style="list-style-type: none"> <li>FIC funding was used to pilot the Global Incubator Programme with three countries (and has enabled discussions to take place with India) and it will now be mainstreamed through the core <b>IUK</b> global budget. From the three incubator programmes that originally launched, IUK are now working towards 12 programmes. This includes a proposed Programme with <b>India</b>, which will be included in the list of UKRI-India announcements at the UK-India Ministerial Science and Innovation Council (SIC) on 26th April 2023.</li> </ul>

Source: Programme Lead survey, 2022.

### 3.3 In other cases sustainability is less clear, in large part due to the uncertainty around dedicated UKRI funding to continue collaborating with those countries

Evidence collected via the in-depth case studies also shows that FIC programmes have led to the identification of future opportunities for collaboration. However, in most of these cases, uncertainty around future UKRI funding may prevent these opportunities from being realised. A similar concern was raised more generally in discussions with council International leads.

It is important to note here that fieldwork took place before the announcement of the new International Science Partnerships Fund (ISPF)<sup>12</sup>, which initially (in phase 1) will provide £119m of UK Government funding for UK researchers and innovators to collaborate with partner countries on multidisciplinary projects. Initial calls under this fund were announced on 13<sup>th</sup> March 2023<sup>13</sup>. As of 14<sup>th</sup> April 2023, there were open calls with China, Singapore, South Korea, Taiwan, the USA, Canada and Australia, while calls had already been run with Ireland, Japan and the USA.

<sup>12</sup> Announced on 13<sup>th</sup> December 2022. <https://www.gov.uk/government/news/uk-science-and-technology-minister-launches-new-global-international-science-partnership-funding-in-tokyo-with-initial-119m-of-funding> (accessed 13<sup>th</sup> March 2023)

<sup>13</sup> <https://www.gov.uk/government/publications/international-science-partnerships-fund-ispf/international-science-partnerships-fund-ispf> (accessed 13<sup>th</sup> March 2023)





Table 4 Sustainability of funder-level partnerships

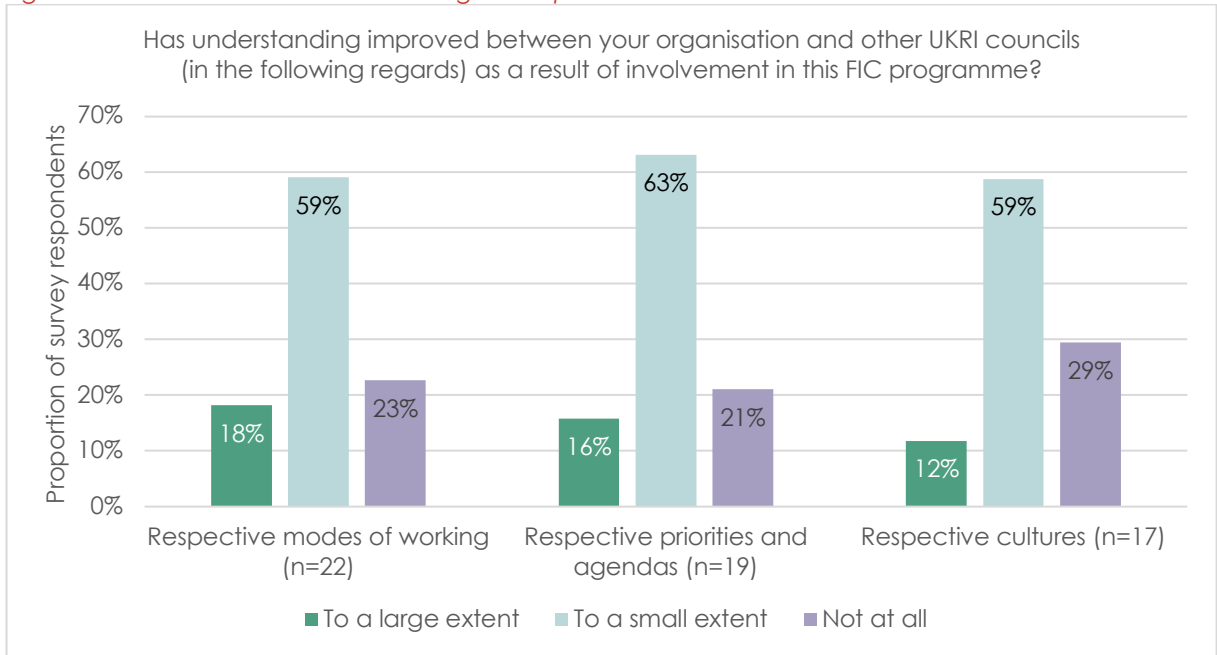
Case study	Assessment	Evidence of sustainability	Change with respect to the baseline
<b>Canadian</b> Institutes for Health Research (CIHR)	<b>High/Highly likely</b>	MRC and CIHR have strengthened relationships and aligned priorities, which will feature centrally in the CIHR's new international strategy. Both agencies are in ongoing conversations to support collaboration around the Canadian Stem Cell Network. CIHR are interested in developing future programmes, but uncertainty around UK funds and timing has detained these conversations. MRC and CIHR will start exploring funding opportunities through the ISPF.	Improved
<b>Enterprise Singapore</b>	<b>High/Highly likely</b>	Innovate UK and Enterprise Singapore are optimistic about the potential results of projects funded through FIC and the new 3-year bilateral agreement. This new MoU is seen as a catalyser for the further development of their partnership and a clear means to achieve long-term international collaboration, underpinned by a 3-year funding commitment. Enterprise Singapore's medium-to-long-term budget and planning (five-year budget allocation) and Innovate UK's core budget will ensure continuity and the possibility to expand their areas of collaborative work.	NA
<b>United States</b> National Science Foundation (NSF Geosciences)	<b>Medium/Likely</b>	FIC programmes underpin current discussions aiming to continue and increase collaborative activities. These are likely to have materialised by the time of the final evaluation, either through joint funding calls (if funding is available) or via the lead agency opportunities. The positive experience of FIC programmes is likely to engage additional NSF directorates and divisions going forward. The scale of FIC funding has raised awareness and demand in the research community, which may be contributing to an observed increase in proposals submitted under the lead agency opportunities. Partnering with additional NSF teams and/or other US agencies provides an opportunity to access additional funding for collaboration programmes. Uncertainty around UKRI funding for international collaboration may hinder engagement with new partners and risk the momentum gained from FIC.	Similar to baseline
National Natural Science Foundation of <b>China</b> (NSFC)	<b>Medium/Likely</b>	The UK councils have a well-established partnership with NSFC which predates FIC. The quality of the collaboration between UKRI and NSFC has tended to improve gradually with each new initiative, and this is also the case here, for example with respect to the peer review process. The processes already in place enable the partners to identify future strategic opportunities for collaboration, but the ability to pursue them will depend on the availability of funding. The scope of future collaboration could be affected by geopolitical developments.	Similar to baseline
MOST – Department for Biotechnology (DBT) <b>India</b>	<b>Medium/Likely</b>	Opportunities for sustained collaboration in non-ODA areas have started to emerge and will require long-term funding to consolidate. Additional initiatives such as the "2030 Roadmap for India-UK future relations" are also strengthening collaboration between the countries and preparing the groundwork for future collaborative activities.	Similar to baseline
<b>Japan</b> Science and Technology Agency (JST-RISTEX)	<b>Low/Uncertain</b>	According to ESRC, the relationship with Japan was very much driven by FIC and could not be supported through core budgets. Despite increased interest in future collaboration between ESRC and JST-RISTEX, the absence of future funding from the UK has not supported this, and there are no concrete plans for joint work in the future.	Similar to baseline
<b>Swiss</b> National Science Foundation (SNSF)	<b>Low/Uncertain</b>	Sustained collaborative activity is uncertain and depends on the availability of UK funds for a new joint call in the coming years.	NA

Source: Technopolis analysis of case studies, 2022.

### 3.4 FIC has also strengthened relationships between UK funders by supporting cross-council programmes

Another element of funder-to-funder relationships that FIC supports relates to collaboration between the UKRI councils themselves, with most of the programmes in the FIC portfolio (21 of 37) involving two or more UK councils. Programme leads were therefore also asked about the extent to which understanding has improved **between their council and other UKRI councils** as a result of involvement in their FIC programme. A majority (70%+ in each case) reported improvements in understanding of respective modes of working, priorities and agendas, and cultures. Interviewed council international leads also highlighted that FIC had supported a more collaborative approach to developing ideas for international collaboration across UKRI.

