

# Franco-Scottish Links In Research, Innovation And Higher Education

March 2021



UNIVERSITY OF EDINBURGH  
**Business School**



Scottish Government  
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## **Disclaimer**

This report is based on analysis carried out by an independent researcher and was produced in line with the principles of the UK Government Social Research Code, ensuring outputs are rigorous and impartial, legal, and ethical, accessible, and relevant.

The views summarised in this report are those of the organisations and individuals who chose to submit them. The recommendations expressed in this report are those of the researcher. **The report does not represent the views or intentions of the Scottish Government.**

## **Author**

Claire Périer is a doctoral researcher in Management at the University of Edinburgh Business School ([claire.perier@ed.ac.uk](mailto:claire.perier@ed.ac.uk)).

## **Acknowledgement**

This research was made possible thanks to a Scottish Graduate School of Social Sciences and Scottish Government internship agreement.

The researcher is grateful to all individuals and organizations who participated in this mapping exercise.

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## List of acronyms

ANR	<i>Agence Nationale de la Recherche</i> (National Research Agency)
BioSS	Biomathematics & Statistics Scotland
BERD	Business Expenditure on Research and Development
BRGM	<i>Bureau de Recherches Géologiques et Minières</i> Earth and Geological Research Bureau
CCUS	Carbon Capture, Utilisation and Storage
CEA	<i>Commissariat à l'Energie Atomique et aux énergies alternatives</i> (French Alternative Energies and Atomic energy Commission)
CHU	<i>Centre Hospitalier Universitaire</i> (University Hospital Centre)
CNES	<i>Centre National d'Etudes Spatiales</i> (National Centre for Space Studies)
CNRS	<i>Centre National de la Recherche Scientifique</i> (National Centre for Scientific Research)
CORDIS	Community Research and Development Information Service
COSME	Competitiveness of Enterprises and Small and Medium-Sized Enterprises
ECR	Early Career Researcher
EMEC	European Marine Energy Centre
ERC	European Research Council
ETP	Energy Technology Partnership
EU	European Union
GDP	Gross Domestic Product
GERD	Gross Expenditure on Research and Development
GovERD	Government Expenditure on Research and Development
HEI	Higher Education Institution
HERD	Higher education Expenditure on Research and Development
INRAE	<i>Institut National de la Recherche pour l'Agriculture, l'Alimentation et l'Environnement</i> (National Research Institute for Agriculture, Food and Environment)
INSERM	<i>Institut National de la Santé et de la Recherche Médicale</i> (National Research Institute for Health and Medical Research)

IPGP	<i>Institut de Physique du Globe de Paris</i> (Paris Institute for Earth Physics)
KPI	Key Performance Indicator
MASTS	Marine Alliance for Science & Technology for Scotland
MoU	Memorandum of Understanding
NHS	National Health Service
OECD	Organisation for Economic Co-operation and Development
PNP	Private Non-Profit
R&D	Research and Development
REF	Research Excellence Framework
RSE	Royal Society of Edinburgh
RESAS	Rural and Environment Science and Analytical Services
SAGES	Scottish Alliance for Geoscience, Environment & Society
SAMS	Scottish Association for Marine Science
SDI	Scottish Development International
SEDIA	Single Electronic Data Interchange Area
SEFARI	Scottish Environment, Food and Agriculture Research Institutes
SOCSA	Scottish Informatic and Computer Science Alliance
SINAPSE	Scottish Imaging Network: A Platform for Scientific Excellence
SIRE	Scottish Institute for Research in Economics
SFC	Scottish Funding Council
SRPe	Scottish Research Partnership in Engineering
SULSA	Scottish Universities Life Science Alliance
SUPA	Scottish universities Physics Alliance
THE	Times Higher Education
TNE	Trans National Education
UK	United Kingdom
UKRI	UK Research and Innovation

# 1. Background, scope and methodology

## 1.1 Origins of the project

The Paris Hub is one of a network of international offices of the Scottish Government, overseen by the Directorate for External Affairs (European Relations division), and that aims to build Scotland's reputation abroad, promote innovation and investment, and strengthen cultural and economic ties with other countries. Launched in 2018, and based in the British Consulate in central Paris, the French office is working on the following key priorities:

- Strengthen existing networks and develop new connections.
- Work with Scottish Development International (SDI) to support trade and investment.
- Promote cultural, touristic and sport offerings.
- Build relations with local and national governments for policy development.
- Identify and encourage opportunities for research and innovation collaborations between businesses and universities.

In addition to those overarching objectives, the Paris Hub is also focusing this year on promoting Scotland's world-leading nation in the fight against climate change and on renewable energy. France is of fundamental importance to Scotland economically, culturally, and politically, and bilateral relationships between the two countries are even more important in the context of Brexit.

To best support and encourage links between Scotland and France, the Paris Hub sought to better understand the existing links between the two countries, especially in the field of research and innovation. A more detailed picture of how active and developed these partnerships are will enable the Paris team to make the most of existing efforts to promote and strengthen Franco-Scottish relationships.

By exploring how these links are created, used, and how they could be improved, the Paris office could focus its intervention and target specific geographical and/or expertise areas to add the most value. More generally, this information would be used to develop a regional strategy for France and inform wider policy development for the Scottish Government and its agencies such as SDI.

To guarantee the robustness of this evidence gathering exercise, the Paris Hub sought to appoint a doctoral researcher through the Scottish Graduate School of Social Sciences internship programme. Initially planned for a 3-month period in Summer 2020, the project was delayed due to the Coronavirus crisis. It finally took place over 6 months between October 2020 and March 2021, thus covering not

only the official exit of the UK from the European Union but also the evolution of the pandemic and attached restrictions.

## 1.2 Objectives, scope, and deliverables

The overall objective of the project is to provide an evidence base for the Paris hub, and wider Scottish Government teams, to support their strategic decisions and help prioritise interventions. This includes an overview of existing Franco-Scottish relationships as well as a portfolio of case studies detailing the structure and origin existing partnerships to demonstrate their benefits and showcase possibilities for future collaborations.

As noted above, the Paris Hub is active in a wide range of sectors. The team has already made significant progress in terms of representation and communication of Scottish interests, and in particular cultural links. The Hub is well connected with local and national governments and involved in several policy agendas such as Arctic connections. Business support, including trade and investment, is also well developed thanks to their continuous collaboration with the SDI office.

However, the Research & Innovation sector, one of the strategic objectives for the Paris Hub, remains less understood. Most key policies in this area are currently driven by internal Scottish Government priorities, without recognitions of external interests and existing networks. At the leadership level, discussions tend to remain fixated on the obstacles presented by Brexit rather than drawing from and building upon positive initiatives and examples across Europe.

Research and Innovation was selected as the priority area for the project due to this lack of evidence. This choice was further supported by the fact that Paris Hub team had already initiated contacts with the Higher Education and Research sectors, and related policy teams. An informative note including a call for feedback was sent to Scottish universities and innovation centres in October 2020, which would form the basis of further enquiries.

Education links were initially considered as lower priority and not to be actively investigated. However, as the UK announced that the country would not remain part of the EU Erasmus+ programme (student exchange and mobility scheme), this area became central in discussions with stakeholders, leading the Paris team to launch a call for evidence towards French actors in February 2020. The information received was integrated into this report and complemented by further data collection (see next section).

Given the breadth of academic disciplines and scientific areas, several themes were prioritised for case studies. Those align with the wider strategic commitment of the Paris Hub and the Scottish Government and include: climate change

mitigation, decarbonisation, renewable energies, wellbeing economy and inclusive growth, digital technologies.

