

July, 2023

Evaluation of the Fund for International Collaboration (FIC)

Interim Impact Evaluation - Appendix



Final 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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Appendix A Bibliometric analysis

A.1. Overview

For the purpose of this project, Science-Metrix used the Scopus bibliometric database, produced by Elsevier. Scopus provides comprehensive coverage of the scholarly literature (although there are caveats to this, discussed in the following sections) by indexing more than 43 million publications, published in some 50,000 peer-reviewed journals and conference proceedings since 1996. Scopus also provides the names and affiliations of all authors appearing in peer-reviewed publications, making it possible to identify publications produced by individual researchers and the institutions with which they are affiliated. The funding acknowledgements section was also used to identify articles supported by specific funding bodies.

The document types included in the Scopus analysis are articles, reviews, short surveys and conference proceedings. Unless stated otherwise, the tables and figures deriving from Scopus data include all the aforementioned document types. The version of the production database proposed for this project has complete coverage of articles published up until 2020.

A.2. UKRI/FIC supported publications

Articles supported by UKRI funds were retrieved from the Gateway to Research portal (version of August 2022, to allow for sufficient time to conduct the data cleaning and analysis and inform the first iterations of the report), and matched to the Scopus database (recall > 90%, precision > 98%). The acknowledgements section of the Scopus database was also scanned using specific keywords to add papers to the list (precision > 98%). This additional step added close to 130,000 articles to those found in Gateway to Research.

At this point in time there were 822 publications recorded in Researchfish and associated to FIC (considerably higher than the 195 publications found at the baseline stage). 472 out of 822 publications were found in Scopus. The 350 unmatched articles could not be found in the database 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 (i.e. a researcher that is named against a FIC grant in Gateway to Research).

A.3. Comparator groups

UK funding bodies. Many analyses include the breakdown of the UK scientific outputs based on their UKRI and/or EC FP support. Different combinations were defined (for example, all UKRI-supported articles, all articles supported by UKRI and the European Commission Framework Programme (EC FP), etc.).

Partner countries. International co-publications with FIC priority countries (Australia, Canada, China, India, Ireland, Israel, Japan, Norway, Singapore, South Korea, Sweden, Switzerland and the United States) were included.



Synthetic control group. The synthetic control (SC) group consists of Germany, Italy and France. These countries are considered similar in size and scientific importance to the United Kingdom (e.g. they represent the top four European countries for gross domestic expenditure on R&D in 2018¹), but they do not have programmes similar to FIC.

Sectoral analysis. The share of international co-publication was prepared at the sectoral level (all sectors vs private sector), with partner countries, and with each partner country taken individually. Different combinations based on the geographical location of the private collaborator were made. Comparisons also include the SC group in place of the UK. The academic sector was not presented separately as it constitutes the main component of the overall scientific contribution. All publications involving at least one author from the private sector were considered private. The numbers are currently very small and so we have not presented these within the main report. We will return to this analysis for the final evaluation when we hope to have a greater number of datapoints.

A.4. Breakdown by FIC programmes

The limited number of FIC-supported publications still does not allow for breakdown by programme as the number of publications per programme do not allow the computation of the bibliometric indicators at this level of analysis. However, it is important to note, from the original list of publications from Gateway to Research, that the programme “FIC-18 SSH Pump-Priming with Japan” was responsible for 30% of all the papers (before matching to Scopus), which should indicate that the results reported this year are mostly influenced by the output of this specific programme.

A.5. Weighting of indicators to reflect the distribution of FIC publications across subfields

All indicators of share of international co-publication in the country-level analysis were weighted to reflect the distribution of FIC publications across scientific subfields.

Otherwise, comparisons with the various groups (subgroups of UK publications, papers by SCs) could have provided an unfair reference against which to compare FIC. FIC is not expected to produce publications in all fields of science, and its production may not be distributed the same way as, for example, national production in the United Kingdom, Germany, France or Italy. The weighted indicator was then computed to account for differences in practice of international collaboration across different fields of science.

A.6. Additional Results

The main results from the analysis are presented in the Main report. This subsection contains additional information and tables to further support the results presented in the main body of the report.

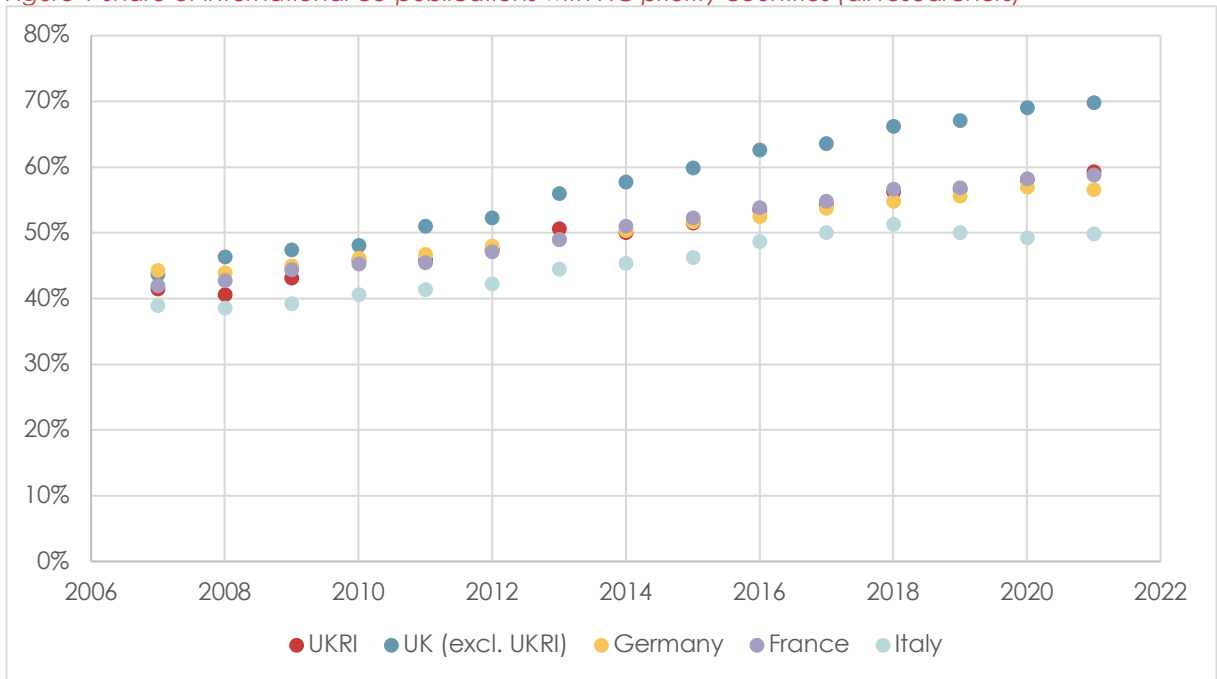
A.6.1. Share of international publications

Bibliometric data shows that **the UK overall** has increased its level of collaboration (on papers) with FIC priority countries over time (see Figure 1).

Note also that collaboration with FIC priority countries is higher across all UK groups in comparison with Germany, France, and Italy (and growing faster).

¹ <https://data.oecd.org/rd/gross-domestic-spending-on-r-d.htm>

Figure 1 Share of international co-publications with FIC priority countries (all researchers)



Source: Technopolis and Science Metrix based on data from GtR, Researchfish, and Scopus (2023)

A.6.2. Scientific impact

As explained in the Main Report, there is the expectation that this degree of international collaboration will contribute positively to the research being conducted and deliver higher scientific impact. 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 presented in Table 1 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 is 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 1 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 Table 2 and Table 3).

Table 1 Average of relative citation (ARCw)

Country/Funding sources	ARC	ARC (for papers that include at least one international collaborator)	ARC (3) (or papers that include at least one international collaborator from a FIC priority countries)
	2014-18	2014-18	2014-18
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
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)

Table 2 Citation distribution index (CDI)

Country/Funding sources	CDI (1)	CDI (2) (for papers that include at least one international collaborator)	CDI (3) (or papers that include at least one international collaborator from a FIC priority countries)
	2014-18	2014-18	2014-18
UK papers	7.9	15.3	17.4
UKRI papers	18.1	21.6	23.0
UK papers without UKRI	4.4	12.7	14.9
Germany	2.0	13.3	15.8
France	-1.3	10.7	14.4
Italy	4.4	13.2	15.8

Source: Technopolis and Science Metrix based on data from GtR, Researchfish, and Scopus (2023)

Table 3 Share of papers among the top 10% most highly cited papers (HCP10)

Country/Funding sources	HPC10 (1)	HPC (2) (for papers that include at least one international collaborator)	HPC10 (3) (or papers that include at least one international collaborator from a FIC priority countries)
	2014-18	2014-18	2014-18
UK papers	1.5	2.0	2.2
UKRI papers	2.1	2.5	2.8
UK papers without UKRI	1.2	1.7	2.0
Germany	1.1	1.7	2.0
France	0.9	1.5	1.8
Italy	1.0	1.6	1.9

Source: Technopolis and Science Metrix based on data from GtR, Researchfish, and Scopus (2023)



Appendix B Case Studies

B.1. Introduction

A series of longitudinal case studies are being developed for the FIC evaluation, each focusing on a specific international funder in a priority country. These cases are seeking to 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). The common structure for each case is as follows:

- **Summary** of key findings in relation to progress / achievements
- **Introduction** to the focus of the case and relevant FIC programmes
- **Pre-FIC relationships** between the overseas organisation and UK partners before FIC
- **Programme origins**, rationale and development
- **Progress** of programmes, including enabling factors, barriers, risks and lessons learnt
- **Programme activities, outputs and outcomes**, across the 2 FIC objectives and 3 themes
- **The future**, in terms of future benefits expected and the sustainability of benefits seen
- *Sources and programme overviews*

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 longitudinal case studies were being developed (each focusing on a specific funder in **China, the US, Canada, India and Japan**). The first iteration of each of these cases (2021) was summarised within and appended to the Baseline Evaluation Report.

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 smaller cases (each focusing on a specific funder within **Singapore and Switzerland**).



B.2. United States National Science Foundation Geosciences

B.2.1. Summary

The United States National Science Foundation (NSF) Geosciences Directorate (NSF GEO) is a partner in three FIC programmes, which are led by NERC with participation from other councils.² After initial delays due to the COVID-19 pandemic, implementation of these programmes is now progressing without any major challenges. Whilst most projects have requested extensions, programme leads were satisfied with project progress, the release of funding through FIC and match-funding from partners.

In the current phase, programme implementation provides a platform for regular interactions between the NERC and NSF FIC leads. The leads agreed that this brings with it the opportunity for exchanging information on research strategies and priorities more broadly, including identification of potential future collaboration areas. Furthermore, programme workshops increase opportunities for interaction and relationship building, both between funders and researchers.

Objective 1: Enabling international collaboration

Theme 1: Enabling funding - At this interim stage, NERC and NSF leads of the FIC programmes selected for this case study are actively discussing areas of mutual interest in anticipation of a call for programme proposals. These discussions include additional NSF Divisions and Directorates which could increase the overall budget of future joint programmes. However, stakeholders pointed to the risk that the timeline of a future call will be incompatible with current US partners' funding cycles. UK programme leads explained that uncertainty around future funding is also putting on hold partnership discussions with other US agencies, beyond NSF. At the researcher level, the FIC programmes have increased planning activities for future collaboration. Two interviewees felt that this may be contributing to a rise in the level of research proposals under the lead agency opportunities, both between NERC and NSF GEO and EPSRC and the NSF Engineering Directorate (NSF ENG).

Theme 2: Deepening R&I - The three FIC programmes involving NERC and NSF GEO are enabling UK and US researchers to access each other's world-leading expertise and facilities. At this interim stage, outputs are starting to emerge, e.g. publications, follow-on funding and policy advice. NSF and UKRI staff highlighted the FIC programmes' success in building international research links across traditional disciplinary boundaries and communities, in key areas of interest to UKRI. As projects continue to collect data and enter their final stages, interviewees expect further outputs to emerge.

Theme 3: Developing partnerships – NSF and NERC staff explained that FIC programme implementation over the past 18 months has further increased familiarity and trust between their teams, which has helped to solidify relationships. Due to its interdisciplinary nature, one of the programmes, *Signals in the Soil*, has also increased communication and working across multiple UKRI councils and NSF Directorates. Implementation of the three FIC programmes has provided partners with insights into each other's research priorities and enabled discussions on research challenges of mutual interest to take forward. For *Signals in the Soil* and *Changing North Atlantic Ocean and its Impact on Climate*, this is helping to identify potential areas of expansion for Lead Agency opportunities. UKRI interviewees explained that individuals at the

² The NERC-NSF GEO relationship was selected for a case study due to the number of FICs (3) that span the two organisations. This case study focusses on outputs/outcomes and learning from these three FIC programmes; other NSF-UKRI FIC programmes are not included in this analysis.

NSF involved in implementing the current FIC programmes play a key role as advocates and advisors on how to set up processes that satisfy both NSF and UKRI regulations. In the context of the relationship with NSF GEO and NSF ENG, this knowledge feeds into continuous improvements to NSF and UKRI's Lead Agency opportunities and other processes supporting collaboration.

Objective 2: Supporting BEIS and wider objectives including science diplomacy

NSF stakeholders reported in interviews that implementation of the FIC programmes profiled in this case study has increased their understanding of UK priorities and UKRI strategies, capabilities and research areas of interest. The programmes have also allowed the UK and US research communities to build closer links. In the emerging area of *Signals in the Soil*, NSF staff felt that FIC had enabled a broader and deeper understanding of UK research capabilities across disciplines, including showcasing UK research facilities to US experts.

A.1.1. Introduction and context

The **National Science Foundation (NSF)** is a federal agency of the United States (US) government that supports fundamental research in all non-medical fields of science and engineering. Its US\$8.8bn budget for 2022 (£7.3bn³) funds approximately 25% of all federally supported basic research conducted at academic institutions in the US.⁴ The agency comprises eight directorates spanning science and engineering research and education.⁵ Overall, NSF is a key partner in FIC, with nine FIC programmes involving NSF Directorates.

The NSF **Geosciences Directorate (NSF GEO)** supports research in Atmospheric, Earth, Ocean and Polar sciences. The Directorate's 2022 budget amounted to around US\$1bn (£830m).⁶

The NSF GEO Directorate is a partner in the following three FIC programmes⁷:

- *Delivering Healthy Soils: Signals in the Soil* (FIC-26, WAVE1), led by NERC and the NSF Engineering Directorate (NSF ENG) with participation of BBSRC, EPSRC, STFC, NSF GEO, NSF Biosciences Directorate (NSF BIO), NSF Computer and Information Science and Engineering (NSF CISE), and the US Department of Agriculture's National Institute of Food and Agriculture (USDA-NIFA). Funded through £8.3m from FIC and US\$8m/£6.6m (plus in-kind contributions) in match funding from the US.
- *Changing North Atlantic Ocean and its Impact on Climate* (FIC2-02, WAVE2), led by NERC and NSF GEO's Division of Ocean Sciences with involvement from the Met Office Hadley Centre. Funded through £5.1m from FIC and US\$16.5 (£13.7m) (plus NSF ship-time costs) in match funding from the US.
- *Climate, Environment and Health* (FIC-23, WAVE1), delivered through the Belmont Forum, with participation of NERC, MRC, ESRC, NSF GEO, US National Oceanic and Atmospheric

³ Conversion rate of 27 February 2023:: US\$1 = £0.83. Used here and throughout the case study.

⁴ <https://nsf.gov/about/> (accessed 3rd Nov 2022)

⁵ <https://beta.nsf.gov/news/nsf-establishes-new-directorate-technology> (accessed 3rd Nov 2022); one directorate, the Directorate for Technology, Innovation and Partnerships, was established within the timeframe of the FIC in March 2022

⁶ <https://www.nsf.gov/about/congress/119/highlights/cu22.jsp> ; https://www.whitehouse.gov/wp-content/uploads/2022/03/nsf_fy2023.pdf (accessed 3rd Nov 2022)

⁷ Technopolis Evaluation of the Fund for International Collaboration. Baseline and Interim Process Evaluation – Technical Report (2021)

Administration, US National Institutes of Health, and other Belmont Forum members.⁸
Funded through £2.8m from FIC and £6.7m in match funding from international partners.

The case study was developed based on desk research and consultation with twelve representatives from NSF, NERC, BBSRC, the UKRI North America Office, and the UK S&I Network. A full list of interviewees is given at the end of the case. The case focuses primarily on the *Signals in the Soil* (FIC-26) and *Changing North Atlantic Ocean* (FIC2-02) programmes.⁹

A.1.2. Pre-FIC relationships

NSF and UKRI have a strong, mature relationship and a long history of collaboration in supporting research through bilateral activities and multilateral arrangements. In 2013, NSF and Research Councils UK (UKRI's predecessor) signed a high-level Memorandum of Understanding (MoU) stating their intention to investigate opportunities for collaboration.¹⁰ This MoU is very broad in nature — more so than MoUs between NSF and other international funders — and hence enables partnering across many research areas. Under the MoU, several “lead agency opportunities” between research councils and NSF Directorates were established which facilitate bottom-up collaborations between UK and US based Principal Investigators (PIs) through a single peer review process. Hence, trust and familiarity between UKRI councils and parts of NSF had been established prior to FIC. The high-level MoU is due to be renewed in 2023.

The relationship between NERC and NSF GEO has a long history. Much of NERC's and NSF GEO's remits are inherently international, e.g. research on climate change and investments in large research infrastructures spanning international borders. To facilitate international collaboration, NERC and NSF GEO co-founded the Belmont Forum in 2009¹¹ and established a lead agency opportunity in 2015.¹² Since then, they have partnered on a range of joint research programmes.

UKRI's interest in partnering is underpinned by NSF's scale of funding and the high quality of research it supports, as well as the organisations' shared values and common approach to research and research funding.¹³ NSF GEO also collaborates with other international partners. However, the partnership with NERC is unique due to the lead agency mechanism, where NSF GEO co-funds projects that were reviewed by NERC (and vice versa).

A.1.3. Programme origins and development

Of the three FIC programmes which involve NSF GEO, two built on existing funder-to-funder relationships and collaborations: the *Changing North Atlantic Ocean* programme (FIC2-02) enables the continuation and extension of an existing joint initiative, while the *Climate, Environment and Health* programme (FIC-23) takes place within the established processes of the Belmont Forum. The third programme, *Signals in the Soil* (FIC-26) represents a new relationship: the opportunity originated with a personal contact between individuals at NERC

⁸ The Belmont Forum is a partnership of 22 funding organisations, international science councils, and regional consortia committed to the advancement of transdisciplinary science providing knowledge for understanding, mitigating and adapting to global environmental change. The Forum funds translational environmental change research through Collaborative Research Actions. Both NSF and NERC are full members.

⁹ FIC-23 is delivered through the Belmont Forum; as a partnership of 22 funding organisations, individuals we interviewed/approached for interview commented that interactions as part of this FIC programme were not specific to NERC-NSF GEO relationship.

¹⁰ https://www.nsf.gov/news/news_summ.jsp?cntn_id=129002 (accessed 3rd Nov 2022)

¹¹ <https://nerc.ukri.org/research/partnerships/international/belmont/> (accessed 3rd Nov 2022)

¹² <https://nerc.ukri.org/funding/available/researchgrants/international/> (accessed 3rd Nov 2022)

¹³ Technopolis Evaluation of the Fund for International Collaboration. Baseline and Interim Process Evaluation – Technical Report (2021)



and NSF ENG, two organisations that had not partnered previously. However, NSF ENG was already familiar with UKRI's approach having worked with EPSRC through a lead agency opportunity.

Delivering Healthy Soils: Signals in the Soil (FIC-26) aims to develop new solutions for delivering healthy and resilient soils to improve food security, climate change mitigation and public health. It is an interdisciplinary programme in an emerging area of research, integrating basic soil science with sensor, network, and data approaches to improve research and monitoring capabilities and thus lead to a better understanding of soil health. NSF had run a first call for proposals for *Signals in the Soil* in 2018, prior to FIC.¹⁴ The announcement of FIC provided an opportunity for NERC to partner with NSF on this topic of mutual interest and bring other UK research councils into the partnership. NSF and UKRI co-designed the 2019 call for project proposals, which was also supported by USDA.¹⁵ In 2020 and 2022, NSF and USDA launched further calls, without UKRI participation (as FIC funding only covered the 2019 call).¹⁶

Changing North Atlantic Ocean (FIC2-2) measures currents in the sub-polar North Atlantic Ocean to improve climate predictions for the UK and Northern Hemisphere and modelling of impacts of subpolar variability on climate change. The programme enabled NERC to continue a (pre-FIC) collaboration with NSF GEO using existing infrastructure, the Overturning in the Subpolar North Atlantic Program (OSNAP) observing system, launched in 2014 by NERC and NSF GEO.¹⁷ NERC's original investment in OSNAP only covered four years of data collection; FIC provided funding for data capture and analysis for a full ten years, until 2023, and for project teams to integrate OSNAP with other data sources to maximise research insights. NERC and the Physical Oceanography programme within NSF GEO had previously funded research through the lead agency mechanism. However, the larger scale of the FIC opportunity compared to individual lead agency projects motivated the NSF GEO team to engage in discussions at the funder level and co-design a directed marine science programme.

Climate, Environment and Health (FIC-23) aims to generate new knowledge, evidence and tools that enable health systems globally to prepare for and manage population health risks as a result of climate change. The multi-national programme is delivered through the Belmont Forum. FIC funding was an important signal to the Belmont Forum as UKRI had not been able to provide budget for a call in several years.¹⁸ As processes for multilateral collaboration were already well established within the forum, the partnership was able to proceed very quickly. Scoping for a second *Climate, Environment and Health* call is currently led by the US funders¹⁹; UKRI participation in a future call is not yet confirmed.

A.1.4. Progress, enabling factors, barriers, risks and lessons learnt

Programme progress

After initial delays due to the COVID-19 pandemic, implementation of the programmes is now progressing without any major challenges. Programme leads were satisfied with project

¹⁴ <https://nsf.gov/pubs/2018/nsf18047/nsf18047.jsp?org=NSF> (accessed 3rd Nov 2022)

¹⁵ <https://www.nsf.gov/pubs/2019/nsf19556/nsf19556.htm> (accessed 7 Nov 2022)

¹⁶ <https://www.nsf.gov/pubs/2020/nsf20548/nsf20548.htm>, <https://www.nsf.gov/pubs/2022/nsf22550/nsf22550.htm> (accessed 3rd Nov 2022)

¹⁷ Technopolis Evaluation of the Fund for International Collaboration. Baseline and Interim Process Evaluation – Technical Report (2021)

¹⁸ Technopolis Evaluation of the Fund for International Collaboration. Baseline and Interim Process Evaluation – Technical Report (2021)

¹⁹ Belmont Forum: Climate, Environment and Health Collaborative Research Action (CEH2) <https://www.youtube.com/watch?v=A6Jk9E6NYvM> (accessed 21 Nov 2022)



progress, the release of funding through FIC was described as 'on target' or 'slightly behind', and match funding from international partners was 'on target' or 'very ahead'. Due to the initial delays, most projects have by now requested (and been granted) an extension. The pandemic also affected planned researcher meetings: While the first meetings were delayed and virtual rather than in-person, the second meetings used (or will use) a hybrid model.

The NSF-UKRI-USDA **Signals in the Soil** programme supports ten projects with funding of £7.7m from FIC, US\$7.2m (£6.0m) from four NSF Directorates, and US\$800,000 (£664,000) from USDA (alongside in-kind contributions) which were described as "spanning the engineering, biology and environmental sciences quite nicely".^{20,21} The review process was led by NSF in partnership with UKRI. One NERC stakeholder compared this experience favourably to previous interactions several years ago with NSF ("For this programme, we were full partners.").

Research was due to start in January 2020. However, the COVID-19 pandemic led to substantial delays and most projects have now been granted extensions. This includes an additional £150,000 from the FIC budget for costed extensions to two projects, allowing project staff to be retained to complete data collection and analysis.