Figure 13 Extent to which understanding has improved between UKRI councils as a result of FIC



Source: Programme Lead survey, 2022. Number of responses varies by question.

## 4 Developing partnerships within projects (Theme 2)

As well as seeking to enable, strengthen, deepen, and broaden relationships between UK and overseas funders (as discussed in the previous section), FIC also aims to improve individual relationships through the projects and other activities that it supports. This section explores the benefits being realised by FIC participants through these international partnerships.

### 4.1 Participation in FIC projects has led to increased UK access to better knowledge and research infrastructure, as well as increased skills to work collaboratively internationally

Access to critical knowledge and expertise, research infrastructure as well as contacts, networks and markets, are strong motivations to take part in grants funded by FIC programmes. In the previous phase of the evaluation (baseline survey), we found that a large majority of UK participants from cohort 1 (78%–94%) agreed or strongly agreed that each of these factors had driven them to work with overseas partners. Similar results were also observed among international participants in grants funded by FIC programmes (baseline survey). This confirmed the assumption that international collaboration in those projects was seen (at least at the outset of the projects) as an important factor to pursue the project objectives.

Additionally, the baseline evaluation found that UK and international participants (cohort 1) were also motivated by a desire to explore how collaboration would work in practice, with 90% and 95% (respectively) agreeing or strongly agreeing that partnering in their FIC project provides a good opportunity to understand how to collaborate in the future.

In the current phase of the evaluation, we have returned to the original group of UK participants (cohort 1) through the interim survey and invited them to reflect on their skills and capabilities in relation to working collaboratively in international teams. They were asked to assess three different points in time (just before the FIC project, at the end of the project, and currently), using a score from 1 to 5 (where 5 is “excellent” and 1 is “poor”). Table 5 below shows that there has been an increase (of more than 0.8 points) across all categories.

*Table 5 Change in skills and capabilities to work in international teams (FIC participants)*

	At the point of application	At the end of the project	Current position
Ability to access new or better knowledge from overseas	2.9	4.0 +	4.1 +
Ability to access new or better facilities, tools and techniques from overseas	2.5	3.5 +	3.7 +
Ability to navigate different working and research cultures	3.0	4.1 +	4.1 +
Ability to identify sources of funding internationally	2.7	3.5 +	3.6 +
Overall ability to work collaboratively in international teams	3.3	4.3 +	3.9 +

Source: Interim survey of UK participants, Cohort 1. Finished projects only. n=84. + indicates an increase of 1 point or more, + indicates a lower increase, = indicates no increase (with respect to the baseline).

For comparison, we asked a similar question to the early group of unsuccessful applicants (interim survey, cohort 1). Their responses also suggest some improvement (on average) over time across all five areas explored in the question, but the difference is much smaller (across the five areas, a 0.03 to 0.14 difference in average scores between application and now).

*Table 6 Change in skills and capabilities to work in international teams (unsuccessful applicants)*

	At the point of application	Current position
Ability to access new or better knowledge from overseas	3.7	3.8 +
Ability to access new or better facilities, tools and techniques from overseas	3.3	3.3 =
Ability to navigate different working and research cultures	3.8	3.9 +
Ability to identify sources of funding internationally	2.9	3.0 +
Overall ability to work collaboratively in international teams	3.9	4.0 +

Source: Interim survey of unsuccessful applicants. Cohort 1. n=83. + indicates an increase of 1 point or more, + indicates a lower increase, = indicates no increase.

#### 4.2 FIC has facilitated new collaborations among researchers and innovators, including with partners overseas

UK participants (cohorts 1 & 2) were asked in the baseline survey to indicate how many of their UK-based and overseas partners were existing and how many were new. As shown in Table 7, **43% of all partners counted were new overseas partners. On average, that equates to 1.9 new overseas partners per project.** There are also new partnerships supported among UK organisations (17%, 0.8 on average), so a total of 61% of partners are new overall.

*Table 7 New and existing partners*

Your partner organisations/university departments	UK-based partner	Overseas partner
<b>Existing partner</b> (i.e. those that your organisation/university department had collaborated in an R&I project with before this application)	22% of partners 1.0 partners per project average	17% of partners 0.8 partners per project average
<b>New partner</b> (i.e. those that your organisation/university department had not collaborated in an R&I project with before this application)	17 % of partners 0.8 partners per project average	43% of partners 1.9 partners per project average

Source: Baseline surveys of UK participants cohort 1 (n=150) and cohort 2 (n=102).

This is further corroborated by analysis of Gateway to Research (GtR). Across the 506 FIC projects recorded in GtR there are 4,166 combinations of bilateral partnerships (i.e. between two different organisations in a consortium). We have searched for each of these same combinations of partners in GtR outside of FIC, but before the start of the FIC project, and identified earlier collaborations between the same parties in only 23% of cases. **Therefore, in the majority of cases (77%), FIC is providing a first opportunity for collaboration between organisations (at least in terms of grants awarded through UK councils)** (see Table 8).

The difference between these statistics and the figures provided by respondents to the survey may be driven by the fact that the GtR analysis focuses on collaborations funded by UKRI, while respondents to the survey are also including collaborations funded via other means (e.g. EU Framework Programmes).



**Table 8** Summary of first-time collaborations between FIC project partners

Type of collaboration	Instances of collaborations in FIC	Proportion
<b>Collaborations also occurring at an earlier date in GtR</b>	963	23%
<b>Collaborations occurring for the first time in FIC</b>	3,203	77%
<b>Total</b>	4,166	100%

Source: Technopolis (2023) using Gateway to Research (GtR).

### 4.3 There is evidence of gains in terms of better understanding of partners' research agendas and capabilities, and improved skills and capabilities of working in international teams

Almost all (Cohort 1) UK participants and international participants (100% and 99% respectively) stated in the interim survey that participation in their project (funded by a FIC programme) has led to a better understanding of their partners' capabilities, to a great extent or to some extent.

Furthermore, FIC projects are also reported to have provided the opportunity to learn about each other's ways of working, as well as their research agendas and priorities, with close to 100% of UK and international participants stating that these had been achieved to a great extent or to some extent.

These are strong results in their own right, but also represent intermediate steps that could lead to further fruitful collaboration. In fact, respondents also stated that participation in their FIC project has increased the likelihood of collaborating with their partners again in the future (e.g. 73% of UK participants responded 'to a great extent'). A slightly smaller (but still large) percentage of participants also stated that their project has led to the identification of further opportunities to collaborate (e.g. 59% of UK participants responded 'to a great extent').

**Table 9** Improvements in understanding and likelihood of collaborating

So far, participation in the project has led to...	UK Participants			International participants		
	To a great extent	To some extent	Not at all/Not yet	To a great extent	To some extent	Not at all/Not yet
An improved ability to work together	63%	34%	3%	80%	19%	1%
A better understanding of their ways of working	63%	36%	1%	65%	32%	2%
A better understanding of their capabilities	73%	27%	0%	77%	21%	1%
A better understanding of their research agendas/priorities	60%	38%	2%	73%	27%	0%
An increased likelihood of collaborating again in the future	73%	24%	3%	77%	20%	2%
The identification of further opportunities to collaborate	59%	29%	12%	63%	32%	5%

Source: Interim surveys of cohort 1 UK participants (n=146-151) and international participants (n=81-84).



#### 4.4 FIC has supported further opportunities for international collaboration, beyond the Fund

Building on the results presented in the previous section, **84% of cohort 1 UK participants** in projects that have now finished<sup>14</sup> stated in the interim survey that they **have been able to continue their relationship with overseas partners from their FIC project** (beyond the project itself) through further grants or other means.

By comparison, just **43% of cohort 1 unsuccessful applicants** (n=81) reported at the interim survey that they had been able to continue their relationship with overseas partners from their FIC application through other grants (or similar). This provides clear evidence of FIC having strengthened the relationships of UK and overseas participants within projects.

Other evidence from the interim survey suggests that FIC participants are now active in international collaboration more generally, not just with their FIC partners. The number of respondents is currently quite small (as we only ask this question of those whose project has finished), but these respondents suggested that since their FIC project had ended, they had (on average) submitted around 1 further proposal with overseas partners from their FIC project, as well as around 3 proposals with other overseas partners (not involved in the FIC project). The increased skills and knowledge obtained through their FIC experience (evidenced above) may partly explain this level of international collaboration activity beyond FIC partners.

Table 10 Average number of research proposals that your organisation or university department submitted...