### **Key project deliverables:**

#### **1. This main report including:**

- **Overview of Research, Innovation and Higher Education in France and Scotland: key indicators, strategies, funding, and key actors**
- **Exploration of Franco-Scottish relationships, including detailed case studies covering the priority themes**
- **Methodological toolbox aimed at facilitating future studies**
- **Recommendations for future support and development of Franco-Scottish collaborations**

**2. Database of existing Franco-Scottish links incorporating maps and infographics including user-guide for future updates.**

**3. Contact list for experts and key stakeholders.**

**4. Ad-hoc support including region or area specific briefs**

## **1.3 Methodology**

**Secondary data collection:** Generic data on the sector was collected through desk-based analysis of grey literature, such as strategic reports and government strategies, but also key performance frameworks in both countries. This helped to identify the key actors of the sectors, and details on main stakeholders and organisations were gathered from their respective websites.

### **TOOLBOX 1: general sources**

Main policy pages: [Science and Research](#) and [Universities](#), policy pages of the Advance Learning and Science Directorate (Scotland). [Department for Business, Energy & Industrial Strategy](#) (UK). [Ministère de l'Enseignement Supérieur, de la Recherche et de l'Innovation](#) (France).

Key indicators and statistics: [Business and innovation statistics](#) collection and [Higher Education Statistics Agency](#) (Scotland and UK). [Etat de l'Enseignement Supérieur, de la Recherche et de l'Education](#) (France)



Evaluation of Universities and Research: [Shanghai Ratings](#) or the academic rankings of world universities; [Times Higher Education](#) world university rankings; [QS](#) world university rankings; [Research Excellence Framework](#) (UK)

The database of links between France and Scotland was generated from data extracted from public research funding repositories, including national agencies as well as all major European programmes. For each entry, the following information was recorded:

- Name and details of the relationship, website when available.
- Type of link: research project (public actors only), knowledge exchange project (when at least one partner is a business), fellowships (PhD programmes or staff mobility schemes), network (group of organisations, including infrastructure and training programmes).
- Field and subfield: based on the European Research Council (ERC) scientific panels' structure<sup>1</sup>.
- Green focus: whether the project is connected to climate change mitigation or renewable energies.
- Organisations: project lead, French, and Scottish partners. For each partner, the organisation name and location (city, region, country) were recorded, alongside its type: business (companies and private research organisations), government (local or national, including agencies), higher education (public universities and other institutions), hospitals (National Health Service, *Centres Hospitaliers Universitaires*), professional associations (groups of private interests), research institutes (public research organisations).
- Estimated value: when available, this is the overall budget of the project (not the shared obtained by each partner).
- Funds: origins of the funding.
- Start and end date: projects ending before January 2020 were not included.

In addition to those recorded in funding repositories, relationships mentioned by stakeholders during the research period were also added to the database. The resulting list is not aimed to be fully exhaustive, however it provides a robust overview of the extent and distribution of Franco-Scottish links across geographies and disciplines.

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<sup>1</sup> [ERC Panel structure 2021 2022 \(europa.eu\)](#)

## **TOOLBOX 2: research projects and organisations repositories**

Scottish sources: no funding repository (see funding section for details). The website [Research Innovation Scotland](#) was recently created jointly by the Scottish research pools and innovation centres. The [Scottish Funding Portal](#) lists all funding opportunities available to actors in Scotland.

UK sources: UK Research and Innovation (UKRI) [Gateway to Research](#), public data Tableaux for [UKRI](#), the [Research Councils](#) and [International Development](#).

French sources: [scanR](#), national repository of public and private organisations and research work. [ANR](#) funded projects. [Recherche en France](#), platform for doctorate and post-doctorate subjects and opportunities, and associated [directory of graduate schools](#). Directory of [research labs and infrastructure](#).

European sources: all funding and tender opportunities are centralised under the Single Electronic Data Interchange Area, [SEDIA](#). The following databases are related to research, innovation, and higher education:

- [CORDIS](#), the Community Research and Development information Service for all EU-funded research projects under the framework programmes (Horizon). More detailed information can be found under the [Collaboration Network](#) visualisation tool, and the [Horizon Dashboard](#) which includes implementation figures, organisation and country profiles and project results.
- [Erasmus+](#) project results (the database only records recipient organisation, not where the partners are located)
- [COSME](#) data hub, programme for the competitiveness of enterprises
- [COST](#) actions, European cooperation in science and technology
- [Interreg](#), the EU instrument supporting cooperation across borders. Scotland and/or some of its regions are involved in several of its sub-programmes: [Peace+](#) (with Ireland and Northern Ireland); [North West Europe](#) (Belgium, France, Germany, Ireland, Luxemburg, Netherlands, Switzerland); [Atlantic Area](#) (West coast regions in Ireland, England, Wales, Spain and Portugal); [North Sea](#) (coastal regions in England, Belgium, Netherlands, Germany, Denmark, Sweden, Norway); [Northern Periphery & Arctic](#) (Northern Ireland, Finland, Ireland, Sweden, Faroe Islands, Iceland, Greenland Norway); [Interreg Europe](#) (policy education); [Espon](#) (territorial analysis); [Urbact](#) (sustainable urban development); [Interact](#) (general assistance).

**Primary data collection:** to explore the origins, challenges and opportunities around Franco-Scottish links, primary data was obtained through semi-structure interviews with key stakeholders. All major research institutes in both France and Scotland (research pools, universities and SEFARI institutes) were contacted, as well as key agencies and organisations working in the sector and identified through the desk-based exercise and conversations with Scottish Government policy teams. When required, several interviews were performed within a single organisation to gather feedback from the different actors involved in Franco-Scottish relations. Whilst not all organisations participated, the final sample includes a wide range of actors thus guaranteeing representativeness. Furthermore, data saturation was observed during the last interviews, with previously mentioned themes reappearing.

All participants received a privacy notice detailing the origins of the project and how their information would be used. Sessions lasted between 20 minutes and 1 hour and were all held online. The interview guide can be found in [Annex I](#). Interviews were conducted by the researcher. Sessions were not transcribed but extensive notes were produced. These were shared with participants, who were able to make amends if required, thus also confirming consent. Anonymity was offered to all participants, although only one interviewee opted for this. Note that ethical approval was sought and granted on this project, with safeguards including anonymity, consent and the lack of vulnerable participants and sensitive topics.

In addition to the interviews, the researcher also attended several meetings with key stakeholders, during which Franco-Scottish links were discussed with other members of the Paris Hub. When relevant and upon approval of participants, themes discussed during those events have been included in the findings. Finally, the face-to-face discussions were supplemented by an online survey covering similar themes, see [Annex II](#). This made it possible to include further participants in a time-efficient manner. The survey was particularly aimed at French respondents in an attempt to reduce the impact of the language barrier. However, only a few responses were received, despite multiple attempts at dissemination through existing contacts and networks. The overall number of responses was 36, with 15 for French actors and 21 in Scotland, providing a good overview of both countries (Table 1).