The partners also organised two programme workshops. The first workshop in September 2020 was virtual due to COVID-19 travel restrictions; the second workshop took place at Rothamsted Research (UK) in May 2022 and employed a hybrid format. Most UK participants and some of the US attendees attended in person (approximately 35 in total), with around 120 participants (mainly from the US) participating virtually. The workshops brought together research teams, funders, as well as business stakeholders. Participation of US businesses was facilitated by the UK SIN in the US for the first workshop; for the second workshop, InnovateUK arranged for a small number of UK SMEs (3-4) to attend. A third programme workshop is expected to take place in the US in 2024.

In addition to the open call, *Signals in the Soil* offers UK early career researchers funding to visit US project partners, in order to carry out joint work, learn new techniques and deepen the collaboration further. The scheme is financed from unallocated FIC budget, with a total of eight visits anticipated; some of these have already taken place. In turn, the NSF set aside US\$50,000 (£41,500) to provide US researchers with the opportunity to apply for supplemental funding, e.g. to cover travel costs to the UK or provide research materials for visiting UK researchers.

The NERC-NSF **Changing North Atlantic Ocean** programme enabled the upkeep of the OSNAP observing system — which would have not been possible without collaborating internationally — and will continue measurements of ocean currents until July 2023 through £1.7m from FIC and US\$15.5m (£12.9m) from the Ocean Science Division within NSF GEO. In addition to the infrastructure investment (the array), two research projects that bring together data from OSNAP and other data sources were funded with £2.6m from FIC and US\$1m (£830,000) from NSF GEO.

Both projects have requested an extension (of 3 and 9 months) due to delays caused by the COVID-19 pandemic. The first meeting with FIC-funded researcher teams and the advisory group followed a virtual format with plans for the second meeting to be held in-person.

²⁰ https://www.eurekalert.org/pub_releases/2020-02/nsf-ns7021320.php (accessed 3rd Nov 2022)

²¹ Technopolis Evaluation of the Fund for International Collaboration. Baseline and Interim Process Evaluation – Technical Report (2021)



The Belmont Forum programme on **Climate, Environment and Health** launched a call for proposals in March 2019, involving 13 funders from nine countries, including four US agencies.²² Nine projects were funded in total and started in January 2020, with an anticipated end date of December 2022. Of these projects, seven include UK research teams and four are led by UK PIs. FIC provided £3.4m in funding, with match funding of £6.7m from across eight international funding agencies. At least three of the projects funded by NERC have received 6- to 12-month extensions due to delays caused by the COVID-19 pandemic.

Enabling factors, barriers and risks

Programme staff from both NERC and NSF agreed that **enabling factors** for the partnership include the pre-existing relationship and established collaboration framework between NSF and UKRI, the larger scale of FIC funding which incentivises engagement at the funder level, and, in the early phases of the programmes, the support provided by the UKRI North America Office.²³ The programme leads at NERC and NSF already had experience of joint funding through establishing and running the lead agency opportunity which provides investigator-led bottom-up funding to PIs. NERC's partnership with the NSF for *Signals in the Soil* was further facilitated by the fact that the NSF had already funded a (US-focussed) call for this programme in the previous year, thus establishing the call framework which UKRI could quickly 'join' (rather than having to engage in planning discussions 'from scratch').

In the current phase, implementation of the FIC programmes provides a platform for regular interactions between NERC and NSF leads. This brings with it the opportunity for exchanging information on research strategies and priorities more broadly, including identification of potential future collaboration areas. As one of the stakeholders explained: "The FIC has made me more familiar [with the partner's R&I strategies and policies, the UK research funding system, and the UK's priority research subject areas]. We sometimes share strategy and thinking. And if we didn't have this [the FIC] context to talk about it, we would probably not have been as open. So there are some ways that it helps."

Programme workshops further increase opportunities for interaction and relationship building, both between funders during the planning stages and between researchers as part of the meeting. For example, as a stakeholder commented on the *Signals in the Soil* workshop in May 2022: "We had a lot of conversations in the build-up to that workshop - we were talking every month, and every few weeks towards the end. We participated fully and they participated fully as well." These planning discussions also brought in partner research councils, e.g. the BBSRC and EPSRC, supporting interactions with the NSF lead as well as across councils. A third workshop, planned for the end of 2023/early 2024, will allow further strengthening of the relationships and discussion of future partnership plans.

On a process level, the flexibility of the FIC mechanism vis-à-vis extensions for research projects was highlighted as an enabler. NSF staff also pointed out in interviews that while differences in funding agency regulations and processes can be challenging to navigate, they can also complement each other; e.g. the ability of UKRI to actively convene and fund researcher workshops was seen as an important enabler, with NSF providing travel budget as part of the research grants.

No barriers to implementation were identified at this stage of the FIC programmes. As one interviewee explained: "I think we have a solid relationship with the NSF. And that has

²² <https://www.belmontforum.org/cras#ceh2019> (accessed 4 Nov 2022)

²³ Technopolis Evaluation of the Fund for International Collaboration. Baseline and Interim Process Evaluation – Technical Report (2021); stakeholder consultation Oct 2022



continued. They haven't raised any issues, they haven't raised any funding problems. It's been very straightforward."

Two complicating factors for the programmes, already highlighted at the baseline stage, were:

- **Timing:** During the proposal stage, the timeframe for submission limited the extent to which programme details could be discussed. This posed challenges in terms of securing match-funding (and jeopardised programmes coming together) due to different budget cycles and the ability to commit funding within a short period of time.
- **The COVID-19 pandemic:** External to FIC, the COVID-19 pandemic had a negative impact on relationship-building between funders and between the research communities. With travel restrictions precluding face-to-face meetings, early workshops and discussions had to take place virtually, limiting opportunities for informal 'coffee break conversations' and networking with the broader stakeholder community. In-person meetings resumed in 2022 following lifting of travel restrictions.

At the baseline stage, stakeholders voiced concerns that a lack of certainty around follow-on funding acted as a barrier to planning future partnerships with NSF counterparts. At this interim stage, programme leads are actively discussing areas of mutual interest, in anticipation of a call for programme proposals in the near future, again with a very short timeline. These discussions have been enabled by the positive experience of implementing the FIC programmes, and the trust built between the partners as a result. However, NSF staff pointed to the risk that the timeline of a future call will be incompatible with budget timelines of US partners – highlighted for both the NSF and the USDA – with the result that planned collaborations cannot be taken forward for this reason. NERC staff explained that uncertainty around future funding and expectations of a short timeline is also limiting the partnership discussions to NSF, as an established partner. While there is interest to widen collaborations and include other US research funding agencies, it was felt that timelines would be too short to allow the necessary relationship building and planning to take place.

A.1.5. Programme activities, outputs and outcomes

Objective 1: Enabling international collaboration

Theme 1: Enabling funding

FIC is enabling the strengthening of the partnership between UKRI and NSF, beyond the lead agency opportunity mechanism which funds individual research projects, by allowing joint programmes at larger scale and with broader scope. The level of funding made available through the FIC has facilitated engagement and partnering at the funder level. At this stage of the partnerships, implementation of FIC programmes is driving regular interactions (e.g. programme meetings) which further deepens familiarity and trust in each other's processes and provides opportunities for information exchange and discussion of potential future collaboration between NERC and NSF. As a result, NERC and NSF leads have now identified research topics of mutual interest and are discussing options for future collaboration. This has the potential to expand to include additional NSF Divisions and Directorates and increase the overall share of budget for joint programmes (see section A.1.6).

Signals in the Soil is enabling research that crosses the traditional organisational and disciplinary boundaries. UKRI staff explained that due to the programme's interdisciplinary nature, its implementation increased communication across UKRI councils over the past four years and has led to enhanced familiarity with each other's organisational structures (see Theme 3: Developing Partnerships). *Vis-à-vis* the NSF, *Signals in the Soil* has provided a focal point for the lead agencies, NERC and NSF ENG, to work with multiple research councils and NSF

directorates spanning across disciplines. If projects had been funded through the lead agency opportunity mechanism, they would have been limited to one agency partner and hence could not have achieved the interdisciplinarity required for this area of research. Even within the UK, UKRI staff felt that the programme brought together otherwise relatively siloed research communities, e.g. soil sciences and engineering (sensor development). As one stakeholder commented, the *Signals in the Soil* call “created an instance where researchers reached out to each other that maybe had not done so before”.

At the researcher level, implementation of FIC-funded projects over the past years has led to an increase in planning activities for future collaboration, including for collaboration across several current project teams. For example, programme staff were aware that *Signals in the Soil* teams are discussing combining a suite of sensors from across projects for collaborative data collection and analysis; another project is planning to submit a proposal for a technical workshop to bring together the community. These activities are based on interactions facilitated by the FIC programme. As one interviewee explained: “I think the collaborations will only happen because they [the researchers] are all involved in the same programme. [...] If they had been running single projects on responsive mode, discovery science, there wouldn't be any interaction between the projects. The FIC programme has created these interactions.” Similarly, researchers brought together by an advisory panel meeting of the *Changing North Atlantic Ocean* programme identified a technical issue in the area of modelling. This prompted the organisation of a further meeting with NERC to assess the scope of the challenge and discuss the level of funding required to address it.

Stakeholders also noted an increase in the level of research proposals under the lead agency opportunities, both between NERC and NSF GEO and EPSRC and NSF ENG. Connections made through the FIC programmes and increased awareness of options for — as well as interest in — UK-US collaboration may be contributing to this rise. More broadly, interviewees from the NSF explained that the increase in international collaboration activity through the FIC (as well as the lead agency opportunities) has started to raise interest with some directorates that have not yet established lead agency opportunities, which may lead to their participation in the future. This would not only expand the areas of research collaboration but could also increase the overall share of budget available for NSF-UKRI projects.

Theme 2: Deepening R&I

The NERC-NSF FIC programmes are enabling UK and US researchers to access each other's world-leading expertise and facilities, thus accelerating progress.

Signals in the Soil is enabling the UK research community to access relevant academic expertise in the USA, “a bigger, broader, wider community, which is probably more advanced than the UK community in areas such as signal sensing”. One stakeholder held the view that the quality of research would not be as high if conducted at a UK national level, as “going to a different country, particularly the United States, is going to give you that extra pool [of expertise] to draw upon and a different perspective.” Vice versa, the US community was able to gain insights into UK research capabilities and unique centres, such as world-wide longest-running longitudinal study at Rothamsted Research which they were able to see first-hand as part of the 2022 programme meeting. The funders also engaged on aspects of the wider research environment. For example, the programme workshop in May 2022 included a plenary session on equality and diversity. Bringing together experiences from the UK and US contexts was described as adding important perspectives which can now be used to inform future funding calls, at national or international level. NERC and NSF are planning to include a further session on this topic at the final programme workshop.

Programme leads felt that research projects funded through *Signals in the Soil* are progressing “as would be expected”. Examples of progress include the development of sensor prototypes which are ready to be deployed for testing, data collection and modelling; in other projects, researchers are now sharing and combining datasets from UK and US sites for analysis. The programmatic nature of *Signals in the Soil* is building a community of researchers funded through the same programme. One stakeholder explained: “Having a focussed programme helps to give it a critical mass of research opportunities, which would not be possible through individual proposals. The programme facilitates shared learning and collaboration between projects, within the community.”

The *Changing North Atlantic Ocean* programme is allowing researchers in the UK and the US to implement and use large infrastructure that would be too costly for a single national funder. NERC and NSF staff explained that the OSNAP array, the underlying infrastructure, relies on international partnership. The research projects brought together the strengths of the UK and US research communities which “gets you the best of both worlds”. The programme also facilitated collaboration across research communities, e.g. by establishing direct links and enabling coordination between scientists collecting data and experts in climate modelling who use the data.

Outputs from the *Changing North Atlantic Ocean* programme are starting to emerge. One of the projects informed the IPCC AR5 report and special report on the ocean cryosphere.²⁴ The project also presented to policy makers at the COP26 meeting. The other project has resulted in 22 publications to date.²⁵ There are some initial indications from the research that the current model for how the North Atlantic Ocean affects climate needs to undergo substantive modifications. Many of the research findings stemming from the *Changing North Atlantic Ocean* programme will be showcased at a meeting at the Royal Society in December 2022.²⁶

Projects funded through the *Climate, Environment and Health* programme are starting to yield outputs and outcomes. For example, following on from the *Pollination of Nepal's Micronutrient-rich Crops in a Changing Climate* project led by the University of Bristol, the PI secured further funding through the UK government's Darwin Initiative.^{27,28} Another project on the impact of heat exposure on maternal and neonatal health, led by the London School of Hygiene and Tropical Medicine, has resulted in eight publications to date and presented findings to policy makers at the COP26 meeting in November 2021.²⁹

Funded projects are continuing to implement their research plans as set out in proposals. Between now and the final evaluation in 2024, some projects may have completed analysis and published results; however, it is likely that many will not be at this stage until a later point in time, especially if they started late due to the COVID-19 pandemic and have been granted extensions.

One of the mechanisms for strengthening links between (and within) the US and UK communities are the programme workshops. These provide an opportunity to share findings

²⁴ <https://gtr.ukri.org/projects?ref=NE%2FT008938%2F1> (accessed 4 Nov 2022)

²⁵ <https://www.ukosnap.org/results-and-publications> (accessed 4 Nov 2022); some of these publications are likely to have been at least partially supported by prior / other grants.

²⁶ <https://royalsociety.org/science-events-and-lectures/2022/12/atlantic-overturning/> (accessed 21 Nov 2022)

²⁷ A UK government grants scheme that helps protect biodiversity, the natural environment and the local communities that live alongside it in developing countries

²⁸ <https://www.darwininitiative.org.uk/project/DAR29001/> (accessed 4 Nov 2022)

²⁹ <https://gtr.ukri.org/projects?ref=NE%2FT013613%2F1#/tabOverview> (accessed 4 Nov 2022)

and learning from research projects as well as enable researchers to build relationships and discuss their work more broadly in informal settings. To support the community building in the emerging research area of *Signals in the Soil*, NSF included a requirement for one US PI and one student from all projects, across calls, to participate in these meetings. As a result, the workshop continues to expand in size - and hence in opportunities for UK participants to network and interact with a wide range of US research groups, leveraging the FIC programme investment beyond its original scope. The growing UK-US links have included interactions between UK research groups and several US research centres, which are likely to present opportunities for international partnering on a larger scale in the future. As one stakeholder explained: "The FIC created a space where their [the US research centre's] international partner is something like 'pre-packaged'." In addition, industry-focussed sessions during the workshops have provided UK researchers with insights into the US and UK early business / start-up environment, and the needs of large industry stakeholders. NERC staff commented that in the future, this could inform the approach academic groups take when bringing their technologies, such as new sensors, to market. Working with InnovateUK, the workshop also enabled UK SMEs to showcase their technology to the US community, bringing valuable exposure to an international audience.

Theme 3: Developing partnerships

The NERC-NSF FIC programmes provide a platform for regular interactions between individuals at UKRI and NSF. This has increased familiarity and built a high level of trust between the lead partners, helping to solidify UKRI-NSF relationships further. These FIC programmes are now providing a model for the design and implementation of UKRI-NSF collaborations ("It's a model for how to get around sticking points due to the different set-ups of our organisations [...]. There is now a precedent for what works for both agencies."). In addition, FIC programme leads highlighted that interactions through the FIC programmes have provided them with insights into NSF and UKRI research priorities and enabled discussions on research challenges of mutual interest ("where we can go next"). Thus, the programme leads are looking to continue their partnership and have identified specific areas of interest for future joint activity which fits "their and our strategies".

Based on the positive experience of *Signals in the Soil*, UKRI, NSF and USDA are discussing research topics of mutual interest. A plenary session at the workshop in May 2022 deepened these discussions to include all interested research councils (NERC, BBSRC, EPSRC) and the research community. From the NSF, several directorates have expressed interest in participating, including directorates that have not partnered with UKRI in the past. As one interviewee explained: "The idea that we would like to pursue next, I think that would not have happened without the *Signals in the Soil* programme. [...] The programme laid the base, the groundwork, it's a model. And now we can build on that."

Signals in the Soil has also facilitated discussions between UK research councils. As one stakeholder explained: "The programme has enabled us to work in this space where we haven't worked much with some councils before. [...] I think the engagement with the EPSRC [in this area] is far stronger now than it was prior to FIC. The FIC is responsible for that." A representative from the BBSRC felt that the opportunity to work more closely with NERC colleagues had not only helped to understand each other's research priorities, but also differences in processes, organisational structures and cultures. In this way, the FIC programme improved mutual understanding and working across council boundaries, which will be of benefit for future joint undertakings. Similarly, interactions through *Signals in the Soil* has enhanced communication between different NSF directorates.

Likewise, *Changing North Atlantic Ocean* has set a precedent for collaboration and established trust in NERC's capabilities with the NSF Physical Oceanography programme, lowering the



barrier to future partnership. The teams are currently developing plans for further collaboration which include a second programme within the NSF division that has not previously collaborated with NERC. As one stakeholder explained: "The FIC programme served to establish a link to the NSF Ocean Sciences Division and is now a model known to have worked well – which is communicated internally and will hopefully facilitate partnering in the future, including with other teams." This also allows reacting to opportunities with short timelines: "There's the trust [with the NSF], we could commission in quick time. We understand how we work together so we can be agile, which isn't going to be possible with a brand-new partnership."

Objective 2: Supporting BEIS and wider objectives including science diplomacy

The 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 FCDO and BEIS 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&D³⁰. 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.

At the level of research funders, 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 the 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 addition, collaborating on interdisciplinary research through *Signals in the Soil* has allowed NSF Directorates and UKRI research councils to gain a better understanding of how their remits align or where research areas are covered by a different team, as disciplinary boundaries do not always match up. This will help staff to find lines of common interest and improve planning of future collaboration programmes.

The FIC increased the amount of collaboration in the research areas its programmes supported, such as soil science, which reinforced their importance in the US and UK research communities and in UKRI and NSF strategies. NERC staff commented that, if maintained, increased organisational focus on specific areas, together with outcomes of the funded research, could lead to impact on national policy in the long term.

Prior to the FIC, NSF programme leads were already aware of UK research and research funding capabilities; similarly, researchers were already aware of UK research strengths, especially in more established research communities such as the ocean sciences. However, while researchers involved in *The Changing North Atlantic Ocean* had already collaborated prior to FIC at some level, the FIC programme allowed them to work together on "truly joint projects". In the emerging area of *Signals in the Soil*, the FIC enabled a broader and deeper understanding of UK research capabilities across disciplines, including through showcasing of UK research facilities during the programme meeting at Rothamsted Research.

³⁰ <https://apply-for-innovation-funding.service.gov.uk/competition/502/overview> (accessed 7 Jan 2023)



A.1.6. The future

Given current discussions described by NERC and NSF programme leads, an increase in collaborative activity, via future joint funding calls (if funding is available) or the lead agency opportunities can be expected by the time of the final evaluation in 2024.

The NERC-NSF FIC programmes are strengthening relationships between the funders, which is underpinning current discussions on future collaboration programmes. The positive experience from on-going FIC programmes is likely to engage additional NSF directorates and divisions going forward. In addition, the increased level of UK-US funding made available has raised awareness and demand in the research community. This may be driving the observed increase in proposals submitted under the lead agency opportunities.

UKRI staff described individuals at the NSF who are involved in implementing the NERC-NSF FIC programmes as playing a key role in advocating for joint working and advising on how to set up processes that satisfy both NSF and UKRI regulations. This knowledge feeds into continuous improvements to NSF and UKRI's lead agency opportunities and other processes supporting collaboration. The FIC programmes have also highlighted areas of mutual interest to the UK-US research communities, helping to identify potential areas of expansion for lead agency opportunities.

The programme leads commented that they had gained valuable operational knowledge of how to design and implement UKRI-NSF programmes through the experience of running the NERC-NSF FIC programmes. UKRI staff felt that there was a risk this knowledge could be lost if/when key individuals at partner agencies move on to posts elsewhere. To ensure opportunities for future collaboration and expanded engagement across the NSF are maintained, it will be important to embed this knowledge by working with individuals across several NSF teams.

In interviews, NSF FIC programme leads explained that they had been approached for advice by several colleagues who were considering partnering with UKRI for the first time and wanted to know 'the basics' and hear about the experience from NSF colleagues. There is hence scope to share and capture best practice, e.g. by bringing together NSF and UKRI leads from across the nine FIC programmes involving the NSF. Outputs of these discussions, e.g. documents setting out general guidelines, a summary of insights, and/or case studies of co-funded programmes, could then be shared more widely among NSF Directorates and UKRI councils, also highlighting the support the UKRI North America office and NSF Office of International Science & Engineering can provide through tailored guidance. In addition, comparing programme leads' approaches in setting up and implementing current FICs can support further streamlining of the processes for future collaboration programmes.

At researcher-level, FIC-funded collaborations have been in place for 1-2 years. FIC programme leads are aware that some groups are now starting to plan joint research beyond the FIC-funded project. By 2024, several joint grant proposals and networking activities, such as technical workshops, can be expected. FIC programme leads commented on potential outputs and outcomes. For example, some of the technologies developed as part of the *Signals in the Soil* programme may progress to a stage where they are of commercial interest. Insights from the *Changing North Atlantic Ocean* programme may enable researchers to monitor the ocean more cost effectively, e.g. via autonomous measurements and satellite data rather than costly arrays, which can result in considerable research cost savings in the future. In addition, a better understanding of the climate change processes gained through the programme can feed into global climate action plans – and ultimately cost savings for the planet.



Relationships between researchers initiated through the FIC-funded projects are likely to continue beyond the lifetime of the FIC, even without follow-on funding. As one stakeholder explained: “Those relationships may wither without more funding, but they won't die. And if there's an opportunity in the future, they can pick [their collaboration] up again. The FIC has created a network that didn't exist before, and that network will continue with or without funding.” Future collaborations have the option to apply for funding under a lead agency opportunity (which may by then be harmonised across councils through information gained from the FIC experience, facilitating interdisciplinary working). Connections made through the FIC may also lead to UK partnerships with NSF-funded centres at US academic institutions.

Interviewees identified several risks to expanding collaboration with the US:

Unlike the FIC, NSF match-funding for FIC programmes is for the most part not additional funding made available for international collaboration. NSF teams draw on the budgets allocated to their divisions/programmes at the start of the annual NSF funding cycle. As one interviewee from the NSF explained, this limits the amount of funding individual NSF teams can designate as co-funding for a FIC programme. An increase in NSF co-funding for a FIC programme can only be achieved by partnering with additional NSF teams and/or other US agencies.

Uncertainty around future UKRI funding opportunities for international collaboration impedes engagement with a new partner. Application timelines are expected to be tight and likely too short to discuss and agree on key programme parameters with a new partner. For example, NERC had considered engaging with the US National Oceanographic and Atmospheric Administration (NOAA) to discuss future joint UKRI-NSF-NOAA activity. NOAA is an attractive partner, given its world-leading capabilities and infrastructure combined with the scientific work it funds. However, uncertainty around future funding opportunities meant that NERC has not pursued partnership discussions at this point.

There is also a risk that the momentum gained from WAVE 1 and 2 FIC calls will be lost due to the long time period between — and uncertainty regarding — a future funding opportunity. While the FIC's novel approach to funding international partnerships had attracted attention and interest among agency leadership at the baseline stage³¹, the lack of continuation meant that the FIC mechanism has now slipped from awareness — and with it, opportunities to use the FIC as a topic for engagement with NSF leadership.