	During the FIC project	Since the FIC project has ended
... with your <b>overseas partner</b> organisations/university departments from the <b>FIC project</b>	0.5	0.8
...with other <b>overseas partner</b> organisations/university departments ( <b>not those in the FIC project</b> )	0.8	2.7

Source: Interim survey of UK Participants, cohort 1. Finished projects only (n=30).

Table 11 Average value of research proposals that your organisation or university department submitted...

	During the FIC project	Since the FIC project has ended
... with your <b>overseas partner</b> organisations/university departments from the <b>FIC project</b>	£6,250	£105,050
...with other <b>overseas partner</b> organisations/university departments ( <b>not those in the FIC project</b> )	£84,000	£688,750

Source: Interim survey of UK Participants, cohort 1. Finished projects only (n=19).

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<sup>14</sup> 84% of the 61 UK participants that responded to the interim survey and stated that their project had finished. The majority (56%) of respondents reported that their project was still ongoing.

## 5 Deepening R&I (Theme 3)

The Fund seeks to enable UK researchers and innovators to carry out world-leading research and innovation within new and existing areas of strategic importance across the UKRI international portfolio, which delivers new knowledge, and societal and economic impact. This section looks at the evidence at this interim stage as to the progress of the research and innovation being funded, as well as the outputs and outcomes of this work.

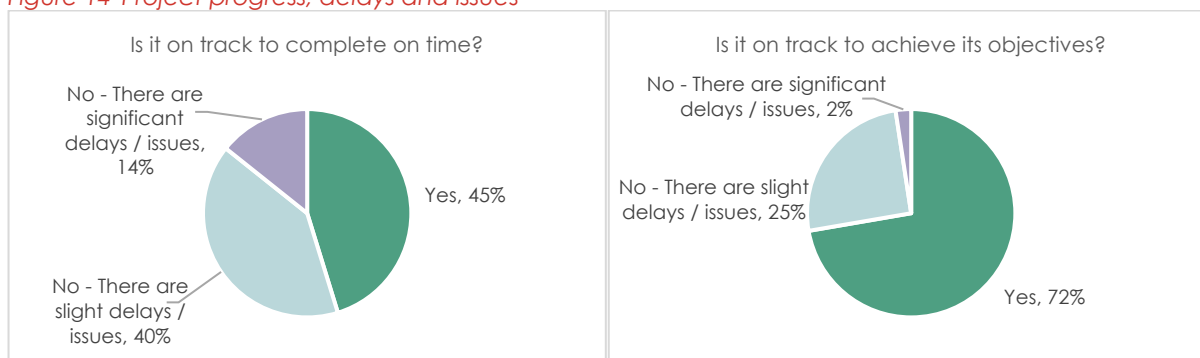
### 5.1 The majority of projects are on track to achieve their objectives, albeit with some delays

In line with the assumptions stated in the ToC, we did not expect to find evidence of the achievement of R&I outputs across all projects at this stage (i.e. before the majority of projects have finished). Indeed, less than half (44%) of surveyed UK participants (from cohort 1) reported in the interim survey that their **FIC project had finished**. However, the data collected does show that good progress is being made with projects and a considerable number of R&I outputs have already been delivered.

UK participants from cohort 1 (whose projects were still ongoing) were asked in the interim survey about the progress of their project. A majority (55%) reported some delays or issues with their timetable, although in most cases these were reported as “slight” rather than “significant”. Despite this, the great majority (72%) of participants reported that their project was still on track to achieve its objectives. Only 2% reported significant issues here.

Incidentally, amongst participants whose project had finished, 80% reported that it had achieved its objectives (while 47% reported their project ended on time, according to the approved timetable).

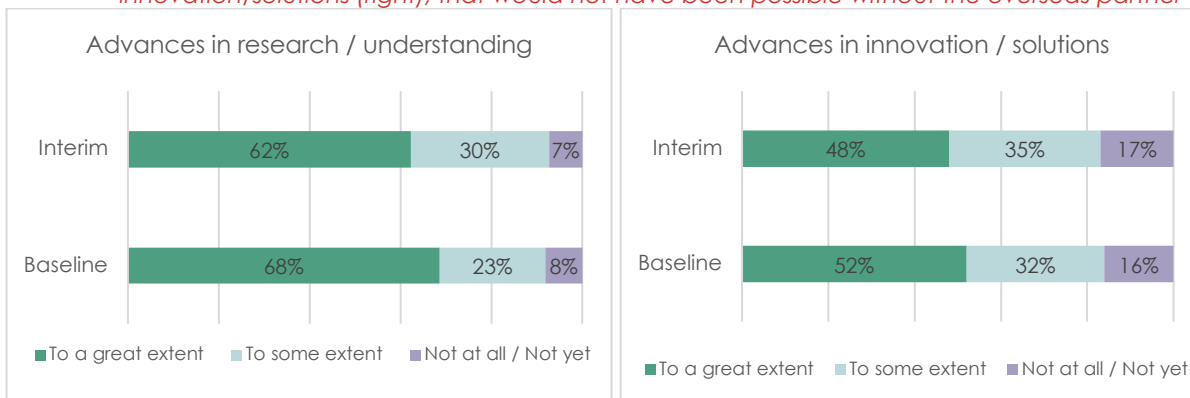
Figure 14 Project progress, delays and issues



Source: Interim survey of Cohort 1 UK participants where the project is ongoing (n=83-84).

Nearly all UK participants (cohort 1) stated in the interim survey that collaboration has led to **advances in both research and innovation**, although the respondents were marginally more cautious in this regard than they were at the time of their baseline survey in 2021.

Figure 15 To what extent has FIC led to advances in research/understanding (left) and innovation/solutions (right), that would not have been possible without the overseas partner



Source: Baseline survey (n=142-146) and Interim survey (n=148-151) of UK participants, cohort 1.

## 5.2 There are an increased number of publications being developed in collaboration with FIC priority countries

One of the expected R&I outputs of FIC projects is publications co-authored between researchers and innovators in the UK and priority countries. We have collected baseline data to track how this evolves over time and this allows us to track progress, understanding that more publications are expected to emerge in years to come as projects make more progress and are finalised. The analysis on progress so far used June 2022 as the cut-off date and included 482 FIC grants, with circa 300 publications associated with them at this stage (corresponding to 122 grants, 30% of which relate to one programme SSH Pump-Priming with Japan).<sup>15</sup> Note that analysis later in the report (section 5.3) suggests that this volume of publications is much higher than seen with other UKRI grants with participants from FIC priority countries (per £m).

Overall, the dataset under analysis includes 78 publications in the field of clinical medicine (26%), 45 in the field of biomedical research (15%), 39 in the field of earth and environmental sciences (13%), and 21 in the field of social sciences (7%), with the remaining publications spread across a further 15 fields.

To explore the effect of FIC on international collaboration in papers, we draw several comparisons and analyse results for:

- The UK (based on papers with at least one authors affiliated to a UK institution)
- UKRI (based on papers that were developed with funding from UKRI)
- FIC papers (which included papers with at least one author affiliated with a UK institution and FIC researcher).

<sup>15</sup> The bibliometric analysis is based on data extracted from Gateway to Research and Researchfish in August 2022 (to allow for sufficient time for data cleaning and analysis to inform the first iterations of the report). At this point in time there were 822 publications recorded in Researchfish associated with FIC (considerably higher than the 195 publications found at the baseline stage). 472 out of 822 publications were found in Scopus. The other 350 could not be found for many reasons (a non-indexed document type, journal not indexed in Scopus, lack of information, etc.). A manual search using the title of these articles was made on 20% of them with no success. This indicates that a substantial proportion of publications recorded in Researchfish may not correspond to peer-reviewed publications. From the 472 articles matched to Scopus, only 315 were kept for the analysis. The 157 rejected articles were considered not FIC supported because the period between the grant start date and the publication date was too short (less than 6 months) (highlighting the fact that researchers may over represent their publication records associated to specific grants in Researchfish). From these 315 articles, 301 were published by at least one author affiliated with a UK institution and 277 with a FIC researcher. See Appendix A of the accompanying Technical Report for further details.

UK and UKRI papers provide a benchmark for the degree of international collaboration and how that changes overtime, providing context to understand the figures for FIC. We also draw international comparisons with Germany, France and Italy to provide further (international) context.

We first focus the analysis only on FIC researchers. This bibliometric analysis (see Table 12) shows that **FIC researchers** were already active in international collaboration before FIC, but that their international collaboration within FIC projects is higher than before and in comparison with other sources of funding.