Country	Organisation	Type	Interview (I) Meeting (M) Online (O)	TOTAL
France	CEA	Research institute	M (1) - I (1)	Interviews = 8 Meetings = 3 Online = 4
	CNES	"	I (1)	
	CNRS	"	I (1)	
	France Energies Marines	"	M (1)	Total = 15
	IPGP	"	O (1)	
	INRAE	"	I (1)	
	Institut Curie	"	I (1)	
	Université Aix Marseille	University	M (1)	
	Rennes 1	"	O (1)	
	Université Clermont Auvergne	"	O (1)	
	Ambassade de France	Other	I (2)	
	Anonymous	"	I (1)	
Grow	"	O (1)		
Scotland	BioSS	Research pool	I (1)	Interviews = 16 Meetings = 2 Online = 3
	ETP	"	I (1)	
	Soillse	"	I (1)	
	SRPe	"	I (1)	Total = 21
	Sulsa	"	M (1)	
	Sages	"	I (1)	
	James Hutton Institute	Research institute	I (3) – O (1)	
	Rowett Institute	"	I (1) – O(1)	
	EMEC	"	I (1)	
	SAMS	"	O (1)	
	Individual researchers	University	I (3)	
	Heriot Watt University	"	I (1)	
	University of Glasgow	"	I (1) – M (1)	
	University of St Andrews	"	I (1)	
	Royal Society Edinburgh	Other	I (1)	
	Scottish Funding Council	"	I (1)	
	Universities Scotland	"	I (1)	

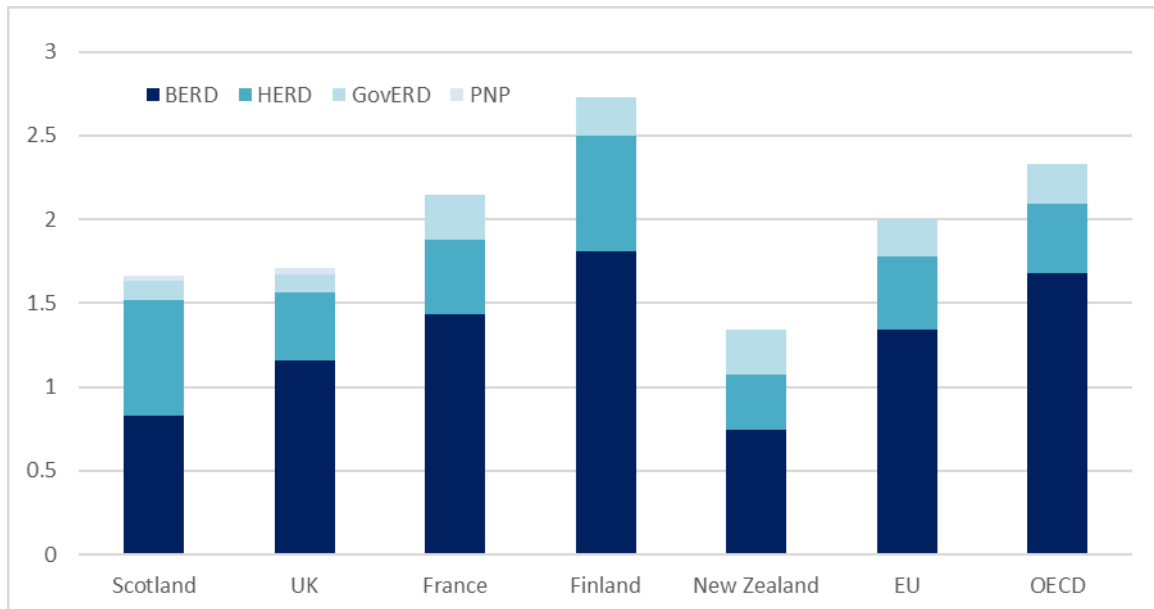
**Table 1 - Participating stakeholders**

## 2. Research & Innovation in France and Scotland

### 2.1 Key indicators

**Gross Expenditure on Research and Development (GERD)** is the main KPI for research performed and funded by different sectors, including businesses (BERD), higher education (HERD), government (GovERD) and private non-profit (PNP) sectors (this latter category is only available in the UK). In Scotland, the measure of GERD as percentage of GDP is one of the KPI's of the National Performance

Framework. It is also a key indicator of the UK's Government Industrial Strategy. Scotland total GERD in 2018 represented 1.65% of GDP, slightly under the UK (1.71%) and below averages for EU and OECD countries. In contrast, France's GERD accounted for 2.19% of GDP, with the largest contribution (66%) coming from businesses. In Scotland, businesses' share represents just 50% of GERD (Figure 1).

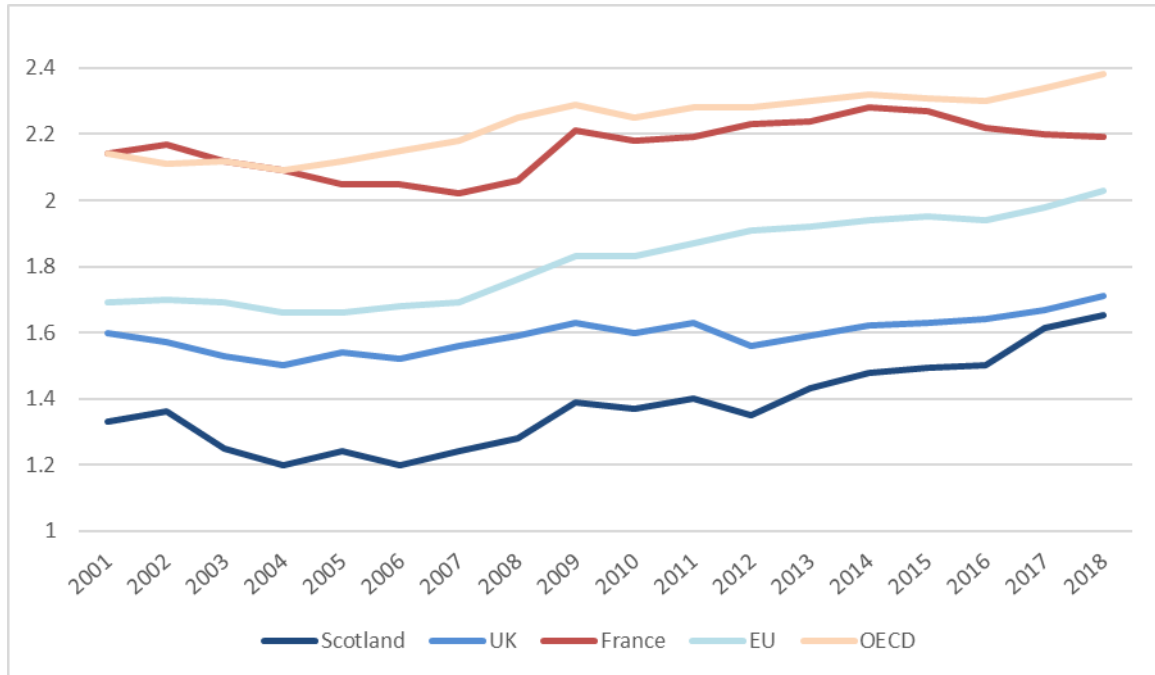


**Figure 1 - GERD as percentage of GDP in 2018, source: Scottish Government <sup>2</sup>**

The Europe 2020 strategy, which was published in 2010, on the back of the financial crisis had set a target of 3% for GERD by 2020. EU average has seen some moderate growth since then but remains below this target and the performance of other countries like the United States (2.8% in 2018). In Scotland, GERD has been growing since 2012, and it is slowly closing the gap towards the UK. Whilst this value is one of the country's KPIs, the Scottish Government has not set any specific target for GERD. The UK's Industrial Strategy, published in 2018, includes a commitment to raise investment on R&D to 2.4% of GDP by 2027 <sup>3</sup>. France's GERD has been slightly decreasing in the past years (Figure 2).

<sup>2</sup> [Gross expenditure on research and development Scotland 2018 \(gov.scot\)](https://www.gov.scot/research/publications/gerd/2019/gerd-scotland-2018)

<sup>3</sup> [Industrial Strategy: building a Britain fit for the future \(gov.uk\)](https://www.gov.uk/government/consultations/industrial-strategy)



In 2018, Scotland’s total GERD amounted to b£2.7, representing 7.3% of UK’s total expenditure of b£37.1, an increase of 4.4% since 2017. France total expenditure for the same year was b€51.8, an increase of 2.3%, which was mostly supported by business investment.