³¹ Technopolis Evaluation of the Fund for International Collaboration. Baseline and Interim Process Evaluation – Technical Report (2021)



A.1.7. Sources

- FIC tracker September 2022
- Survey questionnaires completed by FIC programme leads
- Programme documents as referenced in footnotes
- Information obtained from 12 stakeholder interviews (2022):

Name of interviewee	Organisation		Name of interviewee	Organisation
Amanda Collis	UKRI/BBSRC		Brandi Schottel	NSF ENG
Simon Kerley	UKRI/NERC		Jessica Surma	UKRI/NERC
Jennifer Morgan	UKRI North America Office		Baris M Uz	NSF GEO
Roxanne Nikolaus	NSF International Office		Michael Webb	UKRI/NERC
Ronit Prawer	UK S&I Network in the USA		Luke Williams	UKRI/BBSRC
Liz Rowse	UKRI/NERC		Weihao Zhong	UKRI/NERC

- In addition, the case draws on information previously collected through the following 12 stakeholder interviews undertaken at the baseline stage (2021):

Name of interviewee	Organisation		Name of interviewee	Organisation
Sarah Webb	UKRI/NERC		Jessica Surma	UKRI/NERC
Amanda Collis	UKRI/BBSRC		Baris M Uz	US NSF GEO
Kate Hamer	UKRI		Roxanne Nikolaus	NSF International Office
Simon Kerley	UKRI/NERC		Chloë Somers	UKRI North America Office
Weihao Zhong	UKRI/NERC		Myriam Telford	UKRI North America Office
Michael Webb	UKRI/NERC		Chris Dain	UK S&I Network in the USA



A.1.8. Programme overview (as of December 2022)

Programme name	Delivering Healthy Soils: Signals in the Soil	The Changing North Atlantic Ocean and its Impact on Climate	Climate, Environment and Health
FIC ID	FIC-26	FIC2-02	FIC-23
FIC Wave	1	2	1
FIC Bid Amount (incl. OpEx)	£8.3m	£5.1m	£2.8m
UK partners	NERC (lead) BBSRC EPSRC STFC	NERC (lead) Met Office Hadley Centre (project partner)	NERC (lead) MRC ESRC
Partner Countries	USA	USA	USA Norway Finland Sweden Turkey Brazil Cote d'Ivoire Chinese Taipei
Overseas Partners	NSF ENG (lead) NSF GEO NSF BIO USDA – NIFA	NSF GEO	NSF GEO NOAA NIH European Commission Other Belmont Members
Match Funding (at bid)	US\$7-8m (£5.8-6.6m**) (cash)	£8m (cash)	Not Stated
Number of calls that have made awards	1	1*	1
Value of these calls	£7.7m	£2.6m	£3.4m
Number of awards made through these calls	10	2	7
Final match funding awarded to active grants	US\$8m (£6.6m**) (plus in-kind contributions)	US\$16.5m (£13.7m**) (plus NSF ship-time costs)	£6.7m

* In addition to this call, the FIC covered an infrastructure investment of £1.7m.

**USD were converted to GBP using the conversion rate of 27 Feb 2023: US\$1 = £0.83



A.2. Swiss National Science Foundation

A.2.1. Summary

The FIC-funded **Partnering Awards Programme** is a joint effort between UKRI and the Swiss National Science Foundation (SNSF) to support closer collaboration in R&I through international mobility, especially amongst early career researchers. It focuses on four strategic areas: Languages, Materials, Synthetic Biology and the Life and Physical Sciences interface, plus two cross-cutting themes: Artificial Intelligence (AI) and Big Data.

The programme kicked-off in January 2022, with two parallel calls (led by UKRI International in the UK and SNSF in Switzerland) funding 30 applications (21 in the UK and 9 in Switzerland). The programme has allocated 52.5% of its initial £1m UK budget and 25% of the planned £0.9m Swiss funding. Interviewees pointed to the overlap with existing funding mechanisms already in place in both countries and some UKRI requirements (around being a current/recent grant holder) as potential reasons for this low take-up of the programme.

Projects started in August 2022 and results are expected to emerge over the coming year.

Considering the limited size and scope of the programme, its main contributions to overarching FIC objectives will likely relate to deepening the UKRI and SNSF relationship and feeding into ongoing discussions for broader collaboration between the two countries, as well as reducing barriers for UK and Swiss research communities to access respective infrastructure and scientific communities (enabling new R&I networks) and to explore further international collaboration.

A.2.2. Introduction

The **Swiss National Science Foundation (SNSF)** is a private foundation established in 1952 with the mandate of providing financial support for research projects in all academic disciplines and promoting young scientists in Switzerland. Its main purpose is to expand knowledge and solve problems through the systematic study of nature, technology, and society with a strong focus on contributing to the UN 2030 agenda and the world.³² In 2021, the SNSF funded 1,800 new research projects worth CHF 876 m (about £780m)³³, including 400 fellowships abroad.

SNSF has a strong international character with 75% of its projects involving researchers abroad. In 2021, it furthered its international cooperation strategy through two new bilateral agreements, including the Partnering Awards Programme with the UK, which was funded by FIC through its Strategic Opportunities Stream. The other was an MoU with the National Science Foundation in the US for a lead agency process that allows Swiss and US researchers to submit only one application for joint projects, reducing the administrative burden on researchers.³⁴ In addition, the MoU also promotes other forms of collaboration between these funding agencies, such as joint conferences, and exchanges of information.

The establishment of the **Partnering Awards Programme** reflects UKRI's and SNSF's interest in exploring new routes for closer collaboration in R&I. The programme seeks to support international mobility (especially amongst early career researchers), foster knowledge sharing between researchers and technical specialists, strengthen existing collaborations, enable new research collaborations, and facilitate access to research facilities in the two countries. This

³² <https://www.snf.ch/en/hgwbLlrXdMcv7dz/news/882-million-francs-invested-in-research-in-2021> (accessed 7 Jan 2023).

³³ Calculated based on the Exchange Rate for 27th February 2023: 1CHF = £0.89

³⁴ <https://www.snf.ch/en/2blRsvqyQ040Kxa6/news/snsf-boosts-collaboration-with-us-funding-agency> (accessed 7 Jan 2023)



case study explores the origins of this programme and the processes underpinning its design and roll out from January 2022.

The Partnering awards has been deployed in two parallel and coordinated calls run independently by UKRI International (with BBSRC as the Delivery Partner) and SNSF, launched in January and February 2022 respectively. It focuses in four strategic areas: Languages, Materials, Synthetic Biology and the Life and Physical Sciences interface, plus two cross-cutting themes (Artificial Intelligence and Big Data)³⁵. In the UK, UKRI International and BBSRC lead the call commissioning and worked alongside other research councils (AHRC, MRC, EPSRC) who provided the evaluation of applications in their thematic remit areas. A total pot of £2m was available, made up of equal contributions between UKRI and SNSF. However, only 39.4% of this funding was awarded through these two calls due to a lack of applications.

The Partnering Awards provide up to £25,000 and 100% of the project costs to support collaborative activities between the UK and Switzerland, such as travel expenses, visits and access to facilities, the organisation of workshops and networking events, and the exchange of knowledge and preparation of joint grant proposals³⁶.

Applications were submitted to the funding agency in the country of origin and evaluated independently. In the UK this meant that applications were assessed by AHRC, BBSRC, MRC and EPSRC according to their respective fields. Eligibility criteria were defined by each funder, generating some differences in the calls' requisites. For example, UK applicants had to show they were currently holders of a UKRI grant (for the synthetic biology, materials, life, and physical sciences themes), or had been a grant holder within the past five years (in the case of the languages theme), while these requirements were not placed on the Swiss side. SNSF designed the call as a sub-call of the scientific exchanges programme, with very low requirements (for example, applicants must show that they are employed in Switzerland). A requirement from the scientific exchanges programme to be a PhD degree holder was also relaxed in the Partnering Awards to allow the participation of technicians involved in research activities in Switzerland. Projects started in August 2022 and will last between one and twelve months.

A.2.3. Pre-FIC relationship

Background on the relationships

The UK and Switzerland have been common collaborative R&I partners through multilateral funding and policy forums such as Science Europe and the EU Framework programmes³⁷. The relationship between UKRI and SNSF in these cases mainly entails sharing knowledge and information about their co-participation in calls. FIC represented the first time that they had run bilateral calls together.

According to BBSRC and SNSF interviewees, the research communities of both countries have been collaborating closely and have always valued each other's academic prestige and rigour, as well as their facilities. Cultural and geographic proximity have facilitated this collaboration, particularly in areas such as life and medical sciences. These R&I collaborations

³⁵ <https://www.ukri.org/wp-content/uploads/2022/01/UKRI-100222-Funding-Opp-PartnerResearchersSwitzerland-Guidance.pdf> (accessed 7 Jan 2023)

³⁶ Ibid.

³⁷ For instance, in Horizon 2020, the UK is the third most important partner for Swiss researchers, while Switzerland is ranked eighth as collaborative partner for the UK. Source: <https://www.gov.uk/government/publications/uk-science-and-innovation-network-country-snapshot-switzerland> (accessed 7 Jan 2023)



have been funded by existing UKRI and SNSF unilateral funding schemes, such as the BBSRC Partnering awards³⁸ and the Scientific Exchanges scheme in Switzerland³⁹.

SNSF wider context Pre-FIC

Switzerland has ranked as the world's innovation leader in the Global Innovation Index for the last 12 years⁴⁰ and is the overall innovation leader in the European Innovation Scoreboard⁴¹. SNSF has had a strong relationship with EU countries and a prominent role in the EU Framework Programmes. Recently, however, the relationship with the EU has become more difficult and distant with no access to Horizon 2020 funding since July 2021⁴². To alleviate the impact of this exclusion, the Swiss government has put in place financial guarantees for Swiss participants in ERC grants and Horizon Europe calls, as well as direct funding mechanisms for mono-beneficiary projects⁴³. While the Swiss government is seeking to re-gain its associated status, SNSF is preparing a contingency strategy if it fails.

This new landscape has forced Switzerland to look for alternative partnerships to leverage funding and facilitate international collaboration in R&I activities. For instance, in early 2022 the Swiss government's agency for development and cooperation (SDC) launched a new programme with the United States to promote transdisciplinary research in and with developing countries⁴⁴. SNSF reported that it also considers the UK as one of the most important partners for international collaboration, and so it had also sought to build on the institutional engagement of previous years and find opportunities for further R&I collaboration with the UK at this time.

A.2.4. Programme origins and development

Origins of the programme

Two official senior level visits took place to discuss opportunities for collaboration between UKRI and the SNSF, in February and November 2019. First, UKRI welcomed a Swiss delegation, followed by a visit of UKRI representatives to Switzerland organised by the UKRI International office. According to interviewees, SIN representatives facilitated the visit to Switzerland, with the Ambassador chairing and convening some meetings. These visits confirmed the interest to partner with each other and to deepen their collaboration in R&I.

As a result, UKRI and SNSF undertook a mapping exercise of UKRI's large investments and centres and the SNSF National Centres for Competence and Research (NCCR).⁴⁵ The mapping

³⁸ <https://www.ukri.org/opportunity/bbsrc-global-partnering-award/> (accessed 7 Jan 2023)

³⁹ <https://www.snf.ch/en/wSd33rwrhn7Q16jl/funding/science-communication/scientific-exchanges> (accessed 7 Jan 2023)

⁴⁰ https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2021.pdf (accessed 7 Jan 2023)

⁴¹ <https://www.gov.uk/government/publications/uk-science-and-innovation-network-country-snapshot-switzerland> (accessed 7 Jan 2023)

⁴² <https://www.sbfj.admin.ch/sbfj/en/home/research-and-innovation/international-cooperation-r-and-i/eu-framework-programmes-for-research/horizon-europe.html/> (accessed 7 Jan 2023)

⁴³ <https://www.sbfj.admin.ch/sbfj/en/home/research-and-innovation/international-cooperation-r-and-i/eu-framework-programmes-for-research/horizon-europe.html> (accessed 7 Jan 2023)

⁴⁴ <https://www.snf.ch/en/hgwbLlrXdMcgv7dz/news/882-million-francs-invested-in-research-in-2021> (accessed 7 Jan 2023)

⁴⁵ <https://www.snf.ch/en/h5B8IF711Dmx3XpQ/news/news-191216-new-national-centres-of-competence-in-research> (accessed 7 Jan 2023)



showed strategic areas where both countries were investing significantly and where there were synergies and alignment.

In November 2020, UKRI and SNSF then held an online workshop with representatives of the NCCR and UKRI large investments on how to support, strengthen and develop bilateral research collaboration, including areas of strength, needs, barriers and complementarity in the two countries. The discussions in the workshop emphasised that there is strong appetite and potential for future bilateral UK-Switzerland collaboration at the government, funder, and researcher level.

A key outcome of this workshop was an agreement to enable mobility, particularly for early career researchers between the two countries. The idea was to start with a small-scale collaboration that could be done relatively easily and could be integrated into existing funding schemes: specifically, the Partnering Awards in the UK and the Scientific Exchanges in Switzerland. The Partnering Awards had been implemented by BBSRC for more than 15 years and therefore the practical experience on how to run the scheme could be brought into the partnership. According to the UKRI International Team leader, being able to draw on BBSRC's expertise was a key enabling factor for the call delivery. The SNSF call mirrored its existing Scientific Exchanges call, but with minor adjustments in terms of the length of research visits (stays of up to 12 months, rather than 6 months).

Although they would have preferred a joint call, the organisations decided to go for a parallel call instead to take advantage of their existing programmes with similar objectives and so as to fit with different domestic timing requirements. Once partners agreed on how to proceed with the collaboration, UKRI obtained the funding from FIC and asked SNSF to match fund, such that both devoted £1m to the partnership.

The rationale of the programme

The rationale behind the programme design was to boost current in-country strategic areas of R&I through international collaboration using existing funding mechanisms. In this sense, the programme aligns with national priorities in the UK, particularly in technological areas such as materials, synthetic biology, life and physical sciences that have been prioritised in the UKRI strategy 2022-2027⁴⁶. Although, SNSF's focus is on the sustainable development agenda, these four areas constitute strategic technologies and scientific fields that the organisation seeks to advance, and therefore constitute areas of strong investment⁴⁷.

A shared interest in addressing the funding gap generated by non-associated status to the EU Framework Programmes also underpinned this partnership and was a key driver to prioritise international collaboration in their current R&I strategies.^{48,49}

Programme additionality

FIC provided dedicated funding that enabled UKRI and SNSF to work together on a joint effort for the first time.

⁴⁶ <https://www.ukri.org/publications/ukri-strategy-2022-to-2027/ukri-strategy-2022-to-2027/> (accessed 7 Jan 2023)

⁴⁷ <https://www.snf.ch/en/EcRzGgwFJMZifnNc/page/national-centres-of-competence-in-research-nccrs> (accessed 7 Jan 2023)

⁴⁸ <https://www.ukri.org/publications/ukri-strategy-2022-to-2027/ukri-strategy-2022-to-2027/> (accessed 7 Jan 2023)

⁴⁹ <https://www.snf.ch/en/gleN7s0RiX686C4b/news/the-snsf-s-priorities-for-2025-2028-strengthening-research> (accessed 7 Jan 2023)



For the UK community, the Partnering Awards builds on existing research activities, allowing researchers to explore opportunities for deepening or complementing these in a way that would not be possible under other existing funding mechanisms.

The benefits offered by this call to the Swiss research community are less substantive, given the features of the original (pre-FIC) Scientific Exchanges call: an open-ended call, with no geographic restriction, and covering maintenance, tickets, travel expenses, and childcare for those with caring responsibilities.

The main advantages of partnering (pointed to by interviewees) are **improved access to each other's** scientific infrastructure, renowned scientific communities, and networks. They also felt that it **creates opportunities for identifying strategic opportunities for future collaboration**. Both parties recognise the benefits of strengthening their relationship. They also acknowledged the advantages of using existing calls for this initial partnership, as this allowed them to streamline the process on both sides, reducing the resources required (compared with rolling out an entirely new funding mechanism). Similarly, both partners highlighted the complementarities of their R&I systems, for example, the vocational education system in Switzerland, which is of strong interest in the UK (vocational education has recently been regarded as central element in the levelling up agenda of the UK's government).⁵⁰

Nevertheless, interviewees pointed out that the overlap with existing funding mechanisms already in place in both countries may reduce the programme additionality. In a similar vein, interviewees considered that some of the conditions set up by UKRI (requirements around current/recent grants) may have reduced the number of potential applications.

A.2.5. Progress, enabling factors, barriers, risks, and lessons learnt

Progress of the programme

The Partnering Awards Programme has run two parallel calls, one delivered by BBSRC on behalf of UKRI in the UK and one by SNSF in Switzerland. Although they aimed to launch calls in a coordinated manner, some administrative issues prevented SNSF to do it in January (as UKRI), opening their call in February 2022.

A total of 30 awards were made, with 21 projects in the UK and 9 on the Swiss side. Awards were communicated in September 2022, although some projects kicked-off in August when recipients were notified that they were successful. In terms of funding, 39.4% of the initial joint budget was allocated, totalling £0.75m.

Throughout the partnership both countries have coordinated communication strategies, issued joint press releases, and promoted the call on their respective websites.

Enabling factors, barriers, and risks

Three main factors were mentioned by interviewees as enablers of the partnership. First, the commitment from SNSF to the partnership has been key to leverage the funding and therefore, make the calls possible. Secondly, for the UKRI International Office, BBSRC's prior experience in running Partnering awards calls has been an important enabling factor, as "from the international team's perspective [they] don't have access to the grant funding system and didn't have the capability to deliver a call". In this way, it has been possible to address applicants' queries and to run the call smoothly. Finally, the partnership has also benefited from

⁵⁰ <https://www.gov.uk/government/publications/uk-research-and-development-roadmap/uk-research-and-development-roadmap> (accessed 7 Jan 2023)



fluid communication throughout the process since the early visits between the UKRI International Office (plus SIN representatives) and SNSF officials.

As to the challenges and barriers in the programme design and delivery, these were considered by interviewees to be mainly of an administrative nature on both sides. The SNSF has undergone organisational changes over the last two years that may have had an impact on the timeliness of their response. In the UK, frequent changes in the political arena also impacted the timeliness of decision making and raised some concerns within SNSF about shifting priorities.

Lessons learnt

UKRI and SNSF interviewees agreed that it would have been better to have had a joint call rather than parallel ones, as this would have reduced the administrative burden, especially for researchers who had to undertake the procedures separately, instead of via a joint proposal. Interviewees also suggested that having parallel calls may have hampered the visibility of the UK in Switzerland, resulting in a lower number of applications. They believe a joint call could have sent a stronger message about the UK-Switzerland partnership to researchers, and encouraged more applications, especially in Switzerland, where the overlap with Scientific Exchanges could have reduced researchers' perceived value of the call.

With hindsight, one interviewee believed that the efforts involved in running the parallel calls would have been better used in developing a bilateral call for two-to-three-year projects and committing to a larger scale programme.

As discussed earlier, the low use of the partnership's funding (only 39.4%) stands as another potential learning opportunity. Interviewees suggested that UKRI requirements (of being a current / recent grant holder) may have hindered the potential number of applicants, while the low number of Swiss applicants may reflect the overlap with the Scientific Exchange programme (and the limited additionality for Swiss researchers of this UK-focused call).

A.2.6. Programme activities, outputs, and outcomes

Objective 1. Enabling international collaboration

FIC enabled the international collaboration between the UKRI and SNSF, by making dedicated funding available to realise the ideas emerging from the exploratory visits and workshop in previous years. This partnership is seen as a first step towards deeper collaboration. Given the small scale of the funding compared to the SNSF budget, it was relatively easy for the organisation to commit the funds and (according to interviewees) it will be willing to put in more funding for further collaborations in the near future. After the signature of a UKRI-SNSF MoU to enhance bilateral collaboration in February 2022, the UK and Swiss government have also signed an MoU in R&I to endorse their support to further collaboration.

As a result of the partnership, UKRI and SNSF have built closer collaboration and they consider each other trusted partners. They perceive higher openness to share ideas and more strategic information in the policy domain, which nurtures their interest in progressing towards deeper collaborative relationships. The partnership has become a concrete example of joint work that has allowed them to "talk the same language".

Objective 2: Supporting BEIS and wider objectives including science diplomacy

The partnership focuses on the synergies that can result from international collaboration in the four strategic areas selected. With this, partners have gained a clearer understanding of their partners' strengths and capabilities, particularly during the early stage of programme design. However, the scope, size and type of activities entailed by the partnership limit the possibilities



for alignment of R&D policy and strategies, as the partnership doesn't provide an overview of the breadth of the SNSF or UKRI remit.

An early-stage outcome of the partnership relates to the identification of strategic areas of work and, according to UKRI and SNSF interviewees, the outputs from these collaborations will also influence the next steps of collaboration.

A.2.7. The future

The sustainability of the programme is not clear and both UKRI and SNSF do not have certainty about what comes next. Two main factors play a role in this; the lack of clarity about funding from the UK side, and divergent approaches to funding formats (with the SNSF asking for a bottom-up perspective which may be difficult to reconcile with the strategic one of the UKRI).

SNSF reported that researchers in Switzerland would expect to see a joint call launched in the next two years to consolidate their alliance and deepen their collaboration. Interviewees pointed out that failing to achieve this will result in researchers diverting their attention to other international collaboration opportunities.

A.2.8. Sources

- Call texts for project proposals
- Policy documents as referenced in footnotes
- Programme lead questionnaires
- Information obtained from four stakeholder interviews (2022)

Name of interviewee	Organisation
Michelle Truman	UKRI International
Anja Berndt	BBSRC – Programme delivery lead
Matthias Kimmich	SNSF
Martina Novakova	UK SIN representative in Switzerland

A.2.9. Programme overview (as of December 2022)

Programme name	SNSF Partnering Awards
FIC ID	FIC-STR-03
FIC Wave	N/A (Strategic Opportunities Stream)
FIC Bid Amount (incl. OpEx)	£1.04m
UK partners	UKRI BBSRC, AHRC, EPSRC and MRC
Partner Countries	Switzerland
Overseas Partners	Swiss National Science Foundation
Match Funding (at bid)	CHF 1m (£0.9m*) (cash)
Number of calls that have made awards (Dec 2022)	1 call (2 parallel calls)
Value of these calls	£1m (£0.75m awarded)
Number of awards made through these calls	30 (21 UK, 9 Switzerland)
Final match funding awarded to active grants	£0.25m

**CHF were converted to GBP using the conversion rate of 27 February 2023: CHF 1 = £0.89

B.3. Department of Biotechnology (DBT), Ministry of Science and Technology, India

A.2.10. Summary

The **Department of Biotechnology (DBT)**, within India's Ministry of Science and Technology, is involved in two FIC programmes, in partnership with several UKRI councils. These programmes were delayed due to the COVID-19 pandemic, but are now in implementation.

New evidence obtained as part of the 2022 data collection for the interim evaluation of FIC has, to a large extent, focussed on contextual factors. The two programmes are progressing, but it is too early to report on findings or breakthroughs. However, in parallel, relationships and policies are developing as stakeholders turn towards future programmes and challenges. Notable findings include:

- Projects on the two programmes are progressing well and programme-level coordination is organised to complement individual project implementation.
- Some logistical and administrative challenges have been reported, e.g. late payment of funds to the Indian researchers
- Stronger coordination mechanisms are put in place between UK and Indian funding stakeholders. FIC is part of the context for this but not necessarily the driving force.
- The policy context in India is evolving, including personnel changes at the top management at DBT and a focus of resources on preparations for the G20 summit in India.

A.2.11. Introduction and context

The **Department of Biotechnology (DBT)**, within India's Ministry of Science and Technology, was set up in 1986 to promote the adoption of biotechnology. It supports research, infrastructure and human resource development, and also has responsibility for international collaboration and the development of Bio Safety Guidelines for cell-based vaccines.⁵¹

The department has an annual budget of approximately 25bn Rupees (£250m)⁵². More than half of this is dedicated to Research and Development (R&D), human resources and facilities, while another 30% is used to support 16 autonomous institutions under its purview, and 10-12% is allocated to Industrial and entrepreneurship development.⁵³

DBT is involved in **two FIC programmes**, in partnership with several UKRI councils. These are:

- The '*Tackling Anti-Microbial Resistance (AMR) in the Environment*' programme (FIC-25), which aims to inform the development of strategies to limit environmental contamination by waste from antimicrobial manufacturing. NERC and ESRC are the programme partners.
- The '*UK-India Covid-19 Partnership Initiative*' (FIC-STR-02), which will support comparative research of South Asian populations in the UK and India. It aims to explore the role of external factors and demographic variables in influencing the spread of COVID-19, and help to improve understanding, prevention or management of the outbreak among South Asian populations in both countries. This programme is funded under the Strategic Opportunities Stream of FIC, with MRC and ESRC as partners.