For instance, prior to FIC (2014-2018), 39.3% of UKRI papers from FIC researchers included at least one author affiliated to an institution in a FIC priority country. This degree of collaboration has increased over time and is 43.6% in the period 2019-2021. Furthermore, this degree of collaboration is even higher with FIC funding (53.1%) (see cells shaded in blue). This (counterfactual) analysis indicates that in the absence of FIC, researchers would have been active in collaborating with those countries, but FIC has had a positive effect on increasing that degree of collaboration.

The table also indicates that international collaboration through FIC has not come at the detriment of other international collaboration. UKRI-funded researchers have been active in international collaboration prior to FIC and continue to be so with and without FIC funding (see cells shaded in green).

*Table 12 Share of international co-publications (FIC researchers only)*

	Full count (Yearly average)			Share of international co- publications (SIP) with FIC priority countries			SIP with all countries		
	2014-18	2019-21	Δ	2014-18	2019-21	Δ	2014-18	2019-21	Δ
UK papers	2,932	3,775	843	39.1%	44.8%	5.7 pp	55.8%	61.9%	6.2 pp
UKRI papers	1,444	1,941	497	39.3%	43.6%	4.3 pp	55.1%	59.6%	4.5 pp
FIC papers	-	92	-	-	53.1%	-	-	64.4%	-
UK papers without UKRI	1,488	1,834	346	38.8%	46.1%	7.2 pp	56.4%	64.4%	7.9 pp

Source: Technopolis and Science Metrix based on data from GtR, Researchfish, and Scopus (2023). pp=percentage point

Bibliometric data also shows that **the UK overall** has increased its level of collaboration (on papers) with FIC priority countries during the period of the Fund (5.2 percentage points higher in 2019-21 in comparison with 2014-18). It also shows that collaboration within FIC papers is even higher than in comparison with other UK and UKRI (funded) projects (53.1% versus 43.5% and 39.6% respectively) (see Table 13, cells shaded in green).

Note also that collaboration with FIC priority countries is higher across all UK groups in comparison with Germany, France, and Italy (and growing faster). Naturally FIC is not driving this overall increase (given its size), but it is clearly contributing in the right direction.

Table 13 Share of international co-publications (All researchers)

Country/Funding sources	Share of international co-publications (SIP <sub>w</sub> ) with FIC priority countries			SIP <sub>w</sub> with all countries		
	2014-18	2019-21	Δ	2014-18	2019-21	Δ
UK papers	38.3%	43.5%	5.2 pp	59.7%	65.7%	6.0 pp
UKRI papers	35.4%	39.6%	4.2 pp	53.3%	58.1%	4.7 pp
FIC papers	-	53.1%	-	-	64.4%	-
UK papers without UKRI	39.5%	45.3%	5.8 pp	62.1%	68.7%	6.6 pp
Comparator countries	2014-18	2019-21	Δ	2014-18	2019-21	Δ
Germany	32.2%	35.1%	3.0 pp	52.7%	56.4%	3.7 pp
France	30.4%	33.4%	2.9 pp	53.8%	58.0%	4.2 pp
Italy	26.5%	27.0%	0.5 pp	48.3%	49.6%	1.3 pp

Source: Technopolis and Science Metrix based on data from GtR, Researchfish, and Scopus (2023). pp = percentage point. SIP<sub>w</sub> indicators are weighted to align with the distribution of FIC publications across the subfields of science.

In terms of collaboration with individual FIC priority countries, the bibliometric analysis also shows that there has been an increase in collaboration between the UK and each individual FIC priority country (between the pre-FIC and FIC period), in particular China (+2.2pp) (see Table 14). The figures are based on publications that have UKRI as a funder.

Table 14 Co-publications between UK and FIC priority countries with UKRI funding (% that include partner country, average across periods)

Country	Share of international co-publications (SIP <sub>w</sub> ) with each FIC priority country		
	2014-18	2019-21	Δ
Australia	6.2%	7.1%	0.9 pp +
Canada	4.7%	5.1%	0.5 pp +
China	5.7%	7.9%	2.2 pp +
India	1.1%	1.7%	0.6 pp +
Norway	2.5%	3.1%	0.6 pp +
Sweden	4.1%	5.0%	0.9 pp +
United States	18.7%	19.6%	0.9 pp +
Switzerland	3.8%	4.2%	0.3 pp +
Ireland	1.8%	2.1%	0.3 pp +
Israel	0.7%	0.8%	0.1 pp +
Japan	2.7%	2.9%	0.2 pp +
South Korea	0.8%	0.9%	0.1 pp +
Singapore	1.0%	1.3%	0.3 pp +

Source: Technopolis and Science Metrix based on data from GtR, Researchfish, and Scopus (2023). pp = percentage point. SIP<sub>w</sub> indicators are weighted to align with the distribution of FIC publications across subfields of science. + indicates positive change of 0.5pp or more, + indicates a smaller positive change.

There is the expectation that this degree of international collaboration will contribute positively to the research and deliver higher scientific impact (measured by citations). It is too early to measure this effect for FIC, but bibliometric data for UK and UKRI suggests that this is the case.

The analysis (see Table 15) is based on the average of relative citation (ARC) of papers, a proxy for scientific impact. The analysis shows that the ARC of papers conducted with international collaborators tends to be higher than the overall average (1.7 versus 1.3 for UK papers), and that this effect is even higher among papers that include at least one author affiliated to an institution in a FIC priority country (1.9). Moreover, the ARC is higher for UKRI papers (2.1 and 2.3 versus 1.8), suggesting that UKRI's assessment processes are able to identify and fund research of potential high impact from the outset.

The ARC for the third group is also higher for UKRI in comparison with Germany, France, and Italy. The pattern shown in Table 15 also holds when looking at two other metrics: Citation distribution index (CDI) and share of papers among the top 10% most highly cited papers (HCP10) (see Appendix A).

*Table 15 Average of relative citation (ARCw) (2014-2018)*

	ARC (1)	ARC (2) (for papers that include at least one international collaborator)	ARC (3) (for papers that include at least one international collaborator from a FIC priority country)
<b>Country/Funding sources</b>			
UK papers	1.3	1.7	1.9
UKRI papers	1.8	2.1	2.3
UK papers without UKRI	1.2	1.5	1.7
<b>Comparator countries</b>			
Germany	1.1	1.5	1.7
France	0.9	1.4	1.6
Italy	1.1	1.4	1.7

Source: Technopolis and Science Metrix based on data from GtR, Researchfish, and Scopus (2023). The ARC is calculated for groups/entities with a minimum of 30 papers that have a relative citation (RC) score. Only papers published in 2019 or earlier have an RC score.

### 5.3 Projects have also made progress in the development of other R&I outputs

FIC projects have also started to produce **other R&I outputs**, particularly new research tools and materials and research databases and models. However, as stated above and as indicated by stakeholders (via survey and interviews), it is in many cases too early in most projects to yet understand the outputs fully, and more are expected in the coming months.

*Table 16 Other R&I outputs*

	Number of FIC projects reporting output	Average number of output (where reported)	Total number of output reported
New research materials and tools	30	1.7	52
New research databases and models	30	1.9	56
Patent applications published	1	2.0	2
Patents granted	1	2.0	2
Copyrighted products (e.g. software)	1	1.0	1
Spin-out companies	1	9.0	9
Software and technical products	13	1.2	16
Trademarks	0	-	0

Source: Technopolis (2023). Based on Researchfish data.



Researchers and innovators provided (through survey) some examples of current results obtained through their projects. This included:

- Propagation of human cells, while still maintaining their functionality. These can be used for drug screening, disease modelling and toxicology tests in academia and industry.
- A model to identify patients at high risk of osteoporosis using routinely collected data from Electronic Health Records.
- Low-cost wireless agricultural sensors.
- An online overview of available digital tools for artists and art institutions.
- Identification of genetic sequences that can be modulated for crop improvement.
- Co-moulding of continuous and discontinuous fibre composites in an open-edge mould suitable for low volume automotive applications.
- Creating the first genome for a beneficial insect (e.g. pollinators).
- Identification of a specific and significant 3D epigenomic landscape alteration during senescence (biological ageing), which could be a new way of defining it.
- New insights into hydrological aspects of Indian rivers that serve as conduits of antibiotic resistance genes. These insights will be useful to set up follow-up microbiological studies to comprehensively profile these environments.
- New understanding of the limitations of current policy for UK-China film co-production, as well as the weakness of current distribution mechanisms for British films in China, and for Chinese films in the UK.