**Scientific papers and their citations** are another key indicator of research and innovation performance. Despite its relatively small size, Scotland ranked on the 19<sup>th</sup> position in terms of number of documents in the Web of Science database (as of March 2021). England is 3<sup>rd</sup>, behind the USA and China, and France comes in 5<sup>th</sup> position just after Germany. The number of citations per paper in Scotland is higher than in the UK, France, and the worldwide average. The proportion of top papers (papers in the top 1% for the past 10 years and/or that received a very high number of citations in the current two-month period) is also higher in Scotland (Table 2).

Rank	Country	Number of documents	Cites per paper	% top papers	% world papers	% world top papers
1	USA	4390179	19.98	1.8%	18.7%	21.3%
2	China	3215444	12.51	1.2%	13.7%	10.8%
3	England	1121305	20.74	2.2%	4.8%	6.7%
4	Germany	1182032	19.07	1.7%	5.0%	5.5%
5	France	806176	18.66	1.7%	3.4%	3.6%
19	Scotland	169574	23.35	2.6%	0.7%	1.2%

**Table 2 - Publications as of March 2021, source: InCites Essential Science Indicators**

Despite accounting for only 8 % of the UK's population <sup>4</sup> and 8.5% of the country's R&D personnel <sup>5</sup>, Scotland publications represent 12.3% of the UK's total. For top papers, this proportion reaches 14.3% <sup>6</sup>.

The largest subject fields by publication in Scotland are Physical Sciences, Clinical Sciences and Biological Sciences. Humanities have had the largest increase in between 2006 and 2016. Environmental Sciences and Energy subjects have also increased<sup>7</sup>. France is highly specialised in Mathematics, where the proportion of French publications is 60% higher than the rest of the world. The country's specialisation index is also above average in Fundamental biology, Medical research and Universe Sciences. In contrast, the UK's highest specialisation indexes are in Social Sciences and Human sciences, although this could be due to the lack of non-English publications in humanities included in the Web of Science databases<sup>8</sup>.

<sup>4</sup> [Population estimates for the UK, England and Wales, Scotland and Northern Ireland mid 2019 - Office for National Statistics \(ons.gov.uk\)](https://www.ons.gov.uk/population-demography/population/population-estimates-for-the-uk-england-and-wales-scotland-and-northern-ireland-mid-2019)

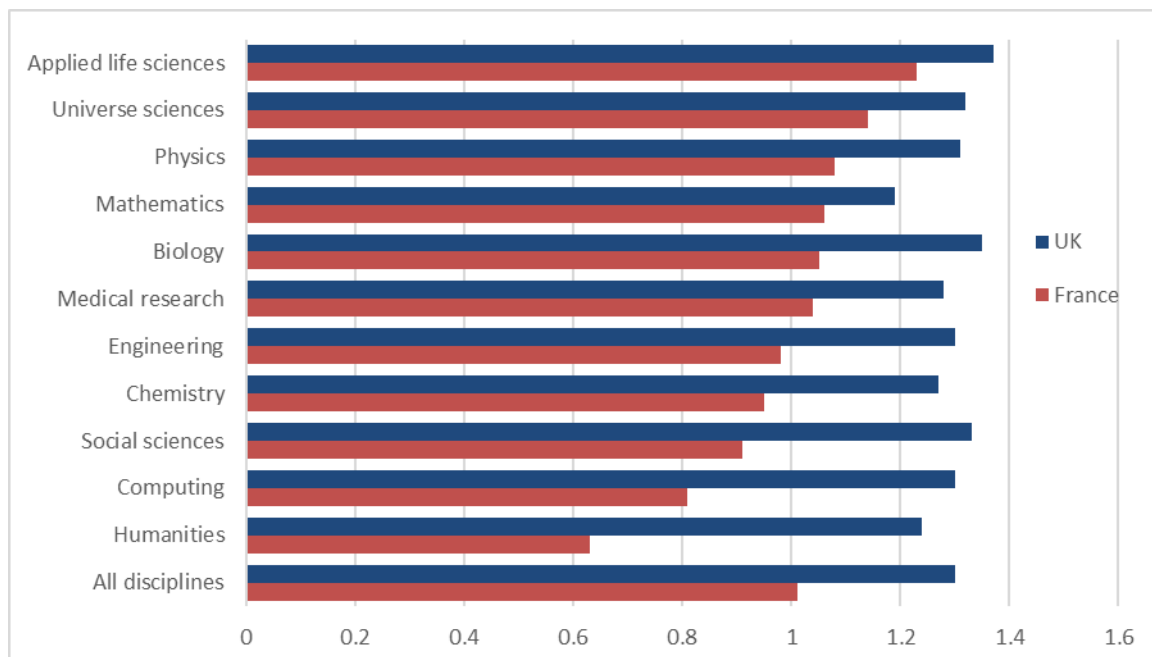
<sup>5</sup> [Database - Science, technology and innovation - Eurostat \(europa.eu\)](https://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&plugin=1) - R&D personnel at national and regional level, values for 2018

<sup>6</sup> [InCites essential Science Indicators \(clarivate.com\)](https://clarivate.com/in-cites-essential-science-indicators/) – Top Papers by Territories

<sup>7</sup> [Scotland's Science Landscape \(2007-2016\) Report | The Scottish Science Advisory Council](https://www.scotlandscotland.gov.uk/scotland-science-landscape-2007-2016-report)

<sup>8</sup> [État de l'Enseignement supérieur, de la Recherche et de l'Innovation en France numéro 13 \(enseignementsup-recherche.gouv.fr\)](https://enseignementsup-recherche.gouv.fr/etat-de-lenseignement-superieur-de-la-recherche-et-de-linnovation-en-france-numero-13)

In 2016, the impact factor (number of citations per publication compared to world average) of France as a whole was 1.01 against 1.20 for the UK. The UK was above France in all disciplines (Figure 3).



**Figure 3 - Impact factor per discipline in 2016, Source: French Government <sup>8</sup>**

The impact factor is not available for Scotland. However, the country's Field Weighted Citation Impact, which uses a different method, was 1.79 for the period 2012-16, against 1.58 for the whole UK<sup>7</sup>.

**International collaboration** can be observed through the number of publications including a French or British author with at least another international co-author. These used to be less than half of all papers for both countries in 2008, but in 2018 they represented 63,3% in the UK and 62.5% in France<sup>6</sup>. Scotland's share of international collaboration (this does not include papers with authors from within the UK) reached 56.9% in 2016, in line with the rest of the UK<sup>8</sup>.

When considering publications in the past 5 years, Scotland's most frequent collaborators were the USA, Germany, China and France respectively (Figure 4a). Note that the position of China in the scientific community has been increasing rapidly in the past few years. Scotland is only in the 20<sup>th</sup> position in terms of number of collaborations with France when considered separately. Still, the whole of the UK remains the second most important collaborator for France, behind the US and above Germany (Figure 4b).