The 'Global Incubator Programme' (FIC2-20), which has implemented as a series of separate bilateral calls between Innovate UK and partners in Canada, Singapore and the United States,

⁵¹ <http://www.dbtindia.gov.in/about-us/mandate> (accessed 7 Jan 2023)

⁵² Conversion rate of 27 February 2023: 1 Indian Rupee = £0.01

⁵³ Annual report 2019-20, p. 210

was also originally planning to launch a bilateral call with India. However, the intention is now to take this forward outside of FIC. 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 IUK global budget. From the three incubator programmes that originally launched, IUK are now working towards 12 programmes. The proposed Programme with India will be included in the list of UKRI-India announcements at the upcoming UK-India Ministerial Science and Innovation Council (SIC) on 26th April.

In total, DBT committed around £9m, in cash or in kind, to joint calls across the programmes, while UKRI has awarded £7.8m through FIC.

The case study was developed based on desk research and consultation with representatives from IUK, NERC, MRC, UKRI India Office and UK S&I Network (some multiple times) in early 2021 and late 2022. A full list of interviewees is given at the end of the case.

A.2.12. Pre-FIC (relationships)

There is a recognition among UKRI councils, especially MRC, that India will be a major research powerhouse in the future. This is something that the UK community also recognises. For example, in a recent survey conducted with academics in the biomedical research field, India was placed as a top 5 priority country for collaboration in the next 10 years.⁵⁴ From the innovation side, there is also recognition that India is increasingly becoming a dynamic and open market, and that there is an appetite from businesses in both the UK and India to keep on exploring commercial opportunities.

The UK and India are historically connected and research collaboration between the two countries was already well-established before FIC. This has been supported via several Memorandums of Understanding (MoUs) and agreements⁵⁵, as well as the institutionalised dialogues that have taken place via the India-UK Science & Innovation Council (SIC) meetings since 2006.⁵⁶

Bilateral collaboration between the two countries has also increased substantially over the last decade, with joint investment in research increasing from less than £1m in 2008 (the year Research Councils UK first established an office in India), to more than £300m in 2018⁵⁷ (when FIC started). A key milestone in the development of bilateral relationships during this period was the UK-India Science & Innovation Task Force in February 2014, where key funding bodies from both countries identified a set of grand challenges to be addressed through collaborative Research and Innovation (R&I)⁵⁸. These grand challenges included:

- Sustainable Cities and Urbanisation
- Public Health and Well Being

⁵⁴ Related by interviewee, not published

⁵⁵ <https://www.gov.uk/government/publications/uk-and-india-mous-and-agreements/uk-india-announcements> (accessed 7 Jan 2023)

⁵⁶ See e.g. "The 6th India-UK Science & Innovation Council (SIC) Meeting was held in New Delhi on 26th July 2018", <https://dst.gov.in/pressrelease/6th-india-uk-science-innovation-Council-sic-meeting-was-held-new-delhi-26th-july-2018> (accessed 7 Jan 2023)

⁵⁷ "Together for Impact: UK Research and Innovation Launched in India", British High Commission New Delhi, 25 October 2018: [Together for Impact: UK Research and Innovation launched in India - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/news/together-for-impact-uk-research-and-innovation-launched-in-india). (accessed 7 Jan 2023)

Note that this figure includes contributions from 'third parties, as well as investments from UK and Indian governments.

⁵⁸ https://blogs.fcdo.gov.uk/ritasharma/2014/04/11/uk-india-research-innovation-partnership-set-to-grow/?utm_source=KE&utm_medium=website&utm_campaign=snapshot (accessed 7 Jan 2023)

- Energy-Water-Food Nexus
- Understanding Oceans (added in 2016)

These formed the basis for the priorities of the Newton-Bhabha Fund (Newton Fund in India), to which the UK committed £104m, enabling a substantial increase in collaborative R&I between the two countries.⁵⁹

DBT is one of the key Indian partners in the Newton-Bhabha Fund, and through this scheme (and other initiatives) it has already collaborated with a number of partners in the UK. For instance, it partners with Cancer Research UK (CRUK) on the India-UK Cancer Research Initiative, and has implemented collaborative programmes with several UKRI councils, the Foreign, Commonwealth and Development Office (FCDO), and the UK Academies.⁶⁰ There are also examples of initiatives which are relevant to current FIC programmes, including a collaboration between the MRC and DBT to establish two multi-million pound centres on anti-microbial resistance in 2015, with funding from the Newton Fund.⁶¹

As a result, by 2018 the UK had become the most significant international partner for DBT.⁶² However, it is worth noting, that prior to FIC, neither NERC nor Innovate UK, who lead UK involvement in two of the FIC programmes, had a close relationship with the DBT. NERC had taken part in a bilateral initiative which also involved the DBT and Ministry of Earth Science⁶³ but did not have an established, direct relationship with DBT (having worked more closely with the Indian Ministry of Earth Sciences). Innovate UK, on their part, had not previously collaborated with the DBT.

A.2.13. Programme origins and development

The FIC programmes involving DBT build on existing priorities within the UK and India, as well as some previous collaborative efforts between the two countries.

The **Tackling AMR in the Environment** programme focuses on environmental contamination by waste from antimicrobial manufacturing, with the aim of contributing to global efforts to help contain resistant bacterial infections of humans and animals. Antimicrobial Resistance (AMR) is a longstanding mutual priority for both UK and Indian governments. For instance, DBT launched its 'Mission program on Antimicrobial Resistance' in 2018/19, aiming to "develop indigenous and cost-effective therapies against AMR; categorise an AMR-specific pathogen priority list for India; establish a Bio-repository for AMR-specific pathogens; and develop rapid and cost-effective diagnostic kits to identify AMR-specific pathogens."⁶⁴ The department is also a member of the Global AMR R&D Hub, as is the UK and the Wellcome Trust.⁶⁵ AMR is also cross-disciplinary priority in the UK and UKRI has a portfolio of investments in AMR spread across many

⁵⁹ Newton Fund Evaluation: Thematic Impact Study Report — India, July 2018

⁶⁰ <http://dbtindia.gov.in/schemes-programmes/international-cooperation/bilateral-multilateral-cooperations> (accessed 7 Jan 2023)

⁶¹ <https://webarchive.nationalarchives.gov.uk/20200923120845/https://mrc.ukri.org/news/browse/new-multimillion-india-uk-research-centres/> (accessed 7 Jan 2023)

⁶² Newton Fund Evaluation, Op. Cit., p. 7

⁶³ NERC had funded 3 projects under the Atmospheric Pollution and Human Health in an Indian Megacity call since 2016. [NERC - Atmospheric Pollution \(ukri.org\)](https://ukri.org/nerc/atmospheric-pollution) (accessed 7 Jan 2023)

⁶⁴ <http://dbtindia.gov.in/sites/default/files/uploadfiles/Mission%20Programmes.pdf> (accessed 8th February 2021)

⁶⁵ <https://globalamrhub.org/about/board-of-members/> (accessed 8th February 2021)



of its councils.⁶⁶ This includes investments in the NERC Centre for Ecology and Hydrology, which — among other things — works to monitor the concentrations of antibiotics in river water.⁶⁷

Prior to this FIC programme, ESRC (and MRC) had already collaborated with DBT on the topic of AMR on several occasions, while NERC had worked with the Indian Ministry of Earth Sciences on related topics such as sewage and farming. The *environmental* dimension of AMR, however, was identified as gap in previous research efforts, and India was seen by the UK as a particularly interesting country in which to study this issue. Unlike NERC's previous collaborative programmes in India, this topic focussed on microbiology, and it was therefore appropriate to engage with the DBT. Conversations between NERC and DBT were facilitated by the UKRI office in India, and the organisations decided to join forces and put together a bid for FIC.

The **UK-India Covid-19 Partnership Initiative** also emerged out of a shared priority, with both UKRI and DBT having invested significantly to support the response to the COVID-19 pandemic.

The UK had identified that black and South Asian minority ethnic communities were disproportionately affected by COVID-19⁶⁸ and discussions with DBT counterparts revealed that there was a good opportunity to establish a programme or project to share and analyse comparative data, in order to understand mortality and mobility in the UK and India. UKRI developed the idea from the UK side and presented it to DBT as a joint activity. The Strategic Opportunities Stream of FIC meant that it was possible to implement the programme quickly in response to unfolding events.

In addition to the need to support the response to the pandemic, the establishment of the programme was recognition that India is regarded as an important strategic partner with increasing investment and the potential to be among the future global leaders in related areas of research. It was therefore a priority to ensure that the UK research community establish good links with Indian counterparts.

The **Global Incubator Programme** is a new concept for Innovate UK and focuses more on (reciprocal) market access than on R&I collaboration. The programme builds upon previous 'missions' to key markets (the 'Global Expert Missions'⁶⁹, which tended to be one-week visits to explore market opportunities), but offers a more immersive experience, allowing companies to interact with an innovation ecosystem through the local incubator (in a country) for three to six months. This is a step away from a more 'traditional' way of supporting companies (based on grants and projects) towards a more active approach to exploring commercial opportunities.

Both Innovate UK and DBT (through its innovation arm BIRAC) had already (separately) provided support for incubators, but UKRI had not had any collaboration with BIRAC in the 10 years preceding the programme. Previously available Official Development Assistance (ODA) funding had not been conducive to innovation programmes like the Global Incubator Programme, whose primary objective is to derive benefit to UK companies. UKRI had not, therefore, had anything to offer BIRAC. Additionally, implementation with non-ODA funding would mean that there were fewer constraints in terms of the (technology) areas that could

⁶⁶ <https://mrc.ukri.org/research/initiatives/antimicrobial-resistance/> (accessed 8th February 2021)

⁶⁷ <https://www.ceh.ac.uk/news-and-media/news/80-percent-cut-antibiotics-thames-avoid-surge-superbugs> (accessed 8th February 2021)

⁶⁸ UKRI has been funding relevant research across multiple areas, including several projects that focus specifically on the increased risk amongst specific ethnic groups in the UK
https://strategicfutures.org/TopicMaps/UKRI/research_map.html (see under 'Infection Risk Groups')

⁶⁹ <https://ktn-uk.org/programme/global-expert-missions/> (accessed 8th February 2021)

be covered, and that activities could have a commercial focus rather than focus mainly on societal benefits to partners.

Initial conversations with BIRAC, DBT revealed an interest to implement a joint initiative of those characteristics. In fact, BIRAC, DBT had previously discussed options for a similar programme with the Swedish innovation agency VINNOVA, but this had failed to materialise as the Swedish agency lacked the funding to take it. FIC provided the opportunity for Innovate UK to pursue this opportunity. It was also able to agree a new MoU with DBT, with the support of UKRI's India Office.

For Innovate UK, the Global Incubator concept offers an opportunity to open markets for UK businesses and establish contacts with a new range of innovation stakeholders. India is seen as a particularly attractive partner, owing to the country's increasing number of start-ups and its entrepreneurial culture.

A.2.14. Progress, enabling factors, barriers, risks and lessons learnt

Progress

As of December 2022, the two FIC programmes involving DBT are in different stages of implementation. Both had previously been delayed (to a greater or lesser extent) by COVID-19 but are now in implementation.

The **Tackling AMR in the Environment programme** was the furthest progressed. UKRI and DBT organised a workshop in Delhi in May 2019 to facilitate partnership development and networking between UK and Indian R&I communities⁷⁰. The programme then ran a call for proposals, with five projects selected for funding (starting August-November 2020).⁷¹

The project start was delayed by COVID, and the Indian components of the programmes were able to start somewhat later than their UK counterparts, but as of December 2022, the programme is running.

In addition to the implementation of individual projects, activities to coordinate across the five projects have been undertaken from the start: UK researchers involved in the programme proactively organised a meeting already in late 2020 to discuss common interests and further meetings have taken place in April 2021 and July 2022. To facilitate interaction of the projects between themselves and between the projects and the funder, NERC has funded a "Programme Coordination Team" (PCT). Although, technically, NERC support for the PCT covers only UK project components, Indian PIs are closely involved in these activities as well.

The '**UK-India COVID-19 Partnership Initiative**' call for proposals was issued in October 2020 with a deadline in December 2020. The selection panel met in February 2021 and four collaborative projects were selected for funding by May of that year.⁷²

Funding for UK researchers was released by UKRI, but project start was delayed in India in the context of a serious wave of COVID-19 infections. Projects were finally able to start in late 2021, and this is judged to be a manageable delay.

Enablers and barriers

⁷⁰ <https://nerc.ukri.org/research/funded/programmes/uk-india-amr/#xcollapse5> (accessed 7 Jan 2023)

⁷¹ http://gotw.nerc.ac.uk/list_them.asp?them=AMR+India (accessed 7 Jan 2023)

⁷² <https://www.ukri.org/news/5m-to-understand-covid-19-severity-in-india-and-the-uk/> (accessed 7 Jan 2023)



Stakeholders from across the two programmes agreed on some important enabling factors which had facilitated the design and early implementation of their programmes, but some qualifications were noted at the interim stage.

DBT was considered a trusted and reliable partner for its UK counterparts, and the established relationship made for a generally smooth collaboration process. UKRI partners had a high degree of confidence in DBT colleagues in terms of following through on commitments and showing the required flexibility to get agreements completed. DBT was also said to stand out amongst other Indian funding bodies in being open to collaboration on interdisciplinary programmes, including the social sciences as in the COVID-19 programme, for example, widening the scope for potential collaborative opportunities.

One challenge reported at the interim stage, however, was a delay in the transfer of funds from DBT to their research teams, within both the AMR and COVID-19 joint programmes. This is likely due to the financial and administrative bodies being two separate teams and holding different processes/mechanisms. At an organisational level, UK SIN interviewees also noted changes to capacity and personnel across higher management teams in the Department. Some of these changes have led to what is perceived to be a greater domestic focus. Similarly, India is also dedicating resource towards preparations for the G20 summit to take place in the country in 2023.

The UKRI India office played a central and important role in providing mediation between the UKRI councils and DBT, and also prepared the ground for more substantial discussions directly with the UKRI councils. Through their long-standing relationship with DBT, the UKRI India office has a portfolio of options for collaboration on areas of mutual interest that can be mobilised when funding is available. Furthermore, during the development of the FIC bids, a member of the UKRI India office was working at DBT two days a week, which proved to be an important enabler as this person was actively facilitating negotiations, helping UKRI to navigate DBT internal processes, detecting and unlocking potential problems in time, and raising UKRI's profile within the organisation. It was reported that DBT relies to a large extent on paper-based internal processes and that it can therefore be helpful to be there in person to help move things along. Since the establishment of the UKRI office in 2008, both organisations have also worked together to set up joint peer review processes, which also facilitates the assessment of project proposals. Whereas UKRI India has enabled strong partnerships and programmes in this way, this configuration also carries some risks. As a consequence of UKRI India's very active role, UKRI councils have somewhat less direct contact with Indian partner organisations and potentially act as a bottleneck in the relationship.

Finally, the UK Science and Innovation Network (SIN) worked with UKRI India office for the initial scoping the COVID-19 initiative, providing advice to UKRI that factored into the joint call.

From a high-level perspective, collaboration with the UK is seen by DBT as more straightforward in comparison with collaboration with other European countries of similar size or the European Union (EU), given the quick turnaround time with regard to agreed joint calls, clearer alignment in terms of understanding each other's priorities and transparency and openness about how the cooperation can bring about mutual benefits. EU cooperation, in contrast, is driven by EU policy and priorities set up in the Horizon 2020 framework programme, which makes it more difficult to jointly identify and define common areas of interest.

No particular barriers to implementation were identified, however interviewees did flag the potential risks involved in establishing FIC programmes. Specifically, the FIC funding process requires collaboration and negotiation with overseas partners to prepare programme ideas before funding has been secured. This poses a potential reputational risk, if that funding is then not forthcoming (i.e. because the programme bid was not subsequently selected for funding),



and requires managing expectations very carefully at the bidding stage, which in turn is easier to do if pre-existing relationships are strong. In addition, a potential lack of subsequent funding risked stalling collaborative partnership building with India in future, potentially undoing some of the successes expected through the current FIC programmes. Several UK funders felt there was a real risk that other countries would take the UK's place among India's preferred partner countries if further funding was not forthcoming. It could also hinder any potential attempt to align policy and / or research and innovation priorities.

Finally, it was noted that the partnerships between UKRI councils and DBT relied heavily on specific key individuals, rather than explicit collaborative agreements or institutionalised collaborative processes. Their departure would therefore present a risk to the ongoing success of the joint activities.

Lessons learnt

The programmes have been implemented as best they could under the circumstances and there were no specific aspects that stakeholders would have handled differently. The early implementation of these programmes had also demonstrated that the partners were able to implement joint calls even in the challenging conditions imposed by the COVID-19 pandemic. There was also a recognition from this experience of the importance of building trusted relationships between partners to underpin international collaboration programmes.

A.2.15. Programme activities, outputs and outcomes

Objective 1: Enabling international collaboration

Theme 1: Enabling funding

There is considerable demand in India for collaboration with the UK, thus FIC funding helps unlock new opportunities. In a situation where the future role of ODA-funding in India is uncertain, FIC provides a forward-looking alternative. It has also allowed the translation of initial interest (in a particular topic or mode of intervention) into concrete opportunities to collaborate. It is considered by stakeholders as a welcome addition to the funding landscape, in the context of UK-India relationships.

FIC has enabled new areas and types of collaborative activities between the UK and India, particularly around innovation and leading-edge research and technology. It would not have been possible to fund these programmes previously available mechanisms and so FIC has opened new opportunities for this bilateral relationship.

Theme 2: Deepening R&I

The programmes have demonstrated the willingness and ability of the UK and India to work collaboratively on topics of mutual interest, such as the COVID-19 pandemic. In this particular case, the nature of the research means that this can only be done through international collaboration, which highlights the ability of FIC to support R&I outputs that would not have been possible otherwise.

For example, researchers in both the UK and India have benefited from adopted standardised methodologies and variables. This has helped make research data and publications more readily comparable between the two countries.

Programme leads also estimate that more than half of these projects involve new collaborative relationships between UK and Indian partners.

Theme 3: Developing partnerships

The FIC programmes build on an established relationship between UKRI and DBT and have allowed the UK to deliver on previously identified opportunities, test new ways of working,



branch out to work in the innovation space, and provide rapid response to unfolding events. Additionally, it has also allowed NERC and Innovate UK to collaborate directly in a funded programme with DBT for the first time.

Prior to FIC, collaboration between the UK and India had primarily been via ODA funding — specifically through the Newton Fund and the Global Challenges Research Fund (GCRF) — as well as a small number of initiatives supported through UKRI council's core funding. Building on these investments, FIC has provided opportunities for new forms of collaboration with India and on new types of topics, beyond the Sustainable Development Goals often addressed through ODA-dedicated funding and other development-oriented initiatives. FIC also provided the opportunity of side-stepping political sensitivities around 'aid' funding.

FIC also facilitated interdisciplinary collaboration between UKRI councils. The central UKRI funding pot made the usual negotiations around the relative contributions and roles of individual councils unnecessary, and further complemented previously established collaboration between the councils, for example on AMR.

The expanded scope of collaboration that is then possible should enable engagement with a wider set of Indian stakeholders, including innovative private sector actors. This, in turn, has helped to strengthen understanding of the R&I ecosystem, including capabilities and R&I priorities as well as business environments.

Objective 2: Supporting BEIS and wider objectives including science diplomacy

The programmes are, to varying degrees aligned with political priorities in the UK and India. The AMR programme, for example aligns with other collaboration on AMR, including health partnership agreed at prime ministerial level on both sides.⁷³ The collaboration on FIC programmes have also helped to improve mutual understanding between the funding partners, and particularly NERC, Innovate UK and DBT.

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.

In parallel to FIC implementation, several new initiatives have been taken to strengthen UK-India collaboration.

- The **“2030 Roadmap for India-UK future relations”** was published in the context of the UK-India virtual summit in May 2021.⁷⁴ The text outlines plans for collaboration across a number of policy areas, including research and innovation (e.g., para. 4.9-4.11), climate, and health. Relevant to the FIC programmes featured here, specific commitments include initiatives on AMR, COVID-19 and pandemic preparedness.
- New coordination processes have been put in place for engaging with DBT in 2022. Monthly joint meetings are now held between DBT, UKSIN, and UKRI among others. This has helped

⁷³ <https://www.gov.uk/government/news/uk-and-india-extend-health-partnership-to-deal-with-global-health-risks> (accessed 7 Jan 2023)

⁷⁴ <https://www.gov.uk/government/publications/india-uk-virtual-summit-may-2021-roadmap-2030-for-a-comprehensive-strategic-partnership/2030-roadmap-for-india-uk-future-relations#i-connecting-our-countries-and-people>



manage the relationship more efficiently, taking up less capacity at DBT for engaging with UK partners, but also coordinating between UK stakeholders.

- These developments cannot easily be attributed to FIC, but FIC is an element in the wider relationship, and has thus contributed positively alongside other initiatives.

B.3.1. Conclusions

FIC builds on an already strong relationship between UK and Indian R&I communities and stakeholders, and contributes to government priorities in areas such as AMR and pandemic response. It has been facilitated by the work of the UKRI office in India and SIN network, while at the same time providing a tangible and concrete opportunity to advance in areas of common interest. The FIC programmes will also help to further strengthen and expand UKRI's partnership with DBT. The broader scope of FIC funding has also enabled UKRI councils to initiate new collaborations with the department and allowed the UK to reach new partners.

Although the two FIC programmes with DBT are still at early stages of development, some collaborative research projects have already been funded and new collaborative relationships between researchers have been formed. The programmes also offer new opportunities for collaborative R&I projects in innovative and leading-edge areas that could not have been funded using previously available funding mechanisms.



B.3.2. Sources

- FIC tracker
- Call texts for project proposals
- Policy documents as referenced in footnotes
- Programme lead questionnaires

- Information obtained from 6 stakeholder interviews (2022):

Contact	Organisation
Liz Rowse	NERC
David Golding (second interview)	Innovate UK
David Pan	MRC
Geeny George Shaju and Zille Anam	UKRI India Office
Sarah Fallon (second interview)	UK SIN Representative
Deep Narayan and Himangi Bhardwaj	UK SIN (health)

- In addition, the case draws on information previously collected through the following 7 stakeholder interviews undertaken at the baseline stage (2021):

Contact	Organisation
Sarah Webb	NERC
David Golding	Innovate UK
Caroline Culshaw	NERC
Alex Harris	MRC
Dr Amit Parikh	Department of Biotechnology, Ministry of Science and Technology
Sukanya Kumar	UKRI India Office
Sarah Fallon	UK SIN Representative



B.3.3. Programme overview (as of December 2022)

Programme name	Tackling AMR in the Environment	UK-India COVID-19 Partnership Initiative
FIC ID	FIC-25	FIC-STR-02
FIC Wave	1	n/a
FIC Bid Amount (incl. OpEx)	£3.5m	£4.16m
UK partners	NERC (lead) ESRC	MRC (lead) ESRC
Partner Countries	India	India
Overseas Partners	DBT, MOST	DBT, MOST
Match Funding (at bid)	£4.5m (in kind)	£4.16m (cash)
Number of calls that have made awards (March 2022)	1	1
Value of this call	£3.8m	£4m
Number of awards made through these calls	5 (+1*)	4

Note (*): NERC has funded UK grant holders to form a Programme Coordination Team (PCT)



B.4. Canadian Institutes of Health Research

B.4.1. Summary

The Canadian Institutes of Health Research (CIHR) is the federal funding agency for health research in Canada. It is a partner in three FIC programmes, all of which have now been successfully implemented, with funded projects expected to conclude in 2023.