It is challenging to arrive to an appropriate comparison and benchmark to understand the extent to which other R&I outputs produced under FIC would have happened anyway, or to a similar extent, and we have tried to approximate this issue by drawing comparisons with UKRI grant data and with unsuccessful applicants (via survey).

First, we compare the outputs that have emerged so far from UKRI grants that include participation from international partners with outputs that emerged from FIC grants. This analysis is based on Researchfish (to allow for comparability across those two samples) and focuses on grants that started in 2019. To further improve comparability, the data is expressed in terms of outputs per £ million invested (based on grant value).

Table 17 shows that FIC is producing more outputs per £ million invested than other UKRI grants that include participation from at least one FIC priority country, in terms of new research databases and models, new research tools and methods, and spin outs. This is also true for publications which are included here for completeness but are better understood based on the analysis presented in Section 5.2 above (and where the existence of bibliometric data allows for a more careful treatment to the question of causality/attribution). FIC is also producing more outputs per £ million invested than other UKRI grants with any other country. However, the average size of the FIC grants concerned is much larger.

However, results need to be taken with caution as they do not include the total cost of the projects, and it is expected that (some) FIC projects have received extra resources as part of the match funding made available by international partners (which would overestimate the figures below as the denominator — value of grants — could be higher).



Table 17 Other R&I outputs, per £m invested

	UKRI grants International (excl. FIC)	UKRI grants priority countries (excl. FIC)	All FIC grants
Number of publications	13.31	6.66	14.26
Number of new research databases and models	0.67	0.38	0.95
Number of new research tools and methods	0.37	0.19	0.88
Number of software and technical products	0.25	0.15	0.27
(Number of entries related to) Intellectual property	0.05	0.03	0.05
Number of spin out companies	0.03	0.01	0.15
Average grant value (of grants providing RF data)	£218k	£896k	£701k

Source: Technopolis (2023). Based on Researchfish data.

Comparisons with the unsuccessful applicants also show mixed results. Information collected via survey shows that FIC UK participants report a higher average number of outputs (so far) for only three of the seven categories for which we collected information: number of new research databases, models or tools, patents filed, trademarks and spin outs.

Table 18 Average number of outputs

	UK participants	UK Unsuccessful applicants
Number of new or enhanced products, process or services	0.67	1.10
Number of new research databases, models or tools	1.16	0.91
Number of patents filed	0.06	0.03
Number of patents granted	0.03	0.07
Number of trademarks	0.08	0.00
Number of copyrighted products (e.g. software)	0.11	0.48
Number of spin out companies	0.04	0.00

Source: Interim surveys of cohort 1 UK participants (n=110) and unsuccessful applicants (n=36).

All these results need to be taken with caution as they will naturally change over time, as projects progress. An updated version of this analysis will be presented in the final evaluation.

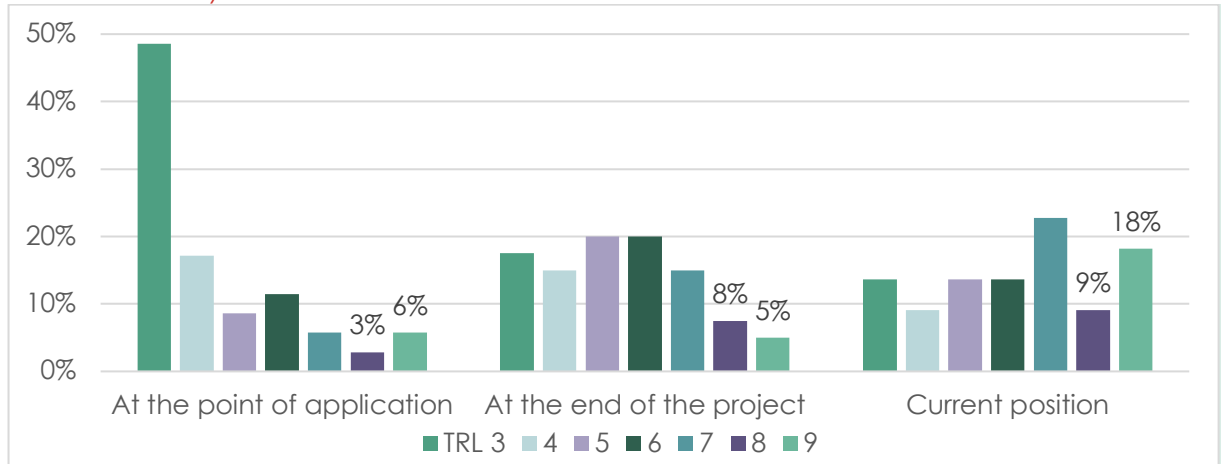
#### 5.4 The number of projects realising commercial outcomes is limited at this stage

One way to assess progress of research and innovation towards commercialisation is to measure the extent to which the ideas and solutions supported by FIC have made progress in terms of their **Technology Readiness Level (TRL)** (understanding that not all the projects supported by FIC are focused on developing solutions that would have a market application).

We collected this information for different points in time via the interim survey. Figure 16 below shows that there has been a shift over time towards higher TRLs among projects for which this metric is relevant, with a decreasing percentage of respondents stating that they are at low TRLs and an increasing percentage reporting higher TRLs (from the point of application, through to the end of the project and on to the current position). The average TRL reported was **4.4 at application, 5.4 at the end of the project, and is 6.2 currently.**

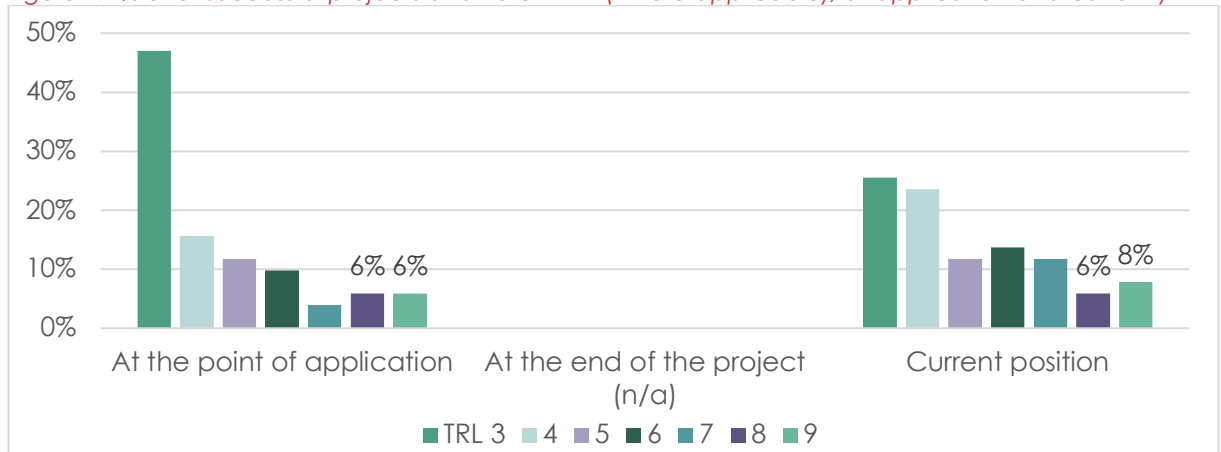
This is higher than the progress of unsuccessful applicants (from the point of application to now). In this case, the average TRL reported was **4.5 at the point of application and is 5.1 now** (see Figure 17), so an increase of 0.6 TRLs, compared with the 1.8 TRL increase seen amongst participants, suggesting a positive impact of FIC.

Figure 16 % of FIC projects at different TRL (where applicable), at application, end of project and currently



Source: Interim survey of UK Participants, cohort 1. Finished projects only (n=22-40).

Figure 17 % of unsuccessful projects at different TRL (where applicable), at application and currently



Source: Interim survey of unsuccessful applicants, cohort 1 (n=51).

Furthermore, 45% of (cohort 1) UK participants strongly/agreed that FIC led to the identification of wider commercial opportunities (see Figure 18). However, the number of respondents that had progressed to commercialisation so far (or close to it) (TRL 8-9) is still very small (n=14).

Figure 18 Thinking about the (FIC) programme as a mechanism to support international collaboration, to what extent do you agree or disagree with the following statements?



Source: Interim survey of UK participants, cohort 1 (n=106). Excludes NA

The insights above are further substantiated by the lack of responses related to revenues being produced from outputs developed with FIC projects. Only three respondents provided figures (£200k, £152k, £70k), but with no further explanation.