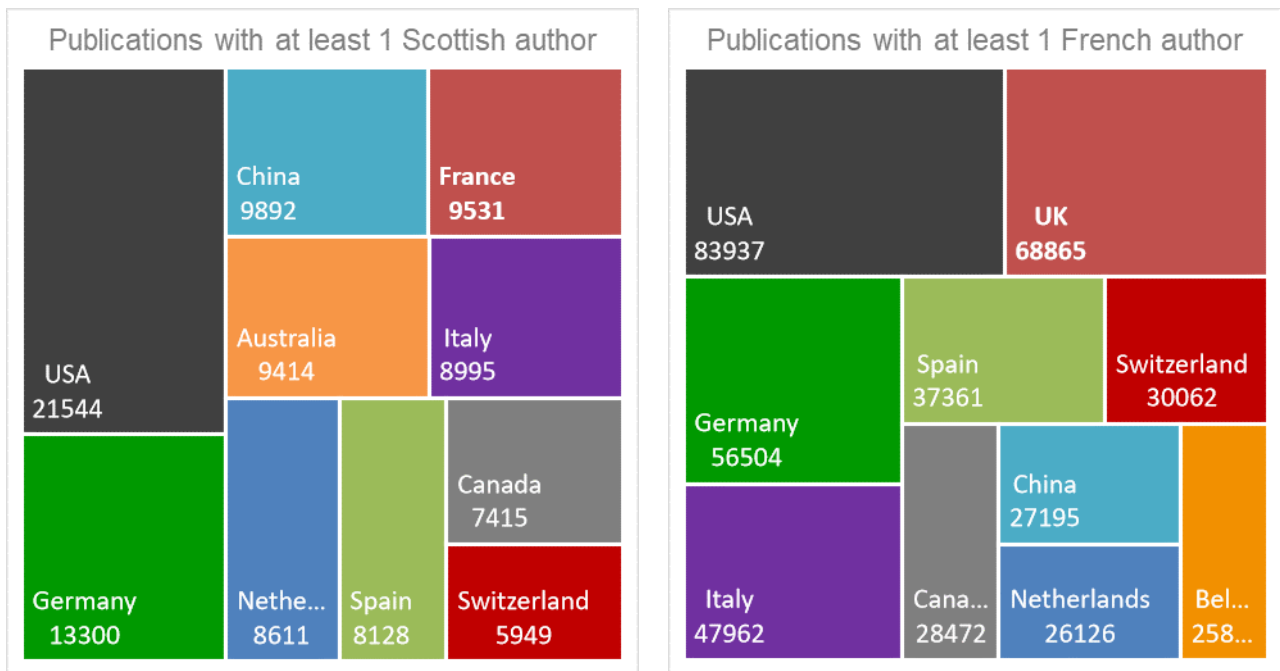


Figure 4 - Publications with international co-authors, source: Web of Science March 2021

## 2.2 Research strategies and the role of international collaboration

**UK:** the UK Government published its Research and Development Roadmap<sup>9</sup> in July 2020, a white paper aimed to be the first step in a conversation to establish the strengths and challenges of the sector, as it will be critical to economic and social recovery from Covid-19. The UK long term objectives are to be a science superpower and invest in the science and research that will deliver economic growth and societal benefits across the UK for decades to come, and to build the foundations for the new industries of tomorrow. The key commitments are to increase investment in R&D to 2.4% in 2027 (3% in the longer term) and public funding to £22b per year by 2024/25.

International collaboration is one of the key areas for improvement for Research and Innovation, as the UK seeks to remain a partner of choice in an increasingly competitive environment. The UK Government proposes to upgrade UK's offer by developing a new portfolio approach that brings together new and existing opportunities. Existing collaborations arrangements will be strengthened, and new partnerships with emerging knowledge economies will be developed through a commitment to spend 0.7% of gross national income in international aid. The UK will seek continued association with the Horizon Europe and Euratom programmes (this was confirmed after the publication of the roadmap). Finally, the UK Government aims to demonstrate the country's leaderships in existing research and

<sup>9</sup> [UK Research and Development Roadmap \(gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/871222/uk_rd_research_and_development_roadmap.pdf)

innovation organisation, and in particular through the upcoming G7 and COP26 presidency.

The roadmap was preceded by the International Research and Innovation Strategy<sup>10</sup>, which sets how the country will develop its research and innovation partnerships, bring talents together and support public and private actors to tackle global challenges. These engagements are to be led by the Science and Innovation Network teams in Embassies and Higher Commissions across the world. Key themes: being a global partner, bringing together talent, global hub for innovation, package of incentives and financial support, global platform for the technologies of tomorrow, partner for a sustainable future, advocate for better research governance, ethics, and impact.

Both strategies are an extension of the Industrial Strategy<sup>3</sup> published in 2018, which sets the goal to make the UK the most innovative country in the world by 2030 and aims to create an economy that boosts productivity and earning power throughout the country. This document sets four grand challenges for the industry and researchers: AI & Data Economy, Future of Mobility, Clean Growth and Ageing Society. Those themes run through the different priority research streams for each of the UKRI councils (see box below).

**UKRI councils' priority research themes, as per their delivery plans for 2019:**

[Arts and Humanities Research Council](#): creativity and the creative economy; discovery research; interdisciplinary for contemporary challenges; understanding cultural value; arts and science, arts in science; global engagement and the SDGs, research unlocking cultural assets.

[Biotechnology and Biological Sciences Research Council](#): understanding the rules of life; transformative technologies; bioscience for sustainable agriculture and food; bioscience for renewable resources and clean growth; bioscience for an integrated understanding do health; people and talent; infrastructure; collaboration, partnerships and knowledge exchange.

[Engineering and Physical Sciences Research Council](#): productive nation: catalysing growth; connected nation: enhancing future digital technologies; healthy nation: transforming healthcare; resilient nation: enabling adaptable solutions.

[Economic and Social Research Council](#): productivity, prosperity and growth; next-generation public services; living with technology; changing populations; the UK in a changing world; global development, environment and society.

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<sup>10</sup> [UK International Research and Innovation Strategy \(gov.uk\)](#)

[Innovate UK](#): artificial intelligence and the data economy; ageing society, health and nutrition; clean growth and infrastructure; mobility, manufacturing and materials.

[Medical Research Council](#): prevention and early detection; precision medicine; multi-morbidities; advanced therapies; mental health; antimicrobial resistance; global health.

[Natural Environment Research Council](#): environmental solutions; pushing the frontiers of understanding; productive environment; healthy environment; resilient environment; digital environment; digital environment; global environment; best environment for research and innovation.

[Science and Technology Facilities Council](#): developing advanced technologies; data-intensive science; research and innovation campuses; solutions for 21st century challenges; inspiring and involving; building international influence.

**Scotland:** the Scottish Government has not published a national research strategy, although the country's sector will be heavily influenced by the UK priorities given the proportion of UK funding won by researchers in Scotland. However, research and international collaboration are mentioned in several national plans:

- Protecting Scotland, Renewing Scotland, the Government's Programme for Scotland 2020-21<sup>11</sup>: direct commitments to research through Covid-19 research programmes, support development of CCUS projects, marine climate change virtual centre, m£1 for research projects on drugs deaths. Indirect commitments through Energy Strategy, Hydrogen Action Plan, Biodiversity Challenge Fund, Agricultural Transformation Fund.
- Inward Investment Plan<sup>12</sup> published in October 2020, seeking to attract investors to complement the plan for exports published in 2019 (see below). Relevance for research as inward investors are responsible for 63% of business R&D spending., with nine opportunity areas where Scottish strengths match global investment flows: energy transition, decarbonisation of transport, software and IT, digital financial services, digital business services, space, health tech, transformation of chemical industries, food & drink innovation.
- Economic Recovery Implementation Plan<sup>13</sup>: published in August 2020, response to the Advisory Group on Economic Recovery report, seeks to

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<sup>11</sup> [Protecting Scotland, Renewing Scotland \(gov.scot\)](#)

<sup>12</sup> [Shaping Scotland's economy: inward investment plan \(gov.scot\)](#)

<sup>13</sup> [Economic Recovery Implementation Plan \(gov.scot\)](#)

address consequences of Covid (and Brexit) for the country's economy and society, with a strong focus on equalities and human rights. Commitments on research are related to the recommendation 21, which ask the Scottish Government and the SFC to protect universities and colleges from the impact of the crisis. This included an additional m£75 funding for university research in the short term. The government plans to take forward the outcomes of the SFC review of coherent provision and sustainability, (due in summer 2021).