The *UK-Canada Diabetes Partnership Initiative*, the *UK-Canada Collaboration on Artificial Intelligence* and MRC's participation in the *NSF NeuroNex* programme have all strengthened the existing relationships between MRC and CIHR. In enabling the formation of new relationships between MRC and CIHR's different institutes and increased understanding of each other's priorities and processes, this has increased interest in and laid the groundwork for future collaborations.

As a result, although the relationship between the UK and Canada was already developing, FIC has provided the platform to increase the scale and strength of this relationship. FIC has provided a valuable mechanism to deliver against the aspirations of the MoU between UKRI and the Canada Research Coordination Committee (CRCC), as well as sending a strong signal to Canadian funding agencies and wider stakeholders that the UK is committed to the partnership. The strategic challenges addressed within the FIC funded programmes align and address mutual intergovernmental priorities, and FIC has made the UK a more attractive partner for Canada, opening the door to other areas of collaboration. Both MRC and CIHR expect to support further collaborative programmes in future, with discussion ongoing regarding the timing and focus of such programmes.

B.4.2. Introduction and context

The Canadian Institutes of Health Research (CIHR) is the federal funding agency for health research in Canada. It invests approximately C\$1.3b (£808m) each year, of which around 70% is discretionary spending.⁷⁵ CIHR is comprised of 13 "virtual" Institutes, each of which is dedicated to a specific area (for example Aging, Genetics or Infection and Immunity) and supports researchers to pursue common goals through interdisciplinary research and the facilitation of connections with health professionals and policymakers.

CIHR is one of three agencies funding research in Canada, alongside the Social Science and Humanities Research Council (SSHRC) and the Natural Sciences and Engineering Research Council (NSERC). CIHR accounts for around 40% of the overall tri-agency funding allocation.⁷⁶

CIHR is a partner in the following three FIC programmes:

- The *UK-USA Neuroscience collaboration through Medical Research Council (MRC) participation in the NSF NeuroNex programme (FIC-17)*. A National Science Foundation (NSF) led initiative to support the development of large collaborative networks of international partners to advance research into the brain, to which CIHR is also a member and has contributed C\$2.5m (£1.54m).
- The *UK-Canada Diabetes Partnership Initiative (FIC 2-11)*. A programme to support the development of a new partnership between CIHR and the MRC to fund collaborative research addressing key knowledge gaps relating to diabetes.

⁷⁵ <https://cihr-irsc.gc.ca/e/51250.html> (Accessed March 7th 2023)

⁷⁶ The Social Science and Humanities Research Council, the Natural Sciences and Engineering Research Council of Canada, and the Canadian Institutes of Health Research

- The *UK-Canada Collaboration on Artificial Intelligence: Building competitive, resilient economies and societies* (FIC2-07). A collaboration between four UKRI councils (AHRC, MRC, EPSRC and led by ESRC) and the Canadian councils (CIHR, NSERC and led by SSHRC) to undertake interdisciplinary collaborative research and generate new insights into the implications of AI technologies for societies.
- This case study was developed based on desk research and consultation with 9 representatives from MRC, ESRC, CIHR, the UKRI International Office in North America, and the UK Science and Innovation Network in Canada. A full list of interviewees is given in section B.4.8.

B.4.3. Pre-FIC (relationships)

The UK and Canada have a relatively new collaborative relationship, evidenced through a series of bilateral agreements and Memorandums of Understanding (MoUs), including a recent High-Level Agreement between the Canada Research Coordination Committee and UKRI (February 2019) which builds on the 2017 Science, Technology and Innovation MoU between the UK Department for Business, Energy and Industrial Strategy (BEIS) and the Department of Foreign Affairs, Trade and Development of Canada (September 2017).⁷⁷ The extent of collaboration between UK and Canadian researchers had also grown steadily over time, before the launch of FIC. For example the proportion of MRC-associated papers with Canadian co-authors more than doubled from ~2.8% in 2006 to ~6.8% in 2016.

Prior to FIC, CIHR itself had a very international outlook and was engaged in over 40 international initiatives supported by bilateral and multilateral agreements with countries and international programmes across the globe.^{78,79,80} CIHR had collaborated with UK funders through a series of multilateral programmes and fora, including the Global Alliance on Chronic Diseases, the Network of Centres of Excellence in Neurodegeneration, the Joint Programming Initiative in Neurodegeneration, and the Heads of International Biomedical Research Organisations forum.

Through these activities and others, CIHR had established strong relationships with MRC and, to a lesser extent, with BBSRC, reflecting the alignment of their respective research areas⁸¹. Other UKRI councils also had their own strong relationships with their counterpart agencies in Canada. Most notable, in the context of this case study, was the strong collaborative relationship between ESRC and SSHRC, facilitated in part by ESRC's Open Research Area agreement and other multilateral programmes such as the Trans-Atlantic Platform.

However, despite these previous interactions, UKRI interviewees noted that the focus within the UK on Official Development Assistance (ODA) funding had left little room for collaboration with Canadian partners outside of core grant funding.

⁷⁷ Memorandum of Understanding between the Department of Foreign Affairs, Trade and Development of Canada and the Department for Business, Energy, and Industrial Strategy of the United Kingdom of Great Britain and Northern Ireland concerning Science, Technology and Innovation (2017), Letter of understanding between The Canada Research Coordinating Committee and the UK Research and Innovation concerning Cooperation for Research (2019)

⁷⁸ CIHR International Collaboration webpage. Available: <https://cihr-irsc.gc.ca/e/27172.html>. (Accessed 8th Feb 2021)

⁷⁹ The CIHR Strategic Plan 2014/15 – 2018/19

⁸⁰ CIHR Strategic Plan 2021-2031. Available: <https://cihr-irsc.gc.ca/e/documents/cihr-strategic-plan-2021-2031-en.pdf> (Accessed March 11th 2021)

⁸¹ For example, the Canada-UK Partnership on Antibiotic Resistance (running since 2007) and the New Dynamics of Ageing Research Initiative (MoU, 2008)



B.4.4. Programme origins and development

The FIC programmes with CIHR involvement all complement pre-existing relationships or initiatives.

The **NeuroNex Programme** is a large, complex international funding activity led by the National Science Foundation (NSF) in the US. The second phase of the programme provided an opportunity for international partners to engage with the programme to support large collaborative networks of neuroscientists, behavioural scientists, and theorists, working in concert with technology and cyberinfrastructure developers. The four international, interdisciplinary networks are working to address grand challenges in the neurosciences and provide insights into the brain. The UK participation in these networks is supported through the *UK-USA Neuroscience collaboration (FIC-17)* programme, led by MRC. Each network is supported by around £2.4m per year over five years (though funding for UK participation only covers participation for three years). UK researchers are involved in three of the networks, two of which also include Canadian researchers, along with researchers from the US and Germany.

The **UK-Canada Collaboration on Artificial Intelligence (FIC2-07)** supports collaborative research projects to generate new insights into the implications of AI technologies for societies. These projects take a sector-based approach to take a holistic view across the entire technology development and diffusion cycle, such that they support the development of interdisciplinary collaborations and provide sector specific outputs relevant to policy makers, businesses and other key stakeholders. The programme arose from ongoing dialogue between ESRC, AHRC and SSHRC, but through FIC came the first interdisciplinary joint call across multiple UKRI councils (AHRC, EPSRC and MRC, led by ESRC) and all three Canadian grant agencies (CIHR and NSERC, led by SSHRC).

The **UK-Canada Diabetes Partnership Initiative (FIC2-11)** is a new bi-lateral partnership between CIHR and MRC to support collaborative research to cover key knowledge gaps pertaining to diabetes. The programme emerged from discussions between CIHR and MRC during the 'CIHR-INMD Workshop: 100 Years of Insulin: What's Next?' in October 2018, which highlighted the strong alignment in research priorities in the area of diabetes and the interest in pursuing bilateral collaboration opportunities.

B.4.5. Progress, facilitators and barriers, lessons learnt

Programme progress

All three FIC programmes with CIHR involvement are ongoing:

- The *UK-Canada Collaboration on Artificial Intelligence (FIC2-07)* ran one competitive call through which 10 projects were funded. These began in January 2020 and are due to end between January 2023 and January 2024.
- The *UK-Canada Diabetes Partnership Initiative (FIC2-11)* ran one call through which six projects were funded. These began in April 2020 and are expected to end in March 2023.
- The *MRC participation in the NSF NeuroNex (FIC-17)* ran one call through which four collaborative networks were funded. The UK participates in three of the networks, two of which involve Canadian collaborators. The projects were launched in 2021 and the UK participation is due to end between July and September 2023.

Interviewees reported that programmes are progressing well, though some project start dates were delayed due to the COVID-19 pandemic, and some projects have since requested (and been granted) extensions. All projects across all three programmes are expected to end in 2023.



Enabling factors, barriers and risks

The key **enablers** for successful programme implementation mentioned are the same as those highlighted by interviewees at the baseline stage, namely the commonalities and complementarities between Canada and the UK in terms of R&I capabilities, values and approaches, operational processes, strategic priorities at the funder and national level and areas of investment. The high degree of alignment between the two countries, as well as the shared language, has made the identification of opportunities of strategic interest, the leveraging of funds and the implementation of programmes relatively straightforward.

The establishment and delivery of the FIC programmes has also been facilitated by the pre-existing and longstanding trusted relationships between CIHR and MRC, and between ESRC and SSHRC, as well as their respective research communities.⁸² Commonalities between UKRI and CIHR (and SSHRC) processes, practices and requirements in terms of programme operation and delivery have also enabled programmes to be delivered as expected.

No major **barriers** to collaboration with the CIHR were identified, although interviewees did note that COVID-19 has had an impact on the progress and potential impact of the programmes. For example, as highlighted at the baseline stage, the *UK-Canada Diabetes Partnership Initiative* was negatively impacted by national lockdowns, affecting researchers' access to labs, and by travel restrictions which limited the development of relationships between researchers.

At the baseline stage, interviewees also noted the challenge presented by the spend profile and timeline of FIC in relation to all three FIC programmes with CIHR involvement.⁸³ In particular, the spending profiles and timeframes limited the time available for preparing calls, placing undue pressures on the panellists and delivery teams, and limiting the extent to which programmes could be promoted. The timeframes and approval process of the fund also prevented UKRI from being in a position to extend the budget for the *UK-Canada Diabetes Partnership Initiative* to match that proposed by CIHR. These requirements also hindered the UK's contribution to the NeuroNex programme, with the programme's budget underspent in part because the FIC could only support UK researchers' participation for three years rather than the full five years of the networks. In relation to these challenges, the representatives from UKRI councils all noted that the FIC team have been very helpful and supportive in addressing concerns and overcoming challenges in the delivery of their programmes.

⁸² Technopolis Evaluation of the Fund for International Collaboration. Baseline and Interim Process Evaluation – Technical Report (2021)

⁸³ Technopolis Evaluation of the Fund for International Collaboration. Baseline and Interim Process Evaluation – Technical Report (2021)

B.4.6. Programme activities, outputs and outcomes

Objective 1: Enabling International Collaboration

Theme 1: Enabling funding: Even at this interim stage, some projects have secured further investment or leveraged additional funding beyond the initial support from UKRI and CIHR. For example, under the UK-Canada Diabetes Partnership Initiative:

- The project 'Mobile health biometrics to enhance exercise and physical activity adherence in type 2 diabetes' has secured £1.63m in further funding from charities and Public Health England to further explore the implementation of remote exercise interventions.⁸⁴
- The project 'Bridging the gap to translation by understanding and preventing diabetic vascular complications using human organoids' secured two further grants from Diabetes UK, together valued at £107k, as well as a £1.5m grant from the Wellcome Trust to further explore lymphatic biology and kidney disease.⁸⁵

Theme 2: Deepening R&I: The FIC programmes are enabling UK and Canadian researchers to access each other's world-leading expertise and facilities, thus accelerating progress. Thus far, the Diabetes partnership has supported the development of 11 publications across four of the projects, and the NeuroNex programme has supported nine publications across three projects.

Theme 3: Developing partnerships: Even at the baseline stage, CIHR noted being more aware of the UK as a potential partner and an increased likelihood they would look to the UK for future international collaborations. While Canada would normally look to its partners in the US (and this will probably always be the case), FIC has made the UK stand out as a good alternative. CIHR are currently in the process of developing their Internationalisation Plan, in which the UK is expected to be one of their priority countries for collaboration.

Representatives from CIHR noted strong interest from across the breadth of its institutes to support future bi-lateral collaborations with MRC and other UKRI councils. Though some discussions have taken place regarding further joint-investment between CIHR and UKRI, these conversations have not yet resulted in confirmed programmes due to uncertainty around the availability of co-funding commitments from UKRI.

More widely however, the relationship between the UK and Canada has continued to remain strong, in part through the wider commitment to UK-Canada research collaboration supported through FIC. From MRC's perspective, FIC provided a platform to support strategic development of relationships rather than "fire-fighting".

Under the leadership of the Canada Research Coordination Committee (CRCC)⁸⁶, the New Frontiers in Research Fund recently announced the delivery of a new initiative with UK involvement. The New Frontiers in Research Fund is a five year £160.3m fund to support exploratory high-risk research, interdisciplinary research and international collaborations, as well as having the flexibility to launch special calls to target emerging issues.⁸⁷ Thus far, the Fund has primarily been used to support Canada's participation in Horizon 2020 projects, however

⁸⁴ Project reference: MR/T032189/1. <https://gtr.ukri.org/projects?ref=MR%2FT032189%2F1#/tabOverview> (accessed 7 March 2023)

⁸⁵ Project reference: MR/T032251/1. <https://gtr.ukri.org/projects?ref=MR%2FT032251%2F1> (accessed 7 March 2023)

⁸⁶ The Canada Research Coordination Committee (CRCC) was established in 2017 to support greater harmonisation, integration and coordination of the research-related programmes and policies of CIHR, SSHRC and NSERC, as well as the Canadian Foundation for Innovation.

⁸⁷ Managed by CRCC, the New Frontiers Fund comprises three stands of funding: 'Exploration' to support high-risk, high-reward research; 'Transformation' to support interdisciplinary and transformative research; and 'International' to enhance opportunities for Canadian researchers to participate in research with international partners.



in January 2023 launched the International Joint Initiative for Research in Climate Change Adaptation and Mitigation.⁸⁸ The initiative is a multilateral collaboration including UKRI and The Wellcome Trust from the UK, along with Brazil, Germany, South Africa, Switzerland, Norway, and the US. The initiative is led by the CRCC and administered by SSHRC. ESRC is coordinating UKRI involvement with support from AHRC and from an ESRC perspective represented a continuation of the relationship built through the UK-Canada Collaboration on Artificial Intelligence. UKRI has committed a total of £6.5m to the programme and researchers will be eligible for financial support of £500,000 for 3-year projects to be sourced from ESRC or AHRC core budgets.⁸⁹ The UKRI call was launched in January 2023 and will close in early May, with projects then running for 3 years from March 2024.

Prior to, and outside of the New Frontiers Fund, CIHR has had no designated funding to support international collaboration. The Institutes mobilise their own core funding to support international collaboration. As a result, the scale of the commitment, in terms of both levels of funding and timeframe, from CIHR institutes hinges upon longer-term strategy and planning. With this in mind, interviewees noted that the degree to which UK partners could leverage these funds would depend on the availability and alignment of national funding. The same also holds true for any future calls for funding through New Frontiers Research Fund. As noted at the baseline stage, uncertainties at the time around the 2021 spending review and the challenges around timelines forced MRC to take a step back from a potential tri-lateral collaboration with the National Health and Medical Research Council (NHMRC) of Australia and CIHR.⁹⁰

The strength of this relationship is evident in the fact that CIHR invited MRC to contribute to the development of their COVID-19 response strategy and related funding activities, consulted MRC in the development of their 10 Year Strategic Plan and that UKRI held a position on the board of Canada's work to modernise their research system.⁹¹ The collaboration between the UK and Canada in the field of health research also extended to collaboration and coordination in response to COVID-19. In October 2020, Dame Ottoline Leyser, Chief Executive of UKRI met with CRCC members to discuss UN Research Roadmap for the COVID-19 Recovery, pandemic preparedness, and reaffirmed a shared commitment to advancing EDI in international research.⁹²

The extent to which these FIC programmes have supported the development of further relationships across councils is limited. Though UKRI councils collaborated in the development and the early stages of programme delivery⁹³, interviewees from across UKRI noted that the extent to which this has led to sustained interactions and subsequent collaborative activity has thus far been limited, though this could also be attributed to uncertainties around funding (both core funding and additional funding programmes akin to FIC). Notably however, MRC

⁸⁸ <https://www.sshrc-crsh.gc.ca/funding-financement/nfr-fnfr/international/2023/international-2023-prelaunch-eng.aspx> (accessed 7 March 2023)

⁸⁹ <https://www.ukri.org/opportunity/international-research-on-climate-change-adaptation-and-mitigation/> (Accessed March 7th 2023)

⁹⁰ Technopolis Evaluation of the Fund for International Collaboration. Baseline and Interim Process Evaluation – Technical Report (2021)

⁹¹ Position on board: <https://cihr-irsc.gc.ca/e/51508.html> (Accessed April 2nd 2021)

⁹² <https://www.canada.ca/en/research-coordinating-committee/services/publications/progress-reports/2020-2021.html> (accessed 10th December 2022)

⁹³ Technopolis Evaluation of the Fund for International Collaboration. Baseline and Interim Process Evaluation – Technical Report (2021)



highlighted that the FIC programme provided a valuable platform for internal discussions across councils and the central FIC team helped to identify particular contacts.

At the baseline stage, representatives from CIHR noted that the availability of FIC funding (and Canada having been identified as a priority country for the Fund) allowed them to better explore the pipeline and identify areas of potential collaboration. The FIC process and timeline also provided CIHR with assurance that the discussions would likely result in joint work, thus presenting an important influencing factor in instigating and supporting the development of these programmes. For MRC, FIC was valuable for delivering against objectives and building relationship with international partners.

Though MRC participation in the *NSF NeuroNex* programme marks the first collaboration between CIHR and MRC's Neurosciences department, as the programme is centrally managed by NSF, there has been little direct interaction between the two agencies since the launch of the programme. As such, whilst the programme could not have been achieved on a bi-lateral level, the structure and delivery of the multilateral partnership designed and delivered by NSF has had less long-term benefits in terms of the collaborative relationships formed between the other partner agencies involved.

Despite this, UKRI programme leads did agree at the baseline stage that the programmes had supported greater familiarity with CIHR's systems and how they work, which would make future collaborations more streamlined.⁹⁴ From CIHR's perspective, this greater knowledge of, and trust in, the processes for delivering calls has laid the foundation for future collaborative activities with MRC.

Objective 2: Supporting BEIS and wider objectives including science diplomacy

Overall, interviewees agreed that FIC has been well received and perceived amongst Canadian partners and viewed as a signal of the UK's openness and desire to support international collaboration (something Canada is also working towards).

FIC has also provided a valuable mechanism to deliver the aspirations in the MoU signed between 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.

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. For example, the UK was able to secure significantly more funding to *NeuroNex* than any other international partner involved in the programme.

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.

⁹⁴ Technopolis Evaluation of the Fund for International Collaboration. Baseline and Interim Process Evaluation – Technical Report (2021)



B.4.7. The future

Both MRC and CIHR expect to continue their strong collaboration in future, with both councils noting the strength of the relationship and the alignment in priorities.

CIHR is in the process of developing their international strategy and expect partnerships with the UK to feature centrally in this plan. There are already ongoing conversations between MRC and CIHR to support collaboration around the Canadian Stem Cell Network.⁹⁵

Looking forward, CIHR are interested in developing future programmes, however the uncertainty around the timing and scope of the Funds available to MRC and other UKRI councils for international collaboration has meant these conversations have not yet been pursued. To better support the development of collaborative activities, CIHR noted they would benefit from a longer-term plan / commitment and regularity of funding to reflect the annual cycles of their Institutes' budgets. Both CIHR and MRC noted the announcement of the International Science Partnerships Fund (ISPF) was welcomed and expected to engage in further conversations in the subsequent months to explore potential opportunities.

B.4.8. Sources

- FIC tracker
- Call texts for project proposals
- Policy documents as referenced in footnotes
- Information obtained from 9 stakeholder interviews (2022 - 2023)

Organisation	Name of interviewee	Organisation	Name of interviewee
UKRI/MRC	Melissa Lennartz-Walker, International Programme Manager	CIHR	Mary-Jo Makarchuk
UKRI/MRC	Vanessa O'Sullivan	CIHR	Daniele St-Jean
UKRI/ESRC	Manija Kamal	CIHR	Claire Millington
UKRI/ESRC	Lewis Preece		
UKRI/UKRI North America Office	Sonny Rathod	UK S&I Network in Canada	David Barnes

- In addition, the case draws on information previously collected through the following 9 stakeholder interviews undertaken at the baseline stage (2021):

Organisation	Name of interviewee	Organisation	Name of interviewee
UKRI/EPSC	Andrew Bourne	CIHR	Mary-Jo Makarchuk
UKRI/MRC	Mark Palmer	CIHR	Daniele St-Jean
UKRI/ESRC	Manija Kamal	UKRI/UKRI North America Office	Sonny Rathod
UKRI/MRC	Charlotte Inchley	UK S&I Network in Canada	Sam Jeremy
UKRI/MRC	Alex Harris		

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B.4.9. Programme overview (as of September 2022)

Programme name	UK-Canada Collaboration on Artificial Intelligence	UK-USA Neuroscience Collaboration through MRC participation in NSF NeuroNex	UK-Canada Diabetes Partnership Initiative
FIC ID	FIC2-07	FIC-17	FIC2-11
FIC Wave	2	1	2
FIC Bid Amount (incl. OpEx)	£5.2m	£6.08m	£2.06
UK partners	ESRC (lead) AHRC EPSRC MRC	MRC (lead)	MRC (lead) ESRC
Partner Countries	Canada	Canada USA Germany	Canada
Overseas Partners	SSHRC (lead) NSERC CIHR	NSF (lead) CIHR FRQ DFG	CIHR
Match Funding (at bid)	C\$5.2 (£3m) (cash)	NSF £47.3m Plus unspecified additional contribution from other funders	£1.6m (cash)
Number of calls that have made awards (Dec 2020)	1	1	1
Value of the call	£3m	£6m	£2m
Number of awards made through the call	10	4	6
Final match funding awarded to active grants	£3m	TBC. At least £33.5 million from NSF, ~£1.5 million from CIHR, ~£1.5 million from FRQ and £5.8 million from DFG	£1.6m



B.5. Enterprise Singapore

B.5.1. Summary

This case study describes the evolution of the partnership between Innovate UK and Enterprise Singapore and how the funding provided by FIC has influenced their relationship.

The partners have rolled out two programmes through FIC. The Eureka GlobalStars Programme supports collaborative R&D projects relating to products with strong market potential. It has run two calls and funded 11 projects. The Global Incubator Programme supports firms seeking to expand their business in Asian markets. It has been rolled out separately, with two cohorts run by Innovate UK and five by Enterprise Singapore. To support firms in exploring their partners' markets, both organisations have contracted local incubators and to date 51 companies have participated.

According to interviewees, FIC has been an important enabling factor for the development of the partnership, providing the necessary funding to expand these two existing programmes (Eureka GlobalStars and Global Incubator) to support stronger UK-Singapore collaboration. The Eureka GlobalStars Programme provided the mechanism to initiate joint work and allowed partners to assess firms' interest in each other's market. The Global Incubator Programme has further demonstrated strong demand and a flow of businesses seeking to access their partners markets.

Interviewees believe the two FIC programmes have carved the way for deeper and broader collaboration between the two countries, which has been reflected through a new and ambitious 3-year-collaborative-agenda that builds on the initial dynamic generated by FIC. This new bilateral agreement commits up to £20m from each organisation to fund collaborative R&I projects and business internationalisation over the next three years, with a more formalised governance arrangement and a more strategic approach to calls and prioritised sectors.