There were also limited examples from businesses (3 out of 11) provided via open question on the commercial opportunities that have emerged from FIC projects. The responses from two of these businesses has been summarised below:

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*One SME in the ICT sector reported that, a year after their FIC project ended, they continue to work with their partner in Canada, cross selling each other's products. They also noted that through the digital marketing of this successful partnership they have been able to secure 3 new Canadian manufacturing SME contracts, which are generating ~c\$185,000 (~£111k) per annum in additional revenue. The project has also led to "a potentially very lucrative opportunity with ngen.ca" [the national network for advanced manufacturing in Canada] and the company have now formed a new entity in British Columbia to work more closely with this organisation. The company concluded that without the international collaboration project "we would not have been able to identify and secure the significant market opportunity in Canada. "*

*Finally, an SME in the digital health sector reported that their ongoing FIC project has developed a model that can identify patients at high risk of osteoporosis using routinely collected data. The model is currently being trialled. They reported that working with two companies in Israel through FIC has "helped to understand how transferable our AI models are to health systems outside of the UK".*

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The third business responding to the survey with information on emerging commercial opportunities also agreed to a follow-up interview about their experience and the benefits from their FIC project. A summary of this case is presented in the box below, while further detail can be found in Appendix C of the accompanying Technical Report.

**Box 3** *Case example of emerging commercial opportunities from a FIC project*

**Summary**

Aurrigo is a Coventry-based publicly listed company, internationally recognised as a leader in autonomous technology. The company was awarded £350k in FIC funding through Innovate UK to develop and test self-driving baggage handling vehicles on site at Singapore's Changi airport. The project has resulted in the Auto-Dolly, a unique and disruptive baggage transportation solution for airports that can reduce baggage and cargo loading and unloading times, improve movement efficiencies, and drastically reduce operational costs. Live flight testing is expected in Singapore later this year, as part of a follow-on agreement between the company and airport to continue joint development and testing post-project. Aurrigo has also established offices across 3 continents, ready to take the product global.

*"The funding and ability to collaborate with partners in Singapore has been terrific. Without this collaboration we would not have made such rapid progress and developed such good working relationships" Aurrigo CEO*

### **Main results**

During the one-year project, the team was able to move from an experimental proof of concept (TRL 3) to the demonstration of a prototype in an operational environment (TRL 7), achieving acceptance from the Civil Aviation Authority of Singapore to operate the Auto-Dolly airside for trialling purposes.

Post-project, further testing has continued, with ever more challenging requirements and an ever more sophisticated product as a result (e.g. the loading and unloading of baggage from the Dolly is now also automated). There are now two autonomous vehicles on site at Changi, with a further 4 later this year, by which time they expect to be able to do live flight testing. In February 2023 a multi-year agreement was also signed between Aurrigo and Changi Airport for the continued joint development and testing of the Auto-Dolly at Changi Airport, alongside demonstrations of the technology to other airports.

Aurrigo has established a business in Singapore, with 10 employees in two offices in Changi that deal directly with the airport, and a listing on the London Aim stock exchange to raise funds for the next stage. Offices have also been established in Australia, Canada and the US – all reportedly inundated with interest. The manufacturing of the Auto-Dolly itself takes place in Coventry, where the factory can produce 400 vehicles a year (more than enough for current needs), but additional sites in Singapore and north America are also being considered.

### **Potential future impact**

Changi airport is already one of the largest transportation hubs in Asia and one of the world's busiest airports. By the end of the decade it will have also built its fifth terminal and is anticipated to be servicing 140 million people. This would require 800-1,000 autonomous vehicles at just this one airport. There are then another 20-30 such large hub airports globally, with hundreds of other mid-size airports – all looking to reduce costs and improve turn-around times and efficiency. With small adaptations, the Auto-Dolly would be suitable across all these sites. The potential market size for the product is therefore immense. From humble beginnings, it could easily be generating tens or hundreds of millions of pounds each year.

Source: Technopolis (2023) based on survey and interview with Professor David Keene, CEO, Aurrigo

The next iteration of the evaluation may reveal further examples of commercialisation opportunities, but given the indications so far, they are still likely to be limited in number.

## **5.5 Finally, there are a number of areas of future potential economic, social and policy impact**

Evidence collected via case studies shows that the programmes and projects are underway, but that there have been some delays due to the COVID-19 pandemic. Again, it is too early to report on outputs/outcomes but expected results include:

- New knowledge into areas of strategic importance for countries involved (including the UK), with insights for policy makers and industry.
- New solutions in areas such as AI, environmental waste.
- Business acceleration (Singapore).

Further examples are shown in Table 19.

Table 19 Outputs emerging from projects

Case study	Progress so far	Future expected results
<b>United States National Science Foundation (NFS Geosciences)</b>	<ul style="list-style-type: none"> <li>Signals in the Soil programme funded ten projects, six of which received additional funding to cover the costs of their extensions due to the pandemic. Two programme workshops organised by partners, with a third expected to occur in 2024. Additionally, the programme has funded eight early career researchers visits to US project partners using unallocated FIC budget.</li> </ul>	<ul style="list-style-type: none"> <li>Building a community of researchers through the <i>Signals in the Soil</i> programme.</li> </ul>
	<ul style="list-style-type: none"> <li>Climate, Environment and Health programme: Projects have started to yield outputs and outcomes. Seven (of nine) projects include UK research teams (four of them led by UK PIs). One project secured a UK follow-on grant and published 8 articles.</li> </ul>	<ul style="list-style-type: none"> <li>Sustained funding and collaborative research in the areas supported by the programmes can lead to impact on national policy in the long term.</li> </ul>
	<ul style="list-style-type: none"> <li>Changing North Atlantic Ocean: OSNAP observing system will continue measurements of ocean currents until July 2023 (two projects running and extended due to COVID).</li> </ul>	<ul style="list-style-type: none"> <li>Insights into circulations in the subpolar North Atlantic have informed policy makers and contributed to IPCC AR5 report and will continue to be presented in other instances.</li> </ul>
<b>National Natural Science Foundation of China (NSFC)</b>	<ul style="list-style-type: none"> <li>Healthy Ageing programme: Five projects making progress after a delayed start.</li> </ul>	<ul style="list-style-type: none"> <li>The programme is supporting collaborative research in an area of strategic importance for both the UK and China.</li> </ul>
	<ul style="list-style-type: none"> <li>One project in the EEID programme (with UK, US and Chinese partners) has been funded and is due to end in March 2024.</li> </ul>	<ul style="list-style-type: none"> <li>Programme is part of a political commitment which should ensure an audience for policy-relevant findings emerging from the funded activities in due course.</li> </ul>
<b>Japan Science and Technology Agency (JST-RISTEX)</b>	<ul style="list-style-type: none"> <li>UKRI-JST Joint Call on Artificial Intelligence and Society: Six projects commenced in January 2020. Five of them were granted extensions due to the COVID-19 pandemic and are expected to end in March and September 2023.</li> </ul>	<ul style="list-style-type: none"> <li>Projects are expected to provide a platform for effective and sustained dialogue and produce insights with opportunities for practical implementation and policy recommendations. An example of this is the contribution made by the project "The Emotional AI in Cities: Cross Cultural Lessons from UK and Japan on Designing for An Ethical Life" (ES/T00696X/1) to numerous policy reports including the United Nations Human Rights Council, UNICEF, amongst others.</li> </ul>