- A Trading Nation – a plan for growing Scotland's exports<sup>14</sup>: published in May 2019, this document sets out the government's intention to drive the internationalisation of the Scottish economy. Key sectors for exports: food & drink, engineering & advanced manufacturing, life & chemical sciences, energy, technology, digital & media, financial & business services, education, tourism. France is identified as a priority market for immediate opportunities; however, the research sector is not highlighted (although life and chemical sciences are one of the main Scottish exports). Commitments on research include: supporting universities and colleges to access international opportunities and build strategic collaborations with markets that are investing heavily in research.

Furthermore, supporting the development of coherent national research and innovation strategies for Scotland is one of the objectives of the Scottish Funding Council (body responsible for the allocation of research grants to Scottish Universities, as well as education funding), alongside supporting world-leading and internationally competitive research. The performance measures for international engagement are the proportion of research funding from international sources and the volume of international partnerships between Scottish and overseas institutions.

In addition to cross-sector national strategies, there are also several plans and roadmaps that include priorities for research for specific areas.

- Rural Affairs, Food and Environment Strategy for 2016-2021<sup>15</sup>: published in 2015, this sets out the direction for the rural affairs, food and environment portfolio, including public investments in scientific research in the area of m£50 per year. Current focus is on three interlinked themes of food, health and wellbeing; productive & sustainable land management and rural economies; and rural assets. The main research providers in the area are coordinated through SEFARI (launched in 2017). The next cycle of research starts in 2022 and is currently undergoing consultation<sup>16</sup>.

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<sup>14</sup> [Scotland: a trading nation \(gov.scot\)](https://www.gov.scot/publications/trading-nation/pages/introduction.aspx)

<sup>15</sup> [Rural Affairs, Food and Environment Research Strategy for 2016 - 2021 \(gov.scot\)](https://www.gov.scot/publications/rural-affairs-food-and-environment-research-strategy-for-2016-2021/pages/introduction.aspx)

<sup>16</sup> [Environment, natural resources and agriculture research - draft strategy \(gov.scot\)](https://www.gov.scot/publications/environment-natural-resources-and-agriculture-research-draft-strategy/pages/introduction.aspx)

- Delivering Innovation through Research – Scottish Government Health and Social Care Research Strategy<sup>17</sup>, published in 2015, articulated on the objective of maintaining Scotland’s position at the forefront of health research.
- Scottish National Research Framework for Problem Drug Use and Recovery (published 2015)<sup>18</sup>, which led to the creation of the Drug Research Network for Scotland, an organisation tasked with developing collaborative research across disciplines, organisations, and countries.
- A Health and biomedical informatics research strategy for Scotland (published 2015)<sup>19</sup>, which reviews approach to health service data and its use for research.

**France:** *France Europe 2020*<sup>20</sup> is the current French National Research Strategy. This programme is a statutory requirement of the *Loi pour l’Enseignement et la Recherche du 22 Juillet 2013* (Law for Education and Research of 22 July 2013) that was published in 2014. It defines the thematic priorities for research and innovation in the country. Its objectives are to respond to scientific, technological, environmental, and societal challenges and valorise results. It is executed through annual contracts with research institutes and higher education institutions, the ANR (*Agence Nationale de la Recherche* – equivalent of UKRI) programmes and other research public funding instruments. The thematic priorities and directions are (translated):

- Restrained resources management and climate change adaptation: intelligent earth system monitoring, sustainable management of natural resources, evaluation and control of climate and environmental risk, eco and biotechnologies for energy transition, “littoral” laboratory.
- Clean, safe and efficient energy: dynamic management of energy systems, multi-scale governance of new energy systems, energy efficiency, reduction of reliance on strategic materials, fossil carbon substitution for energy and chemistry.
- Industrial renewal: digital factories, green and civic factories, flexible manufacturing process centred on humans, new materials design, sensors and instrumentation.

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<sup>17</sup> [Scottish Government Health and Social Care Research Strategy \(gov.scot\)](#)

<sup>18</sup> [Scottish National Research Framework for Problem Drug Use and Recovery \(gov.scot\)](#)

<sup>19</sup> [A Health and Biomedical Informatics Research Strategy for Scotland \(gov.scot\)](#)

<sup>20</sup> [Stratégie nationale de recherche - S.N.R. - Ministère de l'Enseignement supérieur, de la Recherche et de l'Innovation \(enseignementsup-recherche.gouv.fr\)](#)

- Health and wellbeing: multi-scale analysis of diversity and bio-evolutions, processing and collecting of biological data, national network of excellence centres for research and treatment.
- Food security and demographic challenge: health and sustainable food, integrated approach of production systems, from production to diversified uses of biomass.
- Sustainable transports and urban systems: city monitoring centres, new approaches to mobility, tools and technologies for sustainable cities, integration and resilience of infrastructures and urban networks.
- Information and communication society: 5<sup>th</sup> generation network infrastructure, connected objects, big data exploitation, human-machine collaborations.
- Innovative, integrative and adaptive societies: culture and integration studies, new indicators for innovation capacity, data availability and knowledge extraction, social, educative and cultural innovations.
- Aerospace ambition for Europe: service chain for earth monitoring, telecommunications and navigation sectors competitiveness, critical components, technologies for universe observation and exploration, national security and defence.
- Liberty and security for Europe, its citizens and residents: prevention and anticipation of risks and threats, integrated crisis management, security systems resilience.

The National Research Strategy is due to be reviewed every 5 years, and the new programme has been in development since early 2019. After a halt due to Covid, the law was brought forward in summer and adopted by the *Assemblée Nationale* in September 2020 (*Loi de Programmation de la Recherche 2020-2030*). It came into force in 2021 and aligns with Horizon Europe. It includes a commitment to increased public funding, as French GERD has been lagging behind the OECD (2.21% of GDP in 2019) and the European objective of 3%. France will invest a further €25 billion between 2021 and 2030 to support research (€400m in 2021, €800m in 2022 and €1.2b in 2023) and achieve an annual budget of €20b, €5b more than today. The law also includes changes to contracts and salaries to boost recruitment and retain researchers and encourages industry collaborations. Note that the law received strong opposition from academic communities who believe it is not ambitious enough for post-Covid challenges and that it threatens quality of public research. A national strategy setting out thematic priorities may follow but has not been announced yet.

**Europe:** The latest Research and Innovation strategy was published in 2016 by the European Commission: Open Innovation, Open Science, Open to the World – a vision for Europe<sup>21</sup>. This document sets the overarching policy goals: opening up the innovation process to people with experience, spread knowledge as soon as it is available using digital and collaborative technology, promote international cooperation in the research community.

Horizon 2020, the current EU Framework Programme for Research and Innovation, is the main financial implement of this strategy. Funding opportunities under H2020 are set out in multiannual work programmes, which are prepared in consultation of stakeholders ranging from industry and research to representatives of civil society. The latest work programme covered 2018 to 2020, and was articulated around four focus areas aligned to major policy priorities:

- Building a low-carbon, climate resilient future
- Connecting economic and environmental gains – the Circular Economy
- Digitising and transforming European industry and services
- Boosting the effectiveness of the Security Union

The Commission's proposal for the next Framework Programme was published along the next EU long-term budget in May 2018 and included an ambitious €100b investment for 2021-27. The European Parliament and the Council of the EU reached a provisional agreement on Horizon Europe in April 2019. Following this political agreement, the Commission began a strategic planning process to prepare the content of work programmes and calls for proposals for the first 4 years. Five key mission areas have been identified:

- Adaptation to climate change including societal transformation
- Cancer
- Climate-neutral and smart cities
- Healthy oceans, seas, coastal and inland waters
- Soil health and food

**Common areas of interest:** whilst each national strategy is oriented towards specific priorities, there are several areas in which both France and Scotland are aligned. Firstly, climate change mitigation is a truly global challenge, and therefore a salient theme for all countries. This wide umbrella includes fields such as renewable energies, smart cities, hydrogen, sustainable transport but also agricultural transformation and food security. Secondly, AI and the digital sciences

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<sup>21</sup> [Open innovation, open science, open to the world - a vision for Europe \(europa.eu\)](https://ec.europa.eu/euro-iss/innovation-policy/open-innovation-open-science-open-to-the-world-a-vision-for-europe_en)

are a shared interest for both countries, and again cross over a large spectrum of applications and scientific disciplines. The third key theme of shared interest is health, and in particular the development of new diagnostics and treatments, but also the wider concepts of wellbeing economy and social care. Finally, given their similarly extensive coastline, it is unsurprising that France and Scotland share an interest in marine sciences and blue economy, including wildlife observation and preservation, the management of fishery resources as well as aquaculture.