B.5.2. Introduction

This case study explores the evolution of the relationship between Innovate UK and Enterprise Singapore and how the Fund for International Collaboration (FIC) has influenced this.

According to Innovate UK interviewees, Singapore's technological capabilities and economic opportunities make it an important strategic partner for the UK, as well as a strategic gateway to South East Asia. Enterprise Singapore was created in 2018 after the merger of International Enterprise Singapore and SPRING⁹⁶ and is now the government agency for enterprise development in the country. Its mandate spans capacity building, supporting innovation and internationalisation, with a single objective to help Singaporean businesses grow. It has an extensive network of local and overseas partners that enable it to deliver on its aims according to the needs and stage of growth of the relevant companies concerned.

Innovate UK used funding from FIC to roll out two programmes with Singapore:

- The **Global Incubator Programme** aims to support UK firms to explore commercial opportunities and enter overseas markets via local incubators and business accelerators. To facilitate its execution, each country has its own version of the programme. For Singapore, it is the Global Innovation Alliance run by its partners IoT Tribe (2020) and then

⁹⁶ <https://www.enterprisesg.gov.sg/about-us/overview> (accessed 10th March 2023)

Rainmaker⁹⁷ (2022) in London, with five cohorts supported to date. The UK's Global Incubator Programme is delivered by its Singaporean partner GROW⁹⁸, which has supported two cohorts and a total of 16 companies.

- The **Eureka GlobalStars Programme** is a wider programme established through the Eureka network⁹⁹ that enables those within Eureka member countries to partner with countries outside of the network to undertake R&I projects to explore new markets. In 2019, the UK (as an associate member of Eureka) invited Singapore to participate and launched a first call funded through FIC. Interviewees explained that the unexpected high demand from Singaporean firms then motivated a second call in 2020, as well as Singapore's association to Eureka in 2021. The UK's funding for these calls amounted to £2.5m, with £1m also provided by Enterprise Singapore. A total of 11 UK-Singapore initiatives have been supported through the two calls.

This case study looks at how these programmes have contributed to developing the partnership between Innovate UK and Enterprise Singapore, leveraged funding and deepened R&I activities. The case also analyses an early impact of the Fund, a new and ambitious 3-year-collaborative-agenda that builds on the initial dynamic generated by FIC¹⁰⁰.

B.5.3. Pre-FIC relationships

Interviewees reported that the relationship between the UK and Singapore is underpinned by long-standing academic and research ties. This can be seen, for example, in the large number of UK alumni in Singapore¹⁰¹. According to the UK SIN representative to the country, 50% of the current cabinet has been educated in the UK. This creates a favourable context for collaboration and a strong interest in partnerships between the two countries.

According to interviewees, a key feature of the past relationship between the two countries has been business delegations visiting each other to explore commercial opportunities, with introductory meetings usually run by Enterprise Singapore (or previously International Enterprise Singapore) and Innovate UK. However, two main factors were preventing this partnership from advancing. Singapore had two different agencies (SPRING and International Enterprise Singapore) to promote innovation and internationalisation, with their different mandates focused on domestic and international markets respectively. According to the Director of the Global Innovation Network in Enterprise Singapore, that institutional configuration was not suitable for joint work with the UK (as had been proposed by the Deputy Director of Innovate UK in 2017). The other factor was a lack of follow-up support to enable initial commercial interactions to continue and thrive.

According to interviewees, it is only from 2018 onwards that Singapore was able to work more closely with the UK, with the opportunity for bilateral collaboration arising because of the

⁹⁷ <https://www.enterprisesg.gov.sg/industries/hub/startup/global-innovation-alliance/united-kingdom/london/rainmaking>

⁹⁸ Australian incubator based in Singapore and specialised in agri-food tech <https://goqrow.co/>

⁹⁹ <https://www.eurekanetwork.org/countries/united-kingdom/globalstars/>

¹⁰⁰ Enterprise Singapore press released: Singapore signs MoU with the UK in 2021 https://www.enterprisesg.gov.sg/-/media/esg/files/media-centre/media-releases/2021/november/mr10321_singapore-and-the-uk-strengthen-collaboration-in-enterprise-co-innovation-and-joint-rnd.pdf

¹⁰¹ Based on interview to SIN representative, and triangulated with figures found in <https://www.studying-in-uk.org/international-student-statistics-in-uk/> where Singapore stands within the top ten non-EU countries sending the most students to the UK (As of 2020/2021, 6,580 of a total 452,225 international students).



merger of SPRING and International Enterprise Singapore to create Enterprise Singapore, with a mandate of promoting business growth and innovation.

B.5.4. Programme origins and development

In 2018/2019, Innovate UK brought two business delegations to Singapore, which according to interviewees, resulted in promising opportunities for participants. However, there wasn't follow-up support available to offer to those companies. Interviewees mentioned that this is how they identified a gap, as they wanted to support those businesses in pursuing the opportunities identified during their exploratory visits to Singapore, but didn't have the mechanism to do so.

Interviewees identified funding as another limitation for collaborative R&D, as each organisation could only support their domestic firms. It made it difficult for both countries to sign a bilateral agreement and open a joint call. They had already identified FIC as a potential source of funding and, in a conversation between the Innovate UK team and the SIN representative they came up with the idea of using **Eureka GlobalStars** as a straightforward mechanism to partner with Singapore.¹⁰²

Innovate UK was part of the Eureka network, and the GlobalStars Programme promotes multilateral R&I collaboration with countries outside the network. As such, it was the perfect instrument to enact the partnership between the UK and Singapore. Innovate UK was chairing Eureka in 2019 and got the Netherlands buy-in to inviting Singapore to participate in the Eureka network. The GlobalStars Programme offered Singaporean and UK businesses the chance to develop collaborative R&I projects to tap into new market opportunities.

The UK and Singapore had also discussed how to align their support to business expansion in each other's markets. Singapore already had the Global Innovation Alliance programme in place and had established international collaboration agreements to promote international business growth. Similarly, the UK was already developing the **Global Incubator Programme**, with Innovate UK envisaging collaboration mainly with Canada, the US, and India. Both organisations agreed on extending their programmes to include London and Singapore as business destinations, offering a 20-week immersion programme for companies in each other's market. To date agri-food, health, and cybersecurity have been key areas of work for both partners.

According to Enterprise Singapore, these two programmes are complementary and aim to build a continuous flow of businesses willing to collaborate with their peers in the UK and expand their markets. They also align well with the intentions of Innovate UK to strengthen its linkages with the Pacific region and facilitate access to the Asian and Southeast Asian Markets.

Programme leads in both countries found these two programmes a valuable opportunity to initiate a concrete collaboration, experiment and assess the appetite for government support. For the Partnership Manager Asia at Innovate UK, "[I]f it hadn't been for the GlobalStars calls through Eureka, I don't think it would have happened, [...] [...] the relationship wouldn't have been as strong as it is now".

B.5.5. Progress, enabling factors, barriers, risks, and lessons learnt

The **Eureka GlobalStars Programme's** main activities are summarised in Table 4. It has run two rounds of funding, with a total of £2.5m awarded to 11 projects. The projects have a maximum duration of 36 months. Enterprise Singapore offers to fund 70% of total project costs, while

¹⁰² According to the Asian partner manager at Innovate UK, they tried to emulate what had done with Japan using Eureka



Innovate UK offers 50%-70% depending on the business size. Projects within the first round have recently finished, whereas those from the second round are still running and are expected to conclude by May-June 2023.

Table 4 Summary of progress of the Eureka GlobalStars Programme Singapore

Round	Proposals	Funded projects ¹⁰³	Total funding	Status
Eureka GlobalStars Singapore 2019 – First round	15	4	£1.2m	Finished
Eureka GlobalStars Singapore 2020 – Second round	29	7	£1.7m	Ongoing

The two partners perceived the Eureka framework as an important enabling factor that had allowed them to test out their capacity to collaborate, helped them to understand the types of users of such an initiative, and learn the operational elements of collaborating with each other. Both organisations reported that it had been a positive experience and that there had been an unexpectedly high response from firms in both countries to the opportunities.

Despite its benefits, funders also pointed out that Eureka's administrative process required significant efforts due to its multilateral nature. For example, companies had to report to their local funders and to Eureka, which created confusion in some cases and put an extra burden on participants. Likewise, interviewees suggested that proposal evaluation processes were cumbersome due to the need for consensus across funding members.

After these two rounds, Singapore became a member of the Eureka network. The interviewee from Enterprise Singapore highlighted that this was a remarkable output from the initial UK-Singapore collaboration.

Innovate UK and Enterprise Singapore reported that Eureka will continue to be useful for broader multilateral collaboration. However, because of the strong interest to deepen their partnership, they have agreed to channel resources through a bilateral agreement. As such, in 2022, Innovate UK and Enterprise Singapore signed a new 3-year bilateral collaboration agreement to deepen and broaden their collaboration and commit additional funding.

For the **Global Incubator Programme**, each country has rolled out their own version of the programme with a sectoral focus. Both countries share information and support each other in introducing participants to the local context and providing advice on specialised local partners.

Enterprise Singapore connected Innovate UK with GROW, a specialised agro-tech and agri-food incubator, which now delivers the UK version of the Global Incubator Programme. The programme has run two cohorts with a total of 16 companies¹⁰⁴ supported through a four-stage acceleration programme.¹⁰⁵

According to the Deputy of Innovate UK, the Global Incubator Programme was initially conceived as a 20-week programme delivered in Singapore, but due to COVID-19 travel restrictions it had to be adjusted to be delivered completely online. Since June 2022, it changed and included two one-week visits to Singapore, at the beginning and the end of the

¹⁰³ Two projects withdrew the programme. One in round 1, unable to fulfil the match funding. Another in round 2

¹⁰⁴ Data obtained from GROW website: https://gogrow.co/portfolio/?_cohort=2022&_country=united-kingdom&_programme=global-incubator-programme

¹⁰⁵ It includes understanding Asia, goal setting and testing the opportunity – to help participants find their market fit – scaling in Asian and securing opportunities and launching into Asia.



programme. Innovate UK reflected that this mixed approach (in-person and online) proved more manageable than the original plans.

For the Global Innovation Alliance, Enterprise Singapore partnered with IoT Tribe (a UK business accelerator specialised in high-tech industries) to support five (“London Tech calling”) cohorts, with 35 companies supported to assess and pursue market opportunities in the UK.

Like the UK programme, it was delivered online during the pandemic. The main challenge faced in delivering it virtually was that firms were more reluctant to seal deals until they could see the products physically. Enterprise Singapore reported that on average 30% of the programme’s participants get an outcome from their participation in the programme, be that investment, a business deal, or agreeing on partnering with a UK firm. In their view, this is a positive outcome for an incubation programme, and they expect it to continue to improve in the next cohorts.

Enterprise Singapore and Innovate UK reported that, with hindsight, they had underestimated the level of demand and were therefore unable to fund all high-quality proposals. Usually, Enterprise Singapore funds 40% of applications, but this was not possible for the Global Innovation Alliance and even less so for the GlobalStars Programme with an average success rate of 27%.

B.5.6. Programme activities, outputs, and outcomes

Objective 1: Enabling international collaboration

FIC has enabled international collaboration, by providing the necessary funding to run the Eureka GlobalStars and Global Incubator Programmes in partnership with Singapore. It has also provided a platform to test out the interest of UK and Singaporean firms in accessing and expanding in each other’s markets.

Since 2019, Innovate UK and Enterprise Singapore have strengthened their linkages and deepened their collaboration, which has then resulted in a new bilateral agreement signed in 2022 to continue to develop the existing programmes in a more strategic and focused manner.

Theme 1: Enabling funding

In the case of the Global Incubator Programme, FIC funding was matched and exceeded by Enterprise Singapore (who spent more than originally envisaged in response to the high level of interest of Singaporean firms to explore the UK market). The new international collaboration agreement signed by the parties (which was enabled by FIC) has a budget of £15m each for 3 years, with the flexibility to increase this to £20m each to meet demand and will be funded by internal budget from both Innovate UK and Enterprise Singapore.

Theme 2: Deepening R&I

FIC funding has allowed UK firms to understand the Singapore market, as well as to discover and meet local firms with which to develop products to serve this or the wider Asian market. Innovate UK reported that “[Firms obtain] significant benefits, intensive company support, connections and an understanding of what they need in order to get into the market quicker”.

According to the Deputy Director of Innovate UK, three participating companies are reported to have changed their business models to align with the Asian market (due to their participation in the Global Incubator Programme), while one company has even sealed a deal for £3m.

To date, results from both programmes relate predominantly to market access, with few projects involving new product development. The new bilateral agreement seeks to deepen R&I collaboration and foster product development between partners as a key output of the partnership.

Both programmes have provided Innovate UK and Enterprise Singapore with insights into how to deepen collaborative R&I between the two countries and the areas where this is more feasible. The bilateral agreement builds on that, adopting a more strategic approach, which combines general and sector-specific calls in five areas (advanced manufacturing and materials, agri-food tech, mobility and transport, health and life sciences, and cybersecurity). The first open call under the new agreement opened in January 2022, seeking projects from all sectors, and closed in April 2022. An important change from the FIC programmes is that eligible participants now include researchers, as the objective is to strengthen the R&I component of collaborative projects. The second open call launched in February and will close in May 2023.

Innovate UK and Enterprise Singapore are now working on their first sector call (to be launched in August 2023), which will fund innovative and technology-disruptive projects around NetZero. Innovate UK will partner with two further incubators in Singapore to support a wider range of sectors as part of the further expansion of the Global Incubator Programme into Singapore.

Theme 3: Developing partnerships

According to both Innovate UK and Enterprise Singapore, FIC has contributed to building a stronger and closer relationship between the two organisations. Both partners acknowledge having common goals and recognise each other as strategic partners. In their view, that makes it easier for them to plan things together and to envisage routes for improving their current joint programmes (or to create new ones).

The new bilateral agreement enhances their partnership further, by setting up a medium-term agenda and increased funding. Moreover, UK funding will come directly from Innovate UK's core resources, which makes it a more strategic investment and more sustainable. In the case of Enterprise Singapore, they expect to deepen and advance their partnership with the UK over the next five years. The partners have also agreed a more formalised governance arrangement, with regular planning and strategy meetings to steer programmes to meet firms' needs and respond to the demand for this type of service.

A UK-Singapore Business Partnership Forum is planned for June 2023, which will bring together the business communities from the two countries (including beneficiaries from the Global Incubator and Global Innovation Alliance Programmes). The focus of this Forum will be NetZero and will be used to launch the next call for proposals under the bilateral agreement. The Business Forum will then alternate its host and location between the two countries during the next three years, sending a strong message about their collaboration and commitment to a closer partnership. In this way, both organisations expect to make their partnership more dynamic, embedded, and formalised.

Objective 2: Supporting BEIS and wider objectives including science diplomacy

One outstanding result of FIC mentioned by both partners is their capability to identify strategic areas of collaborative work. It builds on the knowledge and understanding generated through delivering the two FIC programmes, as well as the alignment between UK strengths and the priority policy areas defined in Singapore's Agenda 30x30. This alignment spans strategic areas to explore further integration of the partners R&I ecosystems (for example, interviewees from both organisations suggested bringing in UK catapults and Singaporean innovation centres).

FIC has also influenced diplomatic relationships. According to Innovate UK, the feedback received from the British High Commission in Singapore is that the innovation relationship between the UK and Singapore is probably one of the strongest aspects of the whole diplomatic relationship that the UK now has with Singapore.



B.5.7. The future

Both partners are optimistic about the potential results of projects funded through FIC and those in the bilateral agreement. This new MoU is seen by these organisations as a catalyser for the further development of their partnership and a clear means to achieve long-term international collaboration. Within the possible strategies for the future are integrating other actors of the innovation ecosystems and joining efforts to explore new market opportunities together, helping UK and Singapore based companies (together) to expand into a third market. In their view, this broader agenda is only possible because they have achieved a common understanding of their capabilities and interests through the FIC-funded programmes.

The partners expect the new bilateral agreement to lead to: (i) new products and sales because of their collaborative R&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 (iii) the development of new programmes to expand their collaboration.

Both partners expect the new bilateral agreement and its constituent calls to attract higher quality projects. Enterprise Singapore's budget is planned with a 5-year window and a medium-to-long-term perspective, which increases its sustainability and continuity. From the UK perspective, funding the partnership activities with Innovate UK's own resources (rather than bidding into a specific Fund such as FIC) also provides greater certainty about the continuity of funding.

B.5.8. Sources

- Call texts for project proposals
- Policy documents as referenced in footnotes
- Inputs obtained from four stakeholders' interviews

Name of interviewee	Organisation
David Golding	Deputy Director, Global Innovate UK
David Campbell-Molloy	Partnership Manager Asia – Innovate UK
Hanbin Zheng	Head of STI at the British High Commission in Singapore
Jonathan Lim	Director for the Global Innovation Network – Enterprise Singapore



B.5.9. Programme overview (as of September 2022)

Programme name	Supporting business-led multilateral collaboration through the EUREKA framework		Global Incubator Programme
FIC ID	FIC-08		FIC2-20
FIC Wave	Wave 1		Wave 2
FIC Bid Amount (incl. OpEx)	£10.4 (all countries)		£3.32m (all countries)
UK partners	Innovate UK		Innovate UK
Partner Countries	Singapore Canada Japan France Netherlands Austria Denmark	Turkey Finland Portugal Sweden Germany Belgium	Canada Singapore India USA
UK-Singapore Calls only:			
Overseas Partners	Enterprise Singapore		Enterprise Singapore
Match Funding (at bid)	£1m		£5m
Number of calls that have made awards (Dec 2022)	2		2 (UK) + 5 (Singapore)
Value of these calls	£2.5m, including: Round 1: £1.5m Round 2: £1m		Call 1: £0.8m Call 2: £(tbc)
Number of awards made through these calls	11		51
Final match funding awarded to active grants	£1m		£3m-£5m (tbc)

B.6. Japan Science and Technology Agency

B.6.1. Summary

The *UKRI-JST Joint Call on AI and Society* was the first collaboration between ESRC and JST-RISTEX. Despite interest from the UK research community in partnering with Japan, the volume of collaborative activity between the two countries was historically low and ESRC had previously been unable to pursue a joint programme due to financial constraints.

The availability of FIC funding enabled ESRC to pursue collaborations with both the Japan Society for the Promotion of Science and Japan Science and Technology's Research Institute of Science and Technology for Society (JST-RISTEX) and further demonstrate UK commitment to fostering collaborations with Japanese partners. In designing and delivering the *UKRI-JST Joint Call on AI and Society*, ESRC and JST-RISTEX realised the commonalities in their institutional and national strategic priorities in relation to AI research. Through the *UKRI-JST Joint Call*, these funding bodies built stronger mutual understanding of their respective national R&I systems, as well as their operational procedures and requirements in delivering open funding calls. The level of interest in the call and the success of the programme affirmed a growing desire among researchers in both Japan and the UK for joint research programmes. The experience and success of the programme increased interest in future collaborations between the two agencies.

The extent to which this interest and these opportunities (and therefore the longer-term sustainability of the benefits of this programme) have been realised has been compromised by the lack of clarity and confirmation over the availability of future funding from the UK. Though the relationship between UKRI and JST-RISTEX has improved, without the availability and assurance for continued commitment to co-funded programmes, ESRC have so far been unable to fully realise the benefits.

B.6.2. Introduction and context

The **Japan Science and Technology (JST) Agency** is a network-based research institute, and one of seven national R&D agencies that are overseen by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) and the Council for Science, Technology and Innovation (CSTI) in Japan. It has an annual budget of ~¥170.6bn (~£1.06bn), much of which is used to deliver funding programmes for basic research, industry-academic collaboration, technology transfer and international collaboration. Its three core pillars of activity are¹⁰⁶:

- Formulating visionary R&D strategies for co-creation of the future with society
- Creating knowledge and transforming it into economic and social value
- Promoting dialogue with society and cultivating human resources

The **Research Institute of Science and Technology for Society (RISTEX)** is a department within JST. It was established with the specific aim of drawing on the full breadth of research disciplines, including the social sciences and humanities, to understand how new technologies can best be harnessed to deliver the greatest benefit for society. RISTEX conducts interdisciplinary R&D and runs funding programmes with the aim of producing and promoting innovative solutions to the issues that human society confronts.

JST-RISTEX is the overseas partner in the ***UKRI-JST Joint Call on Artificial Intelligence and Society programme (FIC2-09)***, which was led in the UK by ESRC, with the support of AHRC. The

¹⁰⁶ <https://www.jst.go.jp/EN/about/overview.html> (accessed 27th January 2023)



programme funded collaborative research on the societal impacts of Artificial Intelligence (AI) technologies. It was awarded £2.08m from Wave 2 of FIC¹⁰⁷, with around £1.2m¹⁰⁸ in match-funding secured from JST. The programme launched a single call (April-October 2019), with six projects selected that ran from January 2020 to December 2021.

This case study focuses on the relationship between UKRI councils and JST-RISTEX through the FIC-supported *UKRI-JST Joint Call on AI and society*. It was developed based on desk research and consultation with 3 key stakeholders (representatives from JST-RISTEX, ESRC and the UK Science and Innovation Network). A list of interviewees is provided at the end of the case.

B.6.3. Pre-FIC (relationships)

Japan invests heavily in science and innovation (3.26% of GDP), but this is predominantly focused domestically, with relatively low levels of international collaboration activity (for example it has one of the lowest international co-authorship and co-invention rates amongst OECD countries).¹⁰⁹ Currently, its main external research partners are the United States and China, although the extent of cooperation between the UK and Japan has also increased over the past two or three decades. Collaboration between Japan and the UK has expanded in recent years in particular, with the number of co-authored papers growing by 29.22% between 2017 and 2021. However, collaboration in the social sciences remains limited, accounting for only 2.6% of joint publications during this period.¹¹⁰

UK-Japan Joint Committee meetings on Cooperation in Science and Technology have been held since 1994, based on Co-operation in Science and Technology agreements that have been signed between the two countries. In 2017, the Japan-UK Joint Declaration on Prosperity Cooperation set out the aim to establish a 'Lead Agency Arrangement' between UKRI and JST, as well as the Japan Society for the Promotion of Science (JSPS).¹¹¹ However, as of December 2022, there was still no formal, established mechanism for collaboration between UKRI and these Japanese funding agencies. Stakeholders consulted for this case reported that the extent of engagement between the UK and Japan and the opportunity to consolidate earlier discussions through actions had been limited by the availability of funding.

JST's International Strategy (2017), the latest annual plan (The HAMAGUCHI Plan, 2019) and the 2021 National Innovation Strategy set out the importance of promoting international partnerships with both researchers and funding agencies abroad.^{112,113} In particular, the National Innovation Strategy highlights the intention to promote "more strategic bilateral and multilateral international joint research... with other countries in leading-edge critical fields such as quantum technology, AI, and materials".¹¹⁴

¹⁰⁷ Plus £300k underspend from another FIC ESRC programme to fund a sixth grant.

¹⁰⁸ Due to differences in funding (i.e., in Japan overhead costs are met from a separate budget), UKRI considers this to be approximately equal match funding

¹⁰⁹ UNESCO Institute for Statistics (uis.unesco.org). Data as of June 2022; OECD (2017) Japan Policy Brief: Innovation <https://www.oecd.org/japan/japan-strengthening-innovation-for-productivity-and-greater-wellbeing.pdf> (accessed on 15 March 2021)

¹¹⁰ Universities UK (2022) The UK-Japan relationship: collaboration in higher education, research and innovation

¹¹¹

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/641154/Japan-UK_Joint_Declaration_on_Prosperty_Cooperation.pdf (accessed 8th March 2023)

¹¹² JST (2017) Background of the Revision of the International Strategy.

https://www.jst.go.jp/EN/about/intl_strategy/jst_intl_strategy4_ref_en.pdf (accessed 8th December 2022)

¹¹³ JST (2019) The HAMAGUCHI Plan. https://www.jst.go.jp/EN/about/pdf/En_Hamaguchi-plan_w_New_slogan.pdf (accessed 23rd March 2021)

¹¹⁴ https://www8.cao.go.jp/cstp/english/strategy_2021.pdf (accessed January 24 2023)

JST has developed a series of international collaborations, both through specific agreements (for example it signed an Implementing Arrangement for research exchange with the European Research Council in October 2018) and through specific funding programmes, such as the Strategic International Collaborative Research Program (SICORP) and its predecessor the Strategic International Research Cooperative Program (SICP).^{115,116} In 2022, Japan also entered into informal talks to join Horizon Europe (the EU's main funding programme for research and innovation).¹¹⁷

SICP and SICORP are specifically aimed at supporting bi-lateral and multi-lateral cooperation with a range of non-ODA countries (including the UK) through international joint research programmes.¹¹⁸ UKRI councils (MRC, EPSRC, BBSRC and NERC) have all in the past delivered joint programmes with JST through this route, with activities focused on supporting technology and natural science research.