Case study	Progress so far	Future expected results
<b>Canadian Institutes for Health Research (CIHR)</b>	<ul style="list-style-type: none"> <li>UK-Canada Collaboration on AI progressing well, with 10 projects due to end between January and August 2023.</li> </ul>	<ul style="list-style-type: none"> <li>Diabetes and AI areas of research of strategic importance to both UK and Canada, and both expect to provide insights for both industry and policy makers, and support strengthening of transdisciplinary research collaboration across UK and Canada.</li> </ul>
	<ul style="list-style-type: none"> <li>UK-Canada Diabetes Partnership Initiative funded six projects expected to end in March 2023.</li> </ul>	
	<ul style="list-style-type: none"> <li>NSF NeuroNex funded four collaborative networks (with the UK participating in three, including two with Canada). All projects are due to conclude before the end of 2023.</li> </ul>	<ul style="list-style-type: none"> <li>NeuroNex expected to support development of international multidisciplinary teams across US, Germany, Canada, and UK.</li> </ul>
<b>MOST – Department for Biotechnology (DBT)</b>	<ul style="list-style-type: none"> <li>Across all programmes, the COVID-19 pandemic delayed the start of some projects or led to project extensions in other cases.</li> </ul>	
	<ul style="list-style-type: none"> <li>Tackling AMR in the Environment: Five projects running since autumn 2020, with some delays due to the COVID-19 pandemic. Three activities to coordinate across these projects took place in 2020, 2021, and July 2022.</li> </ul>	<ul style="list-style-type: none"> <li>Inform the development of strategies to limit environmental contamination from manufacturing AMR waste.</li> </ul>
<b>Swiss National Science Foundation</b>	<ul style="list-style-type: none"> <li>UK-India COVID-19 Partnership Initiative (Strategic Opportunities Stream). Four projects commenced in late 2021.</li> </ul>	<ul style="list-style-type: none"> <li>Improve understanding and prevention of COVID-19 among South Asian communities in the UK and India.</li> </ul>
	<ul style="list-style-type: none"> <li>Two parallel calls run one in each country, and 30 projects awarded, 21 by UKRI and 9 by the SNSF. Projects started in August 2022 are expected to end by August 2023. Too early to report outputs/outcomes.</li> </ul>	<ul style="list-style-type: none"> <li>Enable new research collaboration, support international mobility (especially amongst early career researchers), and strengthen existing collaborations in the partners' strategic areas.</li> </ul>
<b>Enterprise Singapore</b>	<ul style="list-style-type: none"> <li>Eureka Global Stars Programme has run two calls, funding 11 projects running for 3 years. Four projects funded in the first round have finished recently and those from the second round are expected to conclude by May-June 2023.</li> </ul>	<ul style="list-style-type: none"> <li>Both innovation agencies expect the new bilateral agreement to lead to: (i) new products and sales because of their collaborative R&amp;I in the strategic areas identified (advanced manufacturing and materials, agri-food tech, mobility and transport, health and life sciences, and cybersecurity); (ii) the emergence of more disruptive technologies and, and (iii) the development of new programmes to expand their collaboration.</li> </ul>
	<ul style="list-style-type: none"> <li>Global Incubator Programme has run 2 cohorts and involved 16 companies. Too early to report results of this programme.</li> </ul>	

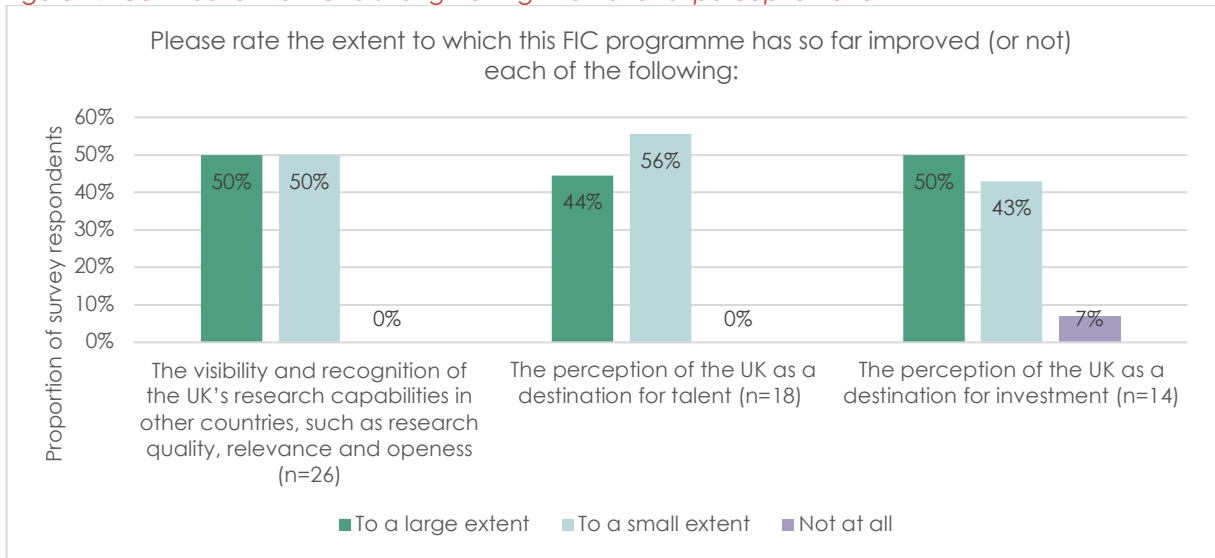
## 6 Strengthening the UK's collective voice in R&I policy (Obj. 2)

Finally, the second objective established for FIC was to support Department for Business, Energy and Industrial Strategy (BEIS, as was) and wider Government objectives, including science diplomacy, enabling the UK to strengthen its collective voice in research and innovation policy.

### 6.1 FIC is supporting wider Government objectives, mostly by helping to identify areas of common interest and adding value to science diplomacy efforts

Responses provided by programme leads suggest that FIC has contributed either to a large or small extent to improving the visibility and recognition of the UK's research capabilities in other countries (50% respectively), the perception of the UK as destination for talent (44% and 56% respectively) and the perception of the UK as destination for investment (50% and 43% respectively).

Figure 19 Contribution to FIC to strengthening international perception of UK



Source: Survey with FIC Programme Leads.

Furthermore, evidence emerging from funder level case studies (at both baseline and interim report) showcases that FIC is delivering on this objective by:





### **Acting as a platform to systematically identify joint opportunities & capabilities, and strategic areas of collaboration (Singapore, Japan, US, Switzerland, China)**

In the case of **Innovate UK and Enterprise Singapore**, stakeholders stated that FIC has improved their ability to identify strategic areas of collaboration. This has allowed them to build upon prior efforts, such as the alignment in priority policy areas reflected in Singapore's (Food Security) Agenda '30 by 30' (published in May 2021) and has also informed the thinking behind the MoU signed in December 2021. There is also the intention to explore further integration of the R&I ecosystems (e.g. exploring collaboration between UK catapults and Singaporean innovation centres).

**In the case of Japan**, both **ESRC and JST-RISTEX** agreed that the collaboration has enabled a better understanding of their partner's respective R&I systems and priorities. In particular, both partners have now seen evidence of the synergies in their priorities and alignment of their broader strategies, including the degree to which both countries focus heavily on AI research and their levels of investment in this area. As stated by one consultee from JST-RISTEX, they have "realised that there are no major differences between Japan and the UK; rather, they have many points in common".

**In the case of the US**, **UKRI and NSF** had already established lead agency opportunities between individual councils and directorates under a broad MoU on collaboration. Working jointly to deliver the FIC programmes has enabled each organisation to gain further knowledge about their partner's funding processes and organisational setup and has opened communication channels between key individuals. As one NSF stakeholder explained: "I'm more aware of UKRI's strategies, capabilities and priority research areas than I was [before FIC], just simply because I'm interacting with them more. We now have a lot of ideas where we might be able to work together in the future."

In the case of **Switzerland**, the FIC programme and partnership between **SNSF and URKI** have led to a clearer understanding of each other's strengths and capabilities in the strategic areas covered by the programme (Languages, Materials, Synthetic Biology and the Life and Physical Sciences interface, plus two cross-cutting themes: Artificial Intelligence (AI) and Big Data), particularly during the early stage of programme design. It is expected that this increased understanding will influence the next steps of collaboration.

### **Providing an opportunity to increase (or sustain) awareness of the UK as a potential partner (Canada, India)**

According to interviews from **CIHR (Canada) and UKRI**, FIC has also improved the perceptions of the UK as a science and innovation partner due to the scale of funding UKRI has been able to commit to international projects and success of UK researchers in securing competitive funding. For example, the UK was able to secure significantly more funding to NeuroNex (a US initiative that supports the development of large collaborative networks of international partners to advance research into the brain) than any other international partner involved in the programme.

In the case of **India**, **DBT** already considers the UK as a favoured partner, and joint calls with UK partners tend to generate a large number of applications. The FIC programmes are therefore helping to sustain a positive perception of the UK as a research and innovation partner. The fact that it is non-ODA funding also means that there is more space to explore areas of joint strategic importance. Stakeholders also highlight the need for more long-term funding to be able to consolidate the current (positive) position and remain India's partner of choice.



### Providing funding to fulfil/follow on from common aspirations/political commitments (Canada, China)

In the case of Canada, FIC has provided a valuable mechanism to deliver the aspirations in the MoU signed between **Canada Research Coordination Committee (CRCC) and UKRI**, with FIC-supported programmes representing the flagship initiatives of this agreement. For example, the *UK-Canada Collaboration on Artificial Intelligence* addresses and aligns with the priorities set out within this agreement and demonstrates a new level of collaboration between the two countries, with all major funding partners involved.