International collaboration is an intrinsic element of the European programmes. At the national level, this is less of a priority as countries' strategies tend to be focused on internal economy.

## 2.3 Key stakeholders

**Scotland's public research institutions:** most of Scottish public research is delivered by the country's 19 universities (see Annex III and Table 3). All are involved in both research and education, although some of the newest institutions tend to be more focused on teaching. The oldest Scottish universities are well represented in international rankings. The most prestigious is the University of Edinburgh, which is the only Scottish Higher Education Institution (HEI) in the Shanghai Ranking top 100 (#42 in 2020). Both the Universities of Cambridge and Oxford are regularly in the top 10<sup>22</sup>. The Shanghai Ranking was created in 2003 and focuses on research performance, although it has been criticised for not considering quality of instruction and humanities, focusing too much on the Anglo-Saxon model, and using metrics not independent to university size.

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<sup>22</sup> [Academic Ranking of World Universities 2020 \(Shanghai Ranking\)](#)



Name	Date founded	Academic staff (2019/20)	Students (2019/2020)	French students (2019/20)
Abertay University	1888	200	4,280	70
Edinburgh Napier University	1964	615	13,930	120
Glasgow Caledonian University	1875	730	17,540	55
Glasgow School of Arts	1845	155	2,380	45
Heriot-Watt university	1821	815	11,155	245
Open University	1969	2,435	17,915	n/a
Queen Margaret University	1875	215	5,130	45
Robert Gordon University	1750	520	12,660	70
Royal Conservatory of Scotland	1947	115	1,220	15
SRUC (Scottish Rural College)	2012	370	1,570	5
The University of Edinburgh	1582	4,735	35,375	265
University of Aberdeen	1495	1,175	15,185	180
University of Dundee	1881	1,540	16,270	80
University of Glasgow	1451	3,340	32,465	295
University of St Andrews	1410	1,210	10,535	90
University of Stirling	1967	730	12,540,	90
University of Strathclyde	1796	1,730	24,330	70
University of Highland and Islands	2001	90	9,905	30
University of the West of Scotland	1836	585	16,105	175

**Table 3 - Higher Education Institutions in Scotland. Source: HESA**

The University of Glasgow is also within the top 100 for the 2020-21 Times Higher Education (THE) ranking (rank #92). Here too the University of Oxford is dominating and has been number one since 2016-17. This ranking includes 30% of teaching indicators, and also takes into international diversity and industry income, although the heavy reliance on citations and therefore English-speaking hard sciences publications has been criticised<sup>23</sup>. THE also publishes an Impact ranking assessing universities against the United Nations' Sustainable Development Goals, in which some Scottish Universities are performing particularly well: University of

<sup>23</sup> [Times Higher Education World University Rankings 2020](#)

Edinburg (#30), Glasgow Caledonian University (#43), University of Dundee (#44), University of Strathclyde (#70), University of Aberdeen (#73).

A third recognized evaluation method of worldwide universities is QS World Universities Ranking. Published since 2003, it is based on an academic peer review, faculty/student ratio, citations, a reputation survey on graduate employers and international student and staff ratio. This is the classification used by The Guardian in the UK. The main criticisms are the ranking's reliance on subjective indicators and reputation surveys, and the integrity of data used. The top 5 is dominated by US institutions, with MIT, Stanford and Harvard sharing the top 3. Oxford, Cambridge, Imperial College London and University College London have been in the top 10 for a few years. In 2020-21, there are three Scottish Universities in the top 100: University of Edinburgh (#27), University of Glasgow (#77) and the University of St Andrews (#96)<sup>24</sup>.

In addition to international rankings, Universities in the UK are also ranked under the Research Excellence Framework (REF), the country's impact evaluation system. The last iteration was 2014, which assessed the period 2008-2013. Universities are currently preparing submissions for REF 2021, however the process has been delayed due to the Covid-19 pandemic. Submissions are assessed on originality, significance and rigor. There is no overall score as part of the REF itself, but THE has produced a ranking based on the REF's Grade Point Average, which is a simple measure of the average quality of research. Ranking of Scottish Universities is:

1. The University of Edinburgh (=11 in UK)
2. University of St Andrews (=21 in UK)
3. University of Glasgow (23 in UK)
4. Heriot Watt University (=33 in UK)
5. University of Strathclyde (37 in UK)
6. University of Dundee (=38 in UK)
7. University of Aberdeen (=46 in UK)
8. University of Stirling (48 in UK)
9. The Open University (=54 in UK)
10. University of the Highlands and Islands (=63 in UK)

To support the work of Universities in research and development, the Scottish Government also supports 10 Research Pools and 7 Innovation Centres, which are funded by the SFC. The pooling programme was created in 2004 to encourage HEI

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<sup>24</sup> [QS World University Rankings](#)

to share resources and respond to international competition. Now successfully implanted, the pools have been recently increasing their focus on international collaboration. The Innovation Centres aim to facilitate collaboration with the industry and draw on Scotland's research expertise.

The Innovation Centres and Research Pools recently came together to create the online platform [Research Innovation Scotland](#) (RIS), in collaboration with Interface, the knowledge connection for business agency. RIS's objective is to showcase the wide range of activities happening across the Scottish research and innovation landscape, alert actors on opportunities for collaborations and ignite new cross-sector partnerships.

Aside from HEIs, a significant proportion of Scottish public research is handled by independent research institutes, in particular in agricultural and food sciences which come under the umbrella of the Scottish Government's Rural and Environment Science and Analytical Service (RESAS). RESAS's Strategic Research Programme is carried out by 6 main research providers, of which only one (SRUC) is also a HEI funded by SFC. The others research institutes are:

- [The James Hutton Institute](#): internationally networked organisation founded in 2011, employing over 500 staff working on crops, soils and land use.
- [Moredun Research Institute](#): attached to the Moredun Foundation which was founded by farmers in 1920, dedicated to livestock health and welfare through the prevention and control of infectious diseases.
- [Rowett Institute](#): attached to the University of Aberdeen, it brings together extensive capabilities and expertise in nutritional research.
- [Biomathematics and Statistics Scotland](#), hosted at the James Hutton Institute, employs 30 staff working on the development and application of quantitative methods in agriculture, the rural economy, environment, food and health.
- [The Royal Botanic Garden Edinburgh](#): carries out research in international, UK and Scottish plant systematics and conservation.

RESAS also fund three centres of expertise that encourage links between the research institutes, HEIs, other organisations in the UK and Scottish Government policy teams. The centres of expertise are the [Centre of Expertise for Waters](#), [ClimateXChange](#) (climate change and low carbon transition) and the [Centre of Expertise of Animal Disease Outbreaks](#).

Finally, several Scottish Government bodies and agencies are also involved directly in public research. This includes [NHS Research Scotland](#) (public health), which is supported by the Chief Scientist Office within the Health and Social Care Directorate.