The relationship between UK and Japanese research partners in the social sciences and humanities (i.e., with ESRC and AHRC) has emerged more recently. This development was supported through the first wave of FIC via *ESRC-AHRC UK-Japan SSH Connection grants* (FIC-18). ESRC reported that prior to this FIC programme they had not been able to launch a partnership with Japan due to funding constraints. ESRC had instead been focusing their international funding activities and strategies on collaborations with EU partners and ODA-eligible countries through the Newton Fund, notably China, India, Brazil and South Africa.¹¹⁹ Whilst collaboration with Japan was identified as 'of interest' to ESRC's research community, the inclusion of Japan as a priority country within FIC (and the additional funding offered through this new funding mechanism) provided the incentive for ESRC to pursue further its desire to develop collaborative activities with Japanese partners.

The *UKRI-JST Joint Call on Artificial Intelligence*, funded through FIC Wave 2, represented a further expansion of ESRC's relationship with Japan. It was the first joint call between ESRC and JST-RISTEX, and indeed the first ever international joint call run by JST-RISTEX (which had previously focused on domestic research programmes, with other JST departments responsible for international programmes). As a result, JST-RISTEX had had little interaction with ESRC before this programme and limited awareness of its priorities, policies and practices (or those of the UK more generally).

B.6.4. Programme origins and development

ESRC first approached JST-RISTEX about a potential collaboration in December 2017 when the SIN officer in Japan organised for the then Acting Chief Executive of ESRC, Professor Tony McEnery, and the Head of International Strategy, Lewis Preece, to visit Japan.¹²⁰ Through this visit and subsequent discussions, ESRC and JST-RISTEX identified their mutual interest in AI and

¹¹⁵ SICP stopped awarding new projects in 2013, and projects awarded from 2014 were managed under SICORP

¹¹⁶ JST (n/a) Global Joint Research Brochure. https://www.jst.go.jp/inter/english/jst_inter_brochure_e.pdf (accessed 8th December 2022)

¹¹⁷ <https://www.researchprofessionalnews.com/rr-news-europe-horizon-2020-2022-5-japan-enters-informal-talks-on-joining-eu-r-d-programme/> (accessed 8th December 2022)

¹¹⁸ <https://www.jst.go.jp/inter/english/index.html> (accessed 8th December 2022)

¹¹⁹ The recent focus of ESRC/AHRC international strategies (and investment from baseline resources) has been on maintaining existing collaborations with European partners. This critical, ongoing commitment has curtailed the development of relationships with new partners excluded from ODA funding streams.

¹²⁰ UK Science and Innovation Network Case Study: SIN Japan assists first ESRC-JST Joint Call for £3m on AI and Society.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/797730/2_Impact_Case_Study_-_SIN_Japan_ESRC_Call.pdf (accessed 28th January 2021)

its societal impacts. JST-RISTEX also made clear their aspiration to internationalise their domestic programmes and, after identifying AI and its impacts as a common priority for both countries, proposed the possibility of a joint call linked to their existing 'Human-ICT Ecosystem' domestic funding programme.

This 'Human-ICT Ecosystem' programme had been launched by JST-RISTEX in 2016 to look at how society or "we as humans" should co-exist with information technology as it continues to evolve in the future. As our consultee from JST-RISTEX acknowledged, "discussions in this field are meaningless if they are just confined to Japan, and there was a growing need to develop deeper discussions through international collaboration." The prospect of a joint call with the UK therefore presented an opportunity for JST-RISTEX to elevate areas of national research into an international context.

To develop this opportunity further, ESRC and JST-RISTEX organised a joint expert workshop in September 2018, with UK and Japanese researchers and stakeholders in attendance. The workshop explored the issues in this area, and identified themes and approaches that would derive the greatest value from UK-Japanese collaboration. The outputs of this workshop, including the identified gaps, synergies and shared priorities, were then used as the basis for defining the scope of the *UKRI-JST Joint Call on Artificial Intelligence and Society*.

The increasing prevalence of AI, machine learning and automation in many aspects of everyday life is already generating a wide array of economic, cultural and social challenges and opportunities. The impact of these technologies could be highly disruptive, both at the individual level and at the wider social and economic level. However, the extent and nature of these impacts are still uncertain. The *UKRI-JST Joint Call on AI and Society* seeks to address this uncertainty around the impacts of AI by supporting collaborative R&D projects.

For ESRC, the successful initiation and development of the *UKRI-JST Joint Call on AI and Society* was in part attributed to the existence of another FIC programme, the Wave 1 *SSH (social science and humanities) Pump-Priming* programme (FIC 18)¹²¹. Although a separate programme, the launch and success of the Pump-Priming programme is considered to have been valuable for establishing the Joint Call on AI programme, in that it signalled the commitment of the UK and ESRC to collaborating with Japanese partners and demonstrated that UK partners could access funds to meaningfully pursue collaborative opportunities.

B.6.5. Progress, enabling factors, barriers, lessons learnt

Programme progress

The *UKRI-JST Joint Call on AI and Society* programme ran one funding call (May-July 2019) which received 30 applications, of which 7 were considered fundable and six were funded. These projects commenced in January 2020 and are expected to last 3 years. Of the six funded projects, five were granted no-cost extensions due to the COVID-19 pandemic and one was granted a costed extensions of £100k. As a result, four projects will have ended by March 2023, with two expected to end in September 2023.

Both ESRC and JST-RISTEX agreed that the high number of proposals and enquiries received indicated that both the choice of partner and the timing of the programme were appropriate. Notably, some applicants to the programme were collaborating with partners that they had

¹²¹ The Wave 1 programme SSH Pump-Priming (FIC-18). £2m funding to improve connectivity between UK and Japan in the area of social sciences, arts and humanities through networking grants. 49 successful awards each receiving up to £50,000. Japanese co-funding was provided at the project level, for example via cash and "in-kind" contributions from Japanese institutions.

initially met at the preliminary 2018 expert workshop to help scope the Joint Call. This demonstrates that relationships between the research communities can be established and built upon even outside of the funded grants, through scoping activities or other engagement.

Enabling factors and barriers

The successful development and launch of the programme were, for both ESRC and JST-RISTEX, attributed to the high level of engagement and communication between the respective programme managers. Regular, open communication enabled both organisations to build their understanding of their respective requirements and overcome challenges that arose.

The first such challenge was a potential language barrier. As our consultee from JST-RISTEX noted, communicating in English is “naturally stressful for both parties, and there must have been some misunderstandings.” However, the “patience and detailed explanations given by ESRC staff to their non-English speaking Japanese counterparts” enabled the success of the joint call. ESRC similarly valued the time and efforts that their Japanese partners invested in ensuring the call would be a success.

A challenge then faced in delivering the programme was to reconcile the different systems for reviewing open calls in Japan and the UK. As the UKRI-JST Joint Call on AI and Society builds on an existing domestic programme, JST-RISTEX had existing systems in place for peer review that differed somewhat from UKRI and ESRC requirements. Overall, however, there was a greater degree of similarity in the peer review process than either partner had expected. The one main exception related to the selection of the peer reviewers, where JST would employ their internal board of experts whilst UKRI would put in place an internal review panel. However, after understanding each other's models and requirements, ESRC and JST-RISTEX were able to reach a mutual understanding and successfully launched the call. Although this process took some time, it did not impact the timeline of the programme. It was also time well invested, as the result was high quality projects and a high level of agreement between the UK and Japanese reviewers. JST-RISTEX has now also proposed a lead agency mechanism to support any new joint call for proposals, which should further streamline the delivery of a joint call.

The COVID-19 pandemic hampered the early progress of the awarded projects. Whilst they have progressed, the inability to travel made it more difficult for some projects to build close relationships among researchers. All six awarded projects have been extended (five at no cost and one with £100k extension), primarily due to the impact of COVID-19 and associated lockdowns on the research collaborations.

From the perspective of ESRC, the SIN officer in Japan was very helpful in facilitating conversations between ESRC and JST-RISTEX at the more senior level, particularly during the early stages of initiating the collaboration. The SIN officer also provided ESRC with insights into wider contextual factors and the Japanese funding system. For example, the timeline of the funding cycle in Japan and the fact that funding is allocated on a one-year cycle means that projects need to start at a certain time. As ESRC were aware that the second wave of FIC funding would become available during the development of the *UKRI-JST Joint Call on Artificial Intelligence*, they were able to engage with JST-RISTEX over a longer period that aligned with their funding timelines.

B.6.6. Programme activities, outputs and outcomes

Objective 1: Enabling International Collaboration

Theme 1: Enabling funding: ESRC has continued to collaborate with the Japanese funding agency JSPS, along with AHRC, on a set of 10 projects to explore the challenges and impacts

of the COVID-19 pandemic.¹²² Launched in 2021, the programme looked to explore the effects of the pandemic on labour markets, mental health, public trust in institutions and sustainability of culture. These awards were expected to further strengthen the partnerships between UK and Japanese researchers. Though not a direct result of the collaboration with JST-RISTEX, this programme UKRI-JST Joint Call on Artificial Intelligence and Society programme further affirmed the UK's interest in delivering collaborative research with Japan at the levels of both the funding agencies and the individual researchers.

Theme 2: Deepening R&I: From the perspective of JST-RISTEX and ESRC, the outputs and outcomes of the programme would not have been possible without the collaboration, as the FIC programme offered the researchers valuable chances to meet.

As an example of benefits emerging from the projects, 'The Emotional AI in Cities: Cross Cultural Lessons from UK and Japan on Designing for An Ethical Life' project has already made numerous contributions to policy development. Project researchers have published, commented on and made submissions to a range of national and international policy documents, including to reports produced by the United Nations Human Rights Council, the UN Committee on the Rights of the Child, UNICEF, European Parliament, and the Parliament of Victoria, Australia.¹²³

The programme has supported improved relationships between Japanese and UK researchers, though the extent of this is limited by the relatively small scale of the programme. Given the small size of the current programmes, the impact is expected to be limited, but it has been a valuable signifier of the UK's interest to collaborate with Japan.

Theme 3: Developing partnerships: The relationship between JST-RISTEX and ESRC had developed in such a way that representatives from JST-RISTEX have approached ESRC for feedback and insights on the development of a new national programme in Japan. Although this is not expected to be a joint call, the request was indicative of the growing relationship between the two agencies.

The *UKRI-JST Joint Call on AI and Society* (along with the other FIC programmes delivered with Japanese partners) was thought to provide a positive foundation for future collaboration. Whilst both JST-RISTEX and ESRC expressed interest to implement further joint funding programmes, the absence of future funding from the UK has not yet supported this. According to ESRC, the relationship with Japan was very much driven by the FIC and not something that could be supported through core budgets. As a result, there are no concrete plans for closer working in the future.

The organisation and operation of the Japanese research funding landscape is one that requires consistent, regular, and longer-term commitments to research funding. JST finances R&D activities following a top-down approach, supporting projects in line with the priorities set out in the Science, Technology and Innovation Basic Plan agreed by Japan's Cabinet Office.¹²⁴ As JST-RISTEX does not have dedicated funding for supporting international collaboration, the FIC programme was only possible as it aligned with an existing priority and area of activity for JST-RISTEX. As a consequence, collaboration between JST-RISTEX and ESRC depends on identifying areas of research which have been prioritised within their annual plans with sufficient

¹²² <https://www.ukri.org/news/uk-japanese-collaboration-to-address-covid-19-challenges/> (accessed January 24 2023)

¹²³ Project reference: ES/T00696X/1. <https://gtr.ukri.org/projects?ref=ES%2FT00696X%2F1> (accessed January 24 2023) and <https://emotionalai.org/outputs> (accessed March 8 2023)

¹²⁴ Universities UK (2022) The UK-Japan relationship: collaboration in higher education, research and innovation

time to support alignment with their annual funding cycles. Without the ability to confirm committed funds for collaboration however, ESRC representatives noted they felt limited in how far further discussions for collaboration can be taken.

Though the International Science Partnerships Fund (ISPF) has since been announced, the extent of the opportunities for the humanities and social sciences within the fund has limited ESRC's continued planning efforts. In light of this lack of clarity (as of January 2023) and the structure of JST's funding cycles, ESRC expect to instead focus their international planning activities on relationships with countries that follow similar funding cycles, or that face similar levels of uncertainty.

Objective 2: Supporting BEIS and wider objectives including science diplomacy

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. Moreover, our consultee from JST-RISTEX "realised that there are no major differences between Japan and the UK; rather, they have many points in common. For this reason, I would like to continue to explore the possibility of further joint calls with the UK."

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 programmes (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, have fostered a positive impression of the UK and helped to offset Japanese concerns surrounding Brexit. Representatives from ESRC also agreed that the FIC programmes supported sustained engagement and have helped to maintain momentum in 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".¹²⁵ The Minister also detailed the continued interest in supporting research collaboration with Japan, and though not mentioning the FIC programme by name, did remark on the "range of joint projects including AI".¹²⁶ In doing so, this indicated that this FIC programme is one part of a collection of collaborative work to support the development of the relationship between Japan and the UK.

B.6.7. The future

Whilst both JST-RISTEX and ESRC expressed interest to implement further joint funding programmes, the current absence of clarity around future funding from the UK has not yet supported this. As a result, there are no concrete plans for closer working in the future.

B.6.8. Sources

- FIC2-09: UKRI-JST Joint Call on Artificial Intelligence and Society Programme Bid (April 2019)
- FIC tracker
- Call texts for project proposals

¹²⁵ <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 January 24 2023)

¹²⁶ <https://policymogul.com/key-updates/26024/science-minister-s-speech-at-keio-university-in-japan> (accessed January 24 2023)

- Policy documents as referenced in footnotes
- Programme lead questionnaire
- Information from 3 stakeholder interviews:

Name of interviewee	Organisation
Lewis Preece	ESRC
Hirao Takanori	JST-RISTEX
Griff Jones	UK S&I Network in Japan

- In addition, the case draws on information previously collected through the following 3 stakeholder interviews undertaken at the baseline stage (2021):

Name of interviewee	Organisation
Sean Nolan	ESRC
Hirao Takanori	JST-RISTEX
Griff Jones	UK S&I Network in Japan

B.6.9. Programme overview (as of September 2022)

Programme name	UKRI-JST Joint Call on Artificial Intelligence and Society
FIC ID	FIC2-09
FIC Wave	2
FIC Bid Amount (incl. OpEx)	£2.08m*
UK partners	ESRC (lead) AHRC
Partner Countries	Japan
Overseas Partners	Japan Science and Technology (JST), Research Institute of Science and Technology for Society (RISTEX)
Match Funding (at bid)	¥56m (£0.35m) (Cash)
Number of calls that have made awards (Dec 2020)	1
Value of this call	£2.4m
Number of awards made through this call	6
Final match funding awarded to grants	£1.2m

* Plus £300k underspend from another FIC ESRC programme.

B.7. National Natural Science Foundation of China

B.7.1. Summary

The National Natural Science Foundation of China (NSFC) is a key partner for the UKRI and have been involved two programmes under FIC: The 'UK-China Healthy Ageing Flagship Challenge — Academic research programme', and the second phase of a UK-US joint programme, 'Next generation transdisciplinary international research collaborations in Ecology and Evolution of Infectious Diseases (EEID)'.

The Healthy Ageing programme has implemented a call and funded five projects involving UK-China collaboration, whereas the multilateral EEID programme has funded one projects with both UK and Chinese partners.

In the process, the partners have been able to overcome challenges posed by the COVID-19 pandemic in adapting joint selection processes and allowing projects to adapt to new circumstances.

The former programme is part of the overall UK-China Healthy Ageing Flagship Challenge programme, and as such it helps meet the political commitments made between the two countries' governments. This should also help to ensure the uptake of policy-relevant findings.

These are two in a series of collaborative initiatives undertaken jointly by UKRI and NSFC, and they have benefited from a very well-established relationship with clear standardised procedures in place. In this context, the programme has reinforced the existing partnership between UKRI and NSFC and helped further improve the collaborative processes between the partners, for example with respect to peer review and support for interdisciplinary research. It has also helped meet the demand for collaborative opportunities from very active communities in both countries.

B.7.2. Introduction and context

The National Natural Science Foundation of China (NSFC) was established in 1986 to manage the National Natural Science Fund, and is responsible for supporting basic research, fostering scientific talent, and promoting socioeconomic development. Its annual budget in 2019 was 31.1bn RMB (£3.5bn) and it makes around 45,000 new awards each year.¹²⁷ This budget is expected to grow in coming years as part of wider increases in research and innovation investment within China.

As a consequence of recent reforms, NSFC was placed under the purview of the Chinese Ministry of Science and Technology (MOST) in 2018, having previously reported directly to the State Council. The Foundation has also updated its funding principles and practices as part of major reforms that are aimed at "building [a] national natural science funding system for the new era".¹²⁸ This includes piloting a greater emphasis on transdisciplinarity and application-driven basic research within certain programs, to test application and review procedures.

NSFC is a partner in the Fund for International Collaboration (FIC) via the **UK-China Healthy Ageing Flagship Challenge programme (FIC2-21)**, awarded through Wave 2 of FIC. UKRI's contribution to this flagship programme was planned to be delivered through an "integrated package of research and innovation activities", including up to three strands of activity:

¹²⁷ http://www.nsf.gov.cn/english/site_1/about/6.html (accessed 23rd March 2021)

¹²⁸ "National Natural Science Fund Guide to Programs 2019", National Natural Science Foundation of China

1. An interdisciplinary academic research programme
2. A 'Joint centre of Excellence' (an innovation programme)
3. Centre partnerships, fellowships or mobility

NSFC participates in the first of these activities (the academic research programme, which is the focus of this case study), partnering with ESRC and MRC in the UK. Innovate UK is then working with the Chinese MOST on the innovation programme (the second strand of the Flagship).¹²⁹ The planned 'centre partnerships' element was not eventually taken forward because the partnership ran out of funds and the other programme activities were sufficient to achieve their objectives. Both academic and innovation components contain some element of mobility including planned SME partnering missions and student exchanges.

A joint call between ESRC, MRC and NSFC was launched in 2019, as part of the Health Ageing programme, and five collaborative research projects were selected for funding, starting in August 2020. UKRI committed £5m to the call, while NSFC committed 2.5m RMB per project, equivalent to £1.4m¹³⁰ in total across the five selected projects.¹³¹ These projects, all of which involve close collaboration between UK and Chinese researchers, seek to make novel interdisciplinary contributions to the evidence base on healthy ageing, providing evidence for key stakeholders in policy and practice in the UK and China and enhance interdisciplinary collaborations and partnerships.

In addition, NSFC was a partner in the multilateral '**Next generation transdisciplinary international research collaborations in Ecology and Evolution of Infectious Diseases (EEID) programme (FIC2-15)**'. The programme built an existing US multi-agency programme led by the National Science Foundation (NSF), Ecology and Evolution of Infectious Diseases (EEID),¹³² and the bilateral UK-US call with the same title under FIC wave 1 (FIC-14).

The programme included four calls for proposals:

- A call for proposals for travel awards in 2019, with awards of up to £5,000 to help establish collaborative relationships and prepare proposals for the EEID programme¹³³
- Three calls for proposals for international partnerships on EEID in 2019,¹³⁴ 2020,¹³⁵ and 2022¹³⁶ to fund either collaborative research projects or Research Coordination Networks

Under the terms of the latter three calls, proposals were required to include researchers from the UK and the US and could optionally include researchers from Israel and China as well. The UK component of proposals were submitted by the US principal investigator and assessed through the NSF peer review process.

¹²⁹ FIC2-21 Bid

¹³⁰ Due to differences in grant models and eligible costs (i.e. NSFC doesn't pay researcher salaries, these are covered by the University directly), UKRI considers this to be approximately equal match funding.

¹³¹ <https://www.ukri.org/news/new-ukri-china-projects-tackle-the-challenges-of-ageing-societies/> (accessed 8th February 2021)

¹³² <https://beta.nsf.gov/funding/opportunities/ecology-evolution-infectious-diseases-eeid> (accessed 10th February 2023)

¹³³ [\[ARCHIVED CONTENT\] Ecology and Evolution of Infectious Diseases Travel Grants – International Travel Award Scheme - BBSRC \(nationalarchives.gov.uk\)](#) (accessed 10th February 2023)

¹³⁴ [\[ARCHIVED CONTENT\] Ecology and Evolution of Infectious Diseases - BBSRC \(nationalarchives.gov.uk\)](#) (accessed 10th February 2023)

¹³⁵ [Ecology and Evolution of Infectious Diseases 2020 – UKRI](#) (accessed 10th February 2023)

¹³⁶ [UK-US research: ecology and evolution of infectious diseases 2022 – UKRI](#) (accessed 10th February 2023)

Of the two programmes, the Healthy Ageing Flagship programme involves the closest collaboration between UKRI and NSFC and is the main focus of this case study, although insights from the experience of with EEID is included as relevant.

The case study was developed based on desk research and consultation with representatives from NSFC, ESRC, BBSRC, UKRI China, and UK S&I Network. A full list of interviewees is given in section B.7.8.

B.7.3. Pre-FIC (relationships)

The **UK and China** have collaborated on science and innovation for several decades, with the first UK-China S&T Cooperation Agreement signed in 1978. Subsequent key milestones have included the initiation of UK-China Joint Commission meetings on STI Cooperation in 1998, the establishment of the UK-China Cooperation Framework in 2009, and the launch of the UK-China Research and Innovation Partnership Fund (Newton Fund) in 2014.

Whilst the long-running Joint Commission meetings between the UK and China take place at ministerial level (between BEIS and MOST), **UKRI and NSFC** have also more recently established biennial funding agency meetings to identify areas of common interest, discuss programme design and mechanisms, and agree on priorities for the next two years. The two funding bodies have also developed a set of standard operating procedures for the joint commissioning of research, written down in a 'guidebook' that can be shared with staff in both organisations.

NSFC has collaborated with UKRI on 27 joint calls and initiatives, both on a bilateral and multilateral basis, with more than 170 individual grants and joint investment of more than £92m from the UK and £43.3m from China. Examples of past joint-funding initiatives include:

- Individual calls for proposals, for example a joint call with EPSRC on carbon capture and storage (CCS),¹³⁷ as an international element of the UK's Energy Programme
- The Newton Fund — also known as the “UK-China Research and Innovation Partnership Fund”¹³⁸ — in which NSFC was a partner in several initiatives, including NERC-MRC-NSFC Atmospheric Pollution & Human Health in a Chinese Megacity (APHH), STFC-NSFC Precision Agriculture for Family-farms in China (PAFiC),¹³⁹ the ESRC-NSFC Call for Collaborative Research: Developing financial systems to support sustainable growth in China,¹⁴⁰ and the BBSRC-ESRC-MRC-NSFC call on antimicrobial resistance¹⁴¹
- Multilateral initiatives, for example a joint call on sustainable cities organised through European Joint Programme Initiative (JPI) Urban Europe.

NSFC and UKRI have gradually increased collaboration, initially with a focus on the physical sciences but then also with ESRC (since 2012) and AHRC (since 2018). The Newton Fund represented a further expansion of funding and also coincided with the launch of the biennial meetings between UKRI and NSFC in 2014. Overall, the relationship between the two funders was considered by those consulted for this case study to be very well-established.