In the case of China, the UK has an established relationship with China at both government level (through the “Joint Commission” strategic process) and at the level of funding bodies (between **UKRI and NSFC**, including via biennial meetings). This ensures that priorities and joint opportunities are systematically identified independently of any specific funding programme. The FIC programme has contributed to government aims by supporting the implementation of the Flagship Challenge programme in Healthy Ageing, thereby following through on political commitments. Through this programme, FIC also intersects with the work of the SIN in China.

### Supporting further diplomatic efforts (Singapore, Japan, US)

FIC has provided **Innovate UK and Enterprise Singapore** a first opportunity to implement and fund a joint activity to support collaboration among innovators in both countries. In turn, the relationship between the UK and Singapore in the area of innovation is now one of the strongest aspects of the diplomatic relationship between the UK and Singapore, based on feedback received by Innovate UK from the British High Commission in Singapore.

In the case of Japan, and from the perspective of the SIN officer, the portfolio of FIC programmes with Japan has supported international diplomatic activities in Japan and improved the credibility and the strength of the **UK-Japan science relationships**. The FIC programme (including both the *UKRI-JST Joint Call on AI and Society* the *UK-Japan SSH Connections grants* programme), in addition to collaborations between the UK and Japan during the COVID-19 pandemic had fostered a positive impression of the UK and helped to offset Japanese concerns surrounding Brexit. Representatives from ESRC also agreed the FIC programmes supported sustained engagement and have helped to maintain momentum of the relationship between UKRI and Japan. Reflecting this, in December of 2022, the UK Science and Technology Minister announced the launch of the ISPF in Tokyo, specifically noting the importance of “deepening our collaborations with R&D powerhouses, like Japan”.<sup>16</sup> The Minister also detailed the continued interest in supporting research collaboration with Japan and mention a “range of joint projects including AI”.<sup>17</sup>

FIC is contributing to broader HMG goals in the US by encouraging, strengthening and deepening **UK-US scientific relationships**. Some FIC programmes align directly with UK government sector priorities in the US, e.g. *Signals in the Soil* and its potential contribution to net zero carbon goals, and a UK-US bilateral FIC programme focussing on offshore wind R&D<sup>18</sup>. In these areas, the FIC has enabled staff at UK Embassy and Consulates to deepen their UK-US engagement with relevant US funders and research communities.

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<sup>16</sup> <https://www.gov.uk/government/news/uk-science-and-technology-minister-launches-new-global-international-science-partnership-funding-in-tokyo-with-initial-1.19m-of-funding> (accessed January 24 2023)

<sup>17</sup> <https://policymogul.com/key-updates/26024/science-minister-s-speech-at-keio-university-in-japan> (accessed January 24 2023)

<sup>18</sup> <https://apply-for-innovation-funding.service.gov.uk/competition/502/overview> (accessed 7 Jan 2023)

### **Leveraging and adding value to other initiatives to support R&I collaboration (in particular the UK Science & Innovation Network, SIN) (US, Canada)**

In the **US**, FIC has served as “a useful calling card” for the SIN and has been profiled as an example of the UK’s commitment to partnership in discussions with US research and innovation stakeholders, including the US Department of Energy, State Department, and White House Office of Science and Technology Policy.

Evidence from the case studies also suggest that the FIC programmes delivered in partnership with **Canada** have been a fundamental driver to the appointment of a new role within the UKRI North America Offices, Head of Canadian Partnerships. This appointment, in part driven by the need for dedicated resource to support the delivery of the FIC programmes with Canada, will also serve to continue to strengthen and build on these relationships through further collaborations and to ensure coordination and coherence in the portfolio of future UK-Canadian collaborations.

## 7 Conclusions

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In conclusion, we find strong evidence that FIC is meeting its two high level objectives. For Objective 1 we find positive evidence of progress for two themes in particular (enabling funding and developing partnerships). Progress towards deepening R&I (Theme 3) is more evident in the area of international research/publications, with more mixed results for other R&I outputs. There is also evidence of FIC contributions to supporting international collaboration more widely and science diplomacy (Objective 2).

In terms of **Enabling funding (Theme 1)**, we look at this from two perspectives: at the funder level and the level of researchers and innovators. **At the funder level**, we find FIC has successfully delivered and attracted additional resources to fund international collaboration in research and innovation (R&I) with priority countries. In addition to UKRI's £160m investment, analysis suggests FIC has attracted £208m from partners in FIC programmes and additional £35m from partners in FIC projects.

FIC resources are relatively small in comparison with pre-existing investments made by UKRI for international collaboration (~3%). However, its main added value is more a matter of focus than scale, as it is aimed at enhancing funder level relationships that are more strategic and longer lasting (see Theme 2).

**At researcher and innovator level**, feedback from FIC participants (as well as evidence on the fate of unsuccessful proposals) suggests that a majority of the international collaboration projects supported through the programmes would not have gone ahead without the Fund, further showcasing the importance of FIC in enabling funding to support international collaboration with priority countries.

In terms of **Developing partnerships (Theme 2)**, we also look at this from two perspectives. **At funder level** we find that FIC has strengthened partnerships between UK and overseas funders, both within FIC programmes and beyond them, demonstrating that successful international collaboration is built over time. Most UK programme leads report significant improvements in mutual understanding and alignment with their overseas partners, as well their abilities to identify strategic opportunities for future collaboration.

The highest added value of FIC has been among partnerships that were relatively new (e.g. with specific funders in Canada and Singapore) and where FIC has provided a substantial (funded) opportunity to collaborate.

In terms of further benefits, beyond FIC, some funders have already taken concrete actions to carry forward the collaborations beyond their FIC programme. However, in other cases sustainability is less clear, in large part due to the uncertainty around dedicated UKRI funding to collaborate with those countries. Opportunities for collaboration with priority countries have been identified that cannot (yet) be taken forward (noting that fieldwork took place in 2022, before the announcement of the new International Science Partnerships Fund (ISPF) to support international R&I collaboration).

**At researcher and innovator level** we find that, through FIC-supported projects, UK participants have increased their ability to access knowledge, facilities and sources of funding overseas, while improving their skills and capabilities to work internationally. These were all areas identified at the baseline evaluation phase as strong motivators for applying for FIC funding.

UK participants reported that ~60% of their partners in FIC projects were from overseas, with the majority of these being new collaborators. All of those surveyed reported that this experience

had led to a better understanding of their partners' capabilities. Most also reported improved understanding of their overseas partner's research agenda, priorities and ways of working.

Where FIC projects have now ended, the majority (84%) of UK participants have been able to continue their relationship with their overseas partners from the FIC project through further grants or other means (twice the rate of unsuccessful FIC applicants).

In terms of **Deepening R&I (Theme 3)**, most FIC projects are still ongoing, with around half having experienced delays to their original timetable. However, good progress is now being made and three quarters expect to achieve their original objectives.

Already over 300 publications have emerged from FIC projects. While most UK participants already co-published internationally before FIC, the Fund has clearly had a positive effect on increasing that degree of collaboration (while not replacing pre-existing levels of activity). It is too early to observe the scientific impact of publications produced within FIC, but across UKRI/UK papers more generally, those with international collaborators tend to score more highly on citation metrics (a proxy of impact).

FIC projects have also started to produce other R&I outputs, particularly new research tools and methods, and research databases and models. However, for many projects it is still too early to have a complete view.

Additionally, FIC projects report good progress (so far) along Technology Readiness Levels (TRLs), where this is relevant. Finished projects have advanced nearly 2 TRLs on average since the time of application (compared with 0.6 TRLs progress for unsuccessful applicants over the same period). The number of FIC projects reaching high TRLs (8-9) is small, however, and there are few examples yet of commercial exploitation.

Evidence from case studies also suggest that there are various areas of potential future economic and social impact including:

- New knowledge into areas of strategic importance for countries involved (including the UK), with insights for policy makers and industry.
- New solutions in areas such as AI, environmental waste.
- Business acceleration (Singapore).

Finally, with regards to **Objective 2**, evidence emerging from funder level case studies (at both baseline and interim report) showcases that FIC is delivering on this objective by:

- Acting as a platform to systematically identify joint opportunities & capabilities, and strategic areas of collaboration (Singapore, Japan, US, Switzerland, China).
  - Providing an opportunity to increase (or sustain) awareness of the UK as a potential partner (Canada, India).
  - Providing funding to fulfil/follow on from common aspirations/political commitments (Canada, China).
  - Supporting further diplomatic efforts (Singapore, Japan, US).
  - Leveraging and adding value to other initiatives to support R&I collaboration (in particular the UK Science & Innovation Network, SIN) (US, Canada).
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