The **research and innovation communities** in the two countries are also very well connected. Bibliometric indicators show a significant increase in collaborative activity: in 2019, a total of

¹³⁷ “Call for Proposals: Collaborative UK-China Research Projects in Carbon Capture and Storage Technologies

¹³⁸ <https://newtonfund.ac.uk/about/about-partner-countries/china/> (accessed 8th February 2021)

¹³⁹ “Newton Fund Evaluation: Thematic Impact Study Report — China”, May 2018, Coffey and RSM.

¹⁴⁰ <https://esrc.ukri.org/research/future-of-social-science-insights-opportunities-and-expectations/newton-fund/> (accessed 8th February 2021)

¹⁴¹ <https://newtonfund.ac.uk/news/latest-news/100816/> (accessed 8th February 2021)

16,267 papers, representing 11% of the UK's total output, were co-authored with China-based researchers, as compared to just 3,324 in 2010. China is now the UK's second most frequent collaborator, after the United States, up from 9th in 2010.¹⁴² The large number of responses to the 2019 Healthy Ageing joint call — 154 initial expressions of interest and 35 full proposals — further illustrates the high demand for collaboration between the two countries.

Beyond the UK, NSFC has also established a large portfolio of other international partnerships, with 93 Cooperative Agreements or MoUs in place with partners in 49 countries and regions.^{143,144} Funding mechanisms for international activities include 'Joint Research Projects' (bottom-up collaboration for NSFC-funded researchers in areas of mutual interest) and 'Major International Joint Research Projects' for more strategic initiatives.¹⁴⁵ In 2020, NSFC's international programme focused on the response to COVID-19, including joint research programmes with partners in the US, Germany, South Korea and the BRICS countries, among others.¹⁴⁶

B.7.4. Programme origins and development

Healthy ageing

The Healthy Ageing FIC programme sits within a wider UK-China strategic initiative. In December 2017, shortly after the launch of the UK Industrial Strategy, the two countries announced a new "UK-China Joint Strategy for Science, Technology and Innovation Cooperation", which aimed to enhance dialogue and collaboration on basic research and innovation on a range of priority issues. This new strategy outlined several collaborative mechanisms and actions, including an agreement to launch annual 'Flagship Challenge Programmes' to address jointly identified priorities.¹⁴⁷ The first two priorities to be identified were Agritech (in 2018) and then Healthy Ageing (in 2019).

The FIC UK-China Healthy Ageing Flagship Challenge programme therefore originated within this UK-China Strategy process. Although ultimately a political decision, the process of selecting the theme of the challenge involved consultations at multiple levels, including via the UKRI and NSFC biennial meetings, as well as with the UK Science and Innovation Network (SIN), BEIS and MOST.

After the new Flagship Challenge Programme was announced, the role of the UKRI's China office was to follow up and ensure commitment from the partners. The office negotiated the specific terms of the programme on their behalf, for example the number of grants to fund and the selection process. The UKRI programme lead, ESRC, then led on commissioning the joint research.

Overall, **collaboration with China** is seen as an important priority for the UK, given the scale of R&I investment, the scale of testing and delivery in China, access to Chinese markets, as well as the expertise of Chinese R&I, which has increased dramatically in quality as well as in scale.

¹⁴² Johnson et al. (2021), *The China Question: Managing risks and maximising benefits from partnership in higher education and research*, Harvard Kennedy School and King's College London, March 2021, p. 19.

¹⁴³ http://www.nsf.gov.cn/english/site_1/international/D2/2018/01-25/87.html (accessed 8th February 2021)

¹⁴⁴ http://www.nsf.gov.cn/english/site_1/about/6.html (accessed 8th February 2021)

¹⁴⁵ http://www.nsf.gov.cn/english/site_1/international/D3/2018/01-25/86.html (accessed 8th February 2021)

¹⁴⁶ http://www.nsf.gov.cn/english/site_1/covid19/N1/index.html (accessed 8th February 2021)

¹⁴⁷ "UK-China Joint Strategy for Science Technology and Innovation Cooperation", Department for Business, Energy & Industrial Strategy (BEIS) and Ministry of Science and Technology (MOST)



Collaboration with China is also seen as an important way of engaging with Chinese research funders and, by extension, to Chinese R&I ecosystems more broadly.

The **topic of healthy ageing** is highly relevant to both China and the UK, and both countries have launched major initiatives in this area in the years preceding the joint programme.

In the UK, Ageing Society was one of four overarching 'Grand Challenges' identified in the UK's Industrial Strategy, with the target ('mission') to ensure five extra healthy, independent years of life for people by 2035. Among other initiatives, £98m has been invested in the Healthy Ageing Industrial Strategy Challenge Fund (ISCF) to this end.¹⁴⁸ ESRC's 2019 Delivery Plan also identifies 'Changing populations', including healthy ageing, as one of six priority areas and the council led the call for the Healthy Ageing Social, Behavioural and Design Research Programme (SBD RP) as part of the ISCF challenge in 2020.

Similarly, ageing and demographic changes are important issues in China, with implications across a number of policy areas. The Chinese government launched the Healthy China 2030 plan in 2016, with scientific development as one of four 'core principles' aimed at improving health and mitigating healthcare costs in the context of industrialisation, an ageing society and increased prevalence of non-communicable diseases.¹⁴⁹ The subsequent Healthy China 2030 action plan, published in 2019, contains a number of concrete measures to reach this goal.

In addition to the specific thematic focus, the FIC programme also offered the opportunity to encourage **interdisciplinary research** (in this case combining medical and social science research), which was one of the major reforms that NSFC was seeking to pilot through selected programs. NSFC is in the process of establishing its mechanisms to commission interdisciplinary research and so the joint call was a way to further develop this new area of collaborative work and potentially to learn from UKRI about designing and implementing interdisciplinary calls.

The expected **benefits for the respective R&I communities** from the programme were outlined in the call for proposals: applicants to the UKRI-NSFC Joint Call were encouraged to take advantage of research strengths across the two nations and thereby enable advances that wouldn't be possible without collaborating. This listed the following specific strengths:¹⁵⁰

- Expertise in China: local surveys, innovative pilot studies, fast technology development
- Expertise in UK: research ethics, end of life care, data resources
- Shared UK-China expertise: cohort studies, cross-national comparative learning, reform of healthcare systems

In addition, the expected benefits of the collaborative projects were stated as including:¹⁵¹

- Novel contributions to the evidence base on healthy ageing
- Evidence for key stakeholders in policy and practice in the UK and China
- New and enhanced existing interdisciplinary collaborations and partnerships
- Enhanced capacity through the sharing of infrastructure and data, and opportunities for early career researchers

¹⁴⁸ <https://www.gov.uk/government/publications/industrial-strategy-the-grand-challenges/industrial-strategy-the-grand-challenges> (accessed 8th February 2021)

¹⁴⁹ Tan, Liu and Shao (2017), Healthy China 2030: A Vision for Health Care, Value in Health Regional Issues 12C, 112-114

¹⁵⁰ UKRI-NSFC Joint Call, Op. Cit, p. 4

¹⁵¹ Programme Bid, p. 5.

Ecology and Evolution of Infectious Diseases (EEID)

Ecology and Evolution of Infectious Diseases is a well-established part of the BBSRC's portfolio but covers aspects relevant to almost all UKRI council remits. UKRI has collaborated repeatedly with US partner agencies over a number of years prior to FIC. The UK has an excellent research community in the field, including at the Roselin Institute in Edinburg with strong links to the US research community.

China and the NSFC joined the UK-US EEID programme relatively recently, with the FIC wave 2 programme in 2019 (see above). Although UK-US collaboration remains at the core of the programme, the inclusion of China in the programme has clear potential benefits to research communities in both countries. In addition to access to world-leading expertise, the partnerships can offer better access to data on diseases in areas where they have arisen or might develop, e.g., avian flu and African swine fever among others.

Additionality and alternative sources of funding

The stakeholders consulted for this case stressed that the **availability of funding** is an important prerequisite for maintaining meaningful partnerships — discussing joint priorities without funding to invest is less interesting — and this was often seen as more important than the specific modalities of funding. This is especially true for the Flagship Challenge programme, where the overall scope had been sanctioned politically, independently of any specific funding source.

The specific FIC investment was also designed to be **complementary** with other ongoing collaborative activities between UK and Chinese partners, including the DfID Global Health partnership and the DIT/FCO healthcare team in China.¹⁵²

A large proportion of recent funding for collaboration between the UK and China has come from the Newton Fund and the Global Challenges Research Fund (GCRF), both of which require spending to comply with requirements for Official Development Assistance (ODA). FIC is seen as a complement to these sources, as it does not come with these same requirements and is able to fund different activities and opportunities that would otherwise be missed. Looking forward, it is also likely that China will no longer qualify for ODA funding and so FIC is seen as playing an important role in supporting China's transition away from these funds.

Industrial Strategy Challenge Fund (ISCF) programmes (which, like FIC, also provide non-ODA funding) have also been used to fund collaboration between the UK and China, for example in relation to the Agritech Flagship Challenge programme.¹⁵³ However, ISCF was considered by interviewees to have more onerous reporting and administrative requirements than FIC, which can be prohibitive for relatively small joint initiatives.

B.7.5. Progress, enabling factors, barriers, risks and lessons learnt

Summary of progress

Following the successful award of FIC funding for the Healthy Ageing programme, UKRI and NSFC organised a joint workshop in June 2019 to further define the topic of the joint call. This meeting confirmed both the importance of the topic of healthy ageing and the need for interdisciplinary collaboration.¹⁵⁴ The joint call for proposal was issued in July 2019 and specified that proposals should aim to “enhance the evidence base on understanding and addressing

¹⁵² Programme bid

¹⁵³ For example “UK-China: precision for enhancing agricultural productivity”: <https://apply-for-innovation-funding.service.gov.uk/competition/482/overview> (accessed 20 March 2021)

¹⁵⁴ UKRI-NSFC Joint Call: Understanding and Addressing Health and Social Challenges for Ageing in the UK and China



health and social challenges facing ageing societies through interdisciplinary collaborations", with a requirement that the team includes both social and biomedical science disciplines.¹⁵⁵

The commissioning process was described by those consulted as relatively unproblematic, although changes had to be made in response to the (then) emerging COVID-19 pandemic in early 2020. The call solicited a large response from the research community, with 154 initial Intentions to Submit (ITS) in September 2019 and about 35 full proposals the following month. The panel meeting, originally planned to take place in the UK in March, was postponed and eventually had to be organised over Zoom, something the partners had never done before. The success of these online meetings demonstrated that funding partners would not need all meetings to be in-person in future.

Five projects were selected for funding and started in October 2020. The implementation of these projects has also been affected by COVID-19, for example their ability to conduct fieldwork. However, as COVID-19 hit during the application process, project PIs were asked to write a statement for the peer review stage on the potential effect of the pandemic on their projects, and potential changes they might have to make as a result. As of December 2022, the projects were all in progress with results awaiting in 2023/24.

In parallel with the implementation of the academic strand of the Healthy Ageing programme, the innovation strand led within UKRI by Innovate UK has made progress after slightly delayed start. Collaboration between the UK National Innovation Centre for Ageing (NICA)¹⁵⁶ and a consortium of Beijing hospitals has played a central role in part of the programme,¹⁵⁷ which is now being further developed.

Under the EEID programme, one project with UK, US, and Chinese partners has been funded so far. Entitled "Predictive phylogenetics for evolutionary and transmission dynamics of newly emerging avian influenza viruses", the project is led in the UK by researchers from the University of Edinburgh and due to be completed in March 2024.¹⁵⁸

Enablers, barriers and risks

The key **enablers** identified by stakeholders for the successful launch and implementation of the Healthy Ageing programme were related to the well-established relationship between the partners. This included the ongoing dialogue, the biennial meetings, and the established standard procedures. The role of the UKRI China office was also noted as particularly instrumental in ensuring clear communication with NSFC. More broadly, the fact that NSFC has a similar working style and structure to UKRI and is considered a reliable partner, able to secure match funding, greatly facilitates collaboration, including on the FIC programme.

As a consequence, there were few **barriers** encountered so far in collaborating with NSFC in this particular case. Even so, the experience has not been without challenges. The very short timeline for the development of the FIC programme bid was reportedly quite challenging. The bidding process also required that negotiations be undertaken with the overseas partner in order to prepare the bid, and thus before it is known whether funding will be available. Stakeholders highlighted that failure to secure funding in such circumstances could potentially risk having an adverse effect on relationships. Similarly, the lack of certainty about the availability of future FIC funding was also seen as a potential barrier for planning future collaboration.

¹⁵⁵ Call text, p. 2

¹⁵⁶ <https://uknica.co.uk/>

¹⁵⁷ See e.g., <https://www.ukri.org/news/tackling-the-challenge-of-ageing-through-innovation/>

¹⁵⁸ <https://www.research.ed.ac.uk/en/projects/predictive-phylogenetics-for-evolutionary-and-transmission-dynami-3>



As described above, COVID-19 has also presented challenges, which have been overcome during the commissioning process, but may yet have an effect on the research. More broadly, there is an increasing awareness amongst UK partners of the need to manage a range of risks in the collaboration with China, for example around sensitive science and engineering subjects. This was most recently highlighted in a report, 'The China Question' from March 2021.¹⁵⁹

Lessons learned

The primary lesson learned so far from the *Healthy Ageing Flagship Challenge* programme has been the re-confirmation that established relationships and procedures are important for successful implementation of joint programmes. This is particularly true when there is limited time available. Overall, there were few suggestions that changes were needed.

The challenges presented by the COVID-19 pandemic have also demonstrated that it is possible to continue managing collaboration and organise joint funding initiatives remotely.

B.7.6. Programme activities, outputs and outcomes

Objective 1: Enabling international collaboration

Theme 1: Enabling funding

FIC has enabled the strengthening of the pre-existing partnership between UKRI and NSFC, by continuing the gradual increase in collaborative activities that has been happening for many years and supporting the implementation of the wider UK-China Joint Strategy for STI cooperation. It has also specifically enabled the opportunity to fund interdisciplinary collaborative research and to test and learn from new application and review procedures.

There is no evidence that the programme has leveraged further funding at this stage, beyond the match-funding provided by NSFC for the projects. However, there is an expectation that the research partnerships will provide a foundation for future collaborations between the respective communities involved, while the Joint Commission and biennial meetings between the UK and China will continue to provide a forum for planning for future collaboration.

Theme 2: Deepening R&I

The FIC Healthy Ageing programme is supporting collaborative research in an area of strategic importance for both the UK and China. Healthy Ageing was the second priority area jointly identified by the UK and China under the UK-China Joint Strategy for Science, Technology and Innovation Cooperation and both countries have launched major initiatives in this area in recent years. In the UK, Ageing Society was also one of the four 'Grand Challenges' identified in the Industrial Strategy, while the 2019 Delivery Plan for ESRC (programme lead) identified 'Changing populations', including healthy ageing, as one of six priority areas to address.

Applicants to the joint Healthy Ageing call were encouraged to take advantage of research strengths across the two nations and thereby enable advances that wouldn't be possible without collaborating. The funded projects are still ongoing, and the stakeholders consulted do not yet have a view yet on the potential impact of the research undertaken. However, it was suggested that as the programme is part of a political commitment to the Flagship Challenge programme under the joint strategic process, this should ensure an audience for policy-relevant findings emerging from the funded activities in due course.

¹⁵⁹ Johnson et al., op cit.

Theme 3: Developing partnerships

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. Though the FIC programme does represent a change from previous collaborative funding initiatives, its focus on interdisciplinarity (medical and social sciences in this instance) is a relatively new area for NSFC. Beyond the FIC programme, UKRI and NSFC recently held a joint workshop on interdisciplinary research in May 2022.¹⁶⁰ Overall, the FIC programme was seen by those consulted to reinforce the existing partnership, rather than radically alter it.

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. Several interviewees have expressed concern about the lack of long-term certainty about funding commitments for international collaboration, something which could hamper efforts to further build on established partnerships. Since most of the data collection for the case study was concluded, the UK Government has announced the new International Science Partnerships Fund (SFPF) in December 2022.¹⁶¹

Objective 2: Supporting BEIS and wider objectives including science diplomacy

As described above, 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 through biennial meetings). This ensures that priorities and joint opportunities are systematically identified independently of any specific funding programme. The Chinese partners are also well aware of UK capabilities and strategic priorities.

The FIC programme described in this case study has contributed to government aims by supporting the implementation of the Flagship Challenge programme and thereby following through on political commitments. Through this programme, FIC also intersects with the work of the SIN in China.

B.7.7. Conclusions

The 'UK-China Healthy Ageing Flagship Challenge — Academic research programme' has successfully implemented a call for proposals and launched five projects. In addition, China has been included in the UK-US joint programme on EEID from which one project with Chinese participation has been funded. In the process, the partners have been able to overcome challenges posed by the COVID-19 pandemic in adapting joint selection processes and allowing projects to adapt to new circumstances.

The former programme is part of the overall UK-China Healthy Ageing Flagship Challenge programme, and as such it helps meet the political commitments made between the two countries' governments. This should also help to ensure the uptake of policy-relevant findings.

These are two in a series of collaborative initiatives undertaken jointly by UKRI and NSFC, and they have benefited from a very well-established relationship with clear standardised procedures in place. In this context, the programme has reinforced the existing partnership between UKRI and NSFC and helped further improve the collaborative processes between the

¹⁶⁰ https://www.nsf.gov.cn/english/site_1/news/A1/2022/05-26/269.html

¹⁶¹ <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>



partners, for example with respect to peer review and support for interdisciplinary research. It has also helped meet the demand for collaborative opportunities from very active communities in both countries.

B.7.8. Sources

- FIC quarterly monitoring report, (including programme data such as funding commitments and number of project awards)
- Call texts for project proposals
- Policy documents as referenced in footnotes
- Programme lead questionnaires
- Information from 4 stakeholders¹⁶²:

Name of interviewee	Role	Organisation
Daniel Brooker	Director	UKRI China
Emily Hancock	International Senior Manager	ESRC
Sadhana Sharma	Head of Bioscience	BBSRC
Morag Brown	Head of Science and Technology Collaboration	British Embassy Beijing

- In addition, the case draws on information previously collected through the following stakeholder interviews undertaken at the baseline stage (2021):

Name of interviewee	Role	Organisation
Woncong Li	Head of the Division of European Affairs, Bureau of International Corporation	National Natural Science Foundation of China (NSFC)
Alexa Mills	Senior Manager of International Strategy	ESRC
Helen Dewberry	First Secretary, Science and Technology, British Embassy Beijing	UK Science and Innovation Network (UKSIN)
Stephen Brennan	Lead on Healthy ageing	UK Science and Innovation Network (UKSIN)
Glen Noble	Acting Director	UKRI China

B.7.9. Programme overview

Programme name	UK-China Healthy Ageing Flagship Challenge — Academic research programme (ESRC-NSFC strand of the programme only)	Next generation transdisciplinary international research collaborations in Ecology and Evolution of Infectious Diseases (EEID)
FIC ID	FIC2-21	FIC2-15
FIC Wave	2	2
FIC Bid Amount (incl. OpEx)	£5m	
UK partners	ESRC (lead) MRC	BBSRC (lead) EPSRC

¹⁶² Note that at the time of writing the evaluation team continue to work with the UKRI office in India to secure an interview with NSFC.



		ESRC NERC MRC
Partner Countries	China	USA Israel China
Overseas Partners	Natural Science Foundation of China (NSFC)	National Science Foundation (NSF) National Institutes of Health (NIH) US Department of Agriculture National Natural Science Foundation of China (NSFC) US-Israel Binational Science Foundation (BSF)
Match Funding (at bid)	3m RMB (per project) (£332.5k)	USA: \$15.75m
Number of calls that have made awards (December 2022)	1	4
Value of the calls	£5m	UK: <ul style="list-style-type: none"> • Travel grants (2019): £15k • International partnerships (2019): £6.2m (UK) • International partnerships (2020): £1.9m (UK) • International partnerships (2022): £3m (UK)
Number of awards made through the calls	5	<ul style="list-style-type: none"> • Travel grants (2019): 5 • International partnerships (2019): 7 • International partnerships (2020): 1 • International partnerships (2020): tbc
Final match funding awarded to grants	2.5m RMB (per project) (£277k)	USA: \$15.01m China: 4.5m yuan (NB: excludes 2022 call)



Appendix C Business participant case study

The following case study has been developed based on a survey response and follow-up interview with a representative from Aurrigo (a FIC grant holder), plus additional desk research undertaken by the study team. A summary of the case is presented within the main report (see Section 5.4), while this appendix provides some additional detail and explanation.

C.1. 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. This collaborative R&D project ("ABACAS") ran from May 2021 to May 2022, with Aurrigo working alongside the Changi Airport Group (CAG, which operates Singapore international airport), and the Civil Aviation Authority of Singapore (CAAS). It has resulted in 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, but with plans well advanced to then 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

C.2. Detail

Current baggage handling systems typically start in a hall full of sorting equipment, with checked bags brought together onto a conveyor system where tags are scanned and manually packed by baggage handlers into Unit Load Device (ULD) containers. These are then pushed onto trailers, called dollies, that are driven in trains of four by a diesel or an electric tug.

However, air passenger numbers (globally) are expected to double in the next 18 years and so airports face the challenge of using existing buildings and infrastructure more efficiently to handle this dramatic increase in people and baggage. Airports are also struggling to rebuild their workforces after the pandemic, with many staff (including baggage handlers) having since moved into other sectors. Furthermore, these staff work in difficult conditions from a health and safety perspective, with baggage handlers competing for space with a range of other airside activities and working in extreme conditions of light, temperature and noise.

The ABACAS project sought to overcome these challenges by developing technology to turn every trailer into an autonomous dolly (Auto-Dolly). This would then enable many more ULDs to be moved within the same space, and more efficiently, as each could move uniquely. For instance, eight autonomous dollies with their own ULDs could be accommodated in the same space as a tug and four traditional trailers, leading immediately to doubling of capacity.

Before the ABACAS project, Aurrigo had already been working with CAG and CAAS on the idea of autonomous dollies, but just remotely through simulation work. They had been in negotiations about doing testing on the ground, but these discussions had been delayed due to the pandemic. That was until the opportunity of FIC funding was identified. This, according to Aurrigo CEO Professor David Keene, changed the dynamic of the relationship and unlocked the next steps in the project. Despite the sums involved being relatively small (a grant of £350k from IUK, compared with a CAG operating profit of over £550m), the UK government



investment catalysed the partners to sign up to the project, with CAG and CAAS also both investing £150k each (in-kind).

The project funding enabled Aurrigo to put its first Auto-Dolly on the ground at Changi Airport, for what was to become an extensive and challenging round of operational testing. Initially in an unused carpark on the edge of the airport, the vehicle was put through 385 different tests set by the CAAS to demonstrate its performance and abilities in a range of different situations (e.g. reacting to a bag being thrown in front of it). Passing all of these tests, Aurrigo was then able to take the Auto-Dolly airside, where the tests were repeated in the airport environment.

As such, with FIC funding, the project achieved acceptance from the CAAS team to operate airside and completed live runs that greatly advanced understanding and allowed further development and improvements to the product. During the one-year project ABACAS was able to move from an experimental proof of concept (TRL 3) to the demonstration of a prototype in an operational environment (TRL 7).

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 this year (2023) a multi-year agreement was also signed between Aurrigo and CAG for the continued joint development and testing of the Auto-Dolly at Changi Airport, alongside demonstrations that would showcase the technology to other airports and stakeholders.

Aurrigo has now 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 is done in Coventry, where the factory can produce 400 vehicles a year (more than enough for current needs), but additional manufacturing sites in Singapore and north America are also being considered.

Changi airport is already one of the largest transportation hubs in Asia and one of the world's busiest airports by international passenger and cargo traffic (e.g. over 68 million passengers in 2019). 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 as well – all similarly looking to reduce costs and improve turn-around times and efficiency. With small adaptations, the Auto-Dolly would be able to address the needs of all of these airports. 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.

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