**Scotland's private research:** Innovation is one of the 4 pillars of Scotland's Economic Strategy<sup>25</sup>. The Scottish Government is committed to support research and innovation across different settings. The Economic Action Plan 2019-20<sup>26</sup> identified Innovation as a key area of development, based on two independent reviews (Muscatelli and Cumberford-Little reports) highlighting the need to promote collaboration between industry and academia. The Scottish Government committed to grow Scotland's business expenditure (BERD) to £1.7b by 2025. From 2018, £110m grant support will be provided to businesses over three years.

Breakdown of BERD expenditure in Scotland is published annually<sup>27</sup>. In 2019 the business expenditure reached b£1.4, the highest in the series and an increase of 1.5% since 2018 (greater than the 0.8% increase for the UK as a whole). Five businesses accounted for over a third of all Scottish BERD spending. Expenditure was split evenly between services and manufacturing products. R&D expenditure in services has increased rapidly since 2007 and exceeded manufacturing for the first time in 2019. This was driven by software development and technical testing and analysis. The growth sectors (as identified by the Economic Strategy), accounted for over 70% of BERD spending, led by life sciences. Overall, businesses in Scotland employed 14,646 R&D staff. Large companies account for almost two thirds of R&D expenditure, and over half came from foreign-owned companies.

Another source of information on business R&D in Scotland is the UK Innovation Survey<sup>28</sup>, which is based on responses of over 14,000 businesses, of which 1,536 were based in Scotland. During the latest survey period (2016-18), the proportion of innovation-active business in Scotland was 32.2% (UK:37.6%). The UK outperformed Scotland across all innovation activities, and Northern Ireland was the only region of the UK with lower levels. Between 2014-16 and 2016-18, innovation activity dropped in both in the UK (-11.4%) and Scotland (-12.8%). It was highest for the sectors of research and experimental development on social sciences and humanities, computer & video and engineering. The largest proportion of expenditure in innovation relates to in-house R&D. The most important drivers for innovation reported by businesses were to improve quality of goods or services and replace outdated products or processes. Environmental impact and new markets ranked last as motivations. Businesses with cooperation arrangements reduced from 55.3 to 42.3% between 2014-16 and 2016-18. These companies reported working mostly with suppliers, clients, and other businesses in the group, universities and public research institutes were not ranked as important source of

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<sup>25</sup> [Scotland's Economic Strategy \(gov.scot\)](#)

<sup>26</sup> [Scottish Government Economic Action Plan 2019-20 \(gov.scot\)](#)

<sup>27</sup> [Business enterprise research and development 2019 \(gov.scot\)](#)

<sup>28</sup> [UK Innovation survey 2019: Results for Scotland \(gov.scot\)](#)

information for innovation. The main barriers to innovation reported by businesses were related to finances and costs, as well as the outcome of Brexit, especially for smaller businesses.

**France's public research:** most research is conducted by higher education institutions and public research organisations. There are 72 Universities in France, plus another 100 higher education institutions (including Grandes Ecoles) also involved in research. In addition to their internal research centres (UPR – *Unité Propre de Recherche*), universities also operate joint research units (UMR – *Unité Mixte de Recherche*) in partnership with one of the 25 public research organisations. In total, there are over 3,000 research units, or *laboratoires*, administered jointly by universities and research institutes. The great majority of public research is done under the UMR model, where contracts are funded by university research, public research bodies, financing agencies (including the ANR, equivalent of UKRI but also regional development agencies), charities, business. French government funding on basic science goes for 55% to research organisations, and 45% to higher education institutions<sup>29</sup>.

Within the public research institutes, the two largest are CNRS (*Centre National de la Recherche Scientifique*, national centre for scientific research, focusing on basic research) and CEA (*Commissariat à l'Énergie Atomique et aux Énergies Alternatives*, atomic and alternative energy commission, applied research) – together they account for 33% of publicly funded research. The other are smaller (see Annex IV).

There are 5 research alliances that group organizations in specific research fields, with the objective to improve collaboration and encourage discussions. The Alliances are the French equivalent to Scottish research pools and were created in 2009-10 alongside the launch of the national strategy:

- AVIESAN: Alliance Nationale pour les Sciences de la Vie et de la Santé – life and health sciences
- ANCRE : Alliance Nationale de Coordination de la Recherche pour l'Énergie – energy research
- ALISTENE : *Alliance des Sciences et Technologies du Numérique* – information sciences and technologies
- AllEnvi : Alliance Nationale de Recherche pour l'Environnement - environment
- ATHENA : Alliance Nationale des Sciences Humaines et Sociales – human and social sciences

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<sup>29</sup> [Research in France \(campusfrance.org\)](http://campusfrance.org)

In addition to public research institutes, there are also a few private foundations, most of which are in the medical field and related to a specific scientist or discovery. The most famous are the Pasteur Institute and the Marie Curie Institute.

- **Institut Pasteur** <https://www.pasteur.fr/>

Founded by Louis Pasteur in 1888, this private non-profit is a major actor of international biomedical research. It employs nearly 2,800 staff in Paris organised in 144 research units grouped in 12 departments: cell biology & infection; developmental and stem cell biology; structural biology and chemistry; genomes and genetics; immunology; global health; microbiology; mycology; neuroscience; parasites and insect vectors; virology; computational biology. The Institute is very active internationally through a network of 32 institutions (none in the UK).

- **Institut Curie** <https://curie.fr>

Founded in 1909, the institute employs 3000 staff working on cancer research and treatment. Their strategic priorities for 2015-20 are: breast cancer; early trials; genetics and epigenetics; immunotherapy; pediatric cancer; radiotherapy and radiation biology; sarcomas; uveal melanoma.

The French government also supports a network of public-private competitiveness clusters (*pôles de compétitivité*), initiated in 2004 to support innovation, economic growth, and jobs<sup>30</sup>. They bring together businesses, higher education and research laboratories. These structures are similar to the Innovation Centres in Scotland. There are over 50 clusters today (there were over 70 at one point) across the country.

**Private research actors in France:** in 2017, BERD in France reached b€33, coming at 60% from large businesses. This is 56% of the country's total GERD, although this is much lower other countries such as Japan, South Korea, Germany and the USA (but higher than the UK). Businesses are driving the increase in GERD in France, with an average of +2% investment per year between 2007 and 2017. The R&D sector employed 265,500 staff (full time equivalent), and businesses run 65% of all research activity in France. Medium and small enterprises are mostly innovating in the service sector, although a lot of those activities are related to industry (specialised scientific and technical analysis). For large businesses, 40 % of R&D is in high technology industries (space and aeronautics, informatic& electronics, pharmaceutical) or medium to high technology (and in particular automobile)<sup>8</sup>.

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<sup>30</sup> [Poles de Competitivite \(gouv.fr\)](http://Poles.de.Competitivite(gouv.fr))

Between 2014 and 2016, a third of businesses were involved in technological innovation (produce or processes). Others developed non-technological innovation in organisation or marketing for example. Overall, 56.4% of companies were innovative, just below the UK (60.3%) but well behind Germany (67%). The IT sector is a leader in innovation, with 73% innovative businesses. Like in Scotland, the number of innovative companies grows with their sizes.

Public-private partnerships are underdeveloped, with only 5.2% of public research funded by private actors in 2016 (and concentrated in non-profit organisations rather than public institutes), and just 17% businesses using public research (2014-16). However, France is ahead of other countries in OECD in terms of patent applications with public and private partners.

## 2.4 Funding sources

**Scottish public research funding:** like the rest of the UK, the Scottish research and innovation sector relies on multiple sources of funding, which have become even more complicated by the gradual devolution of powers and Brexit. Origins of funding for Universities and public research institutes for 2019-20 (Figure 5):

- block grant administered by the SFC: Research Excellence Grant, m£236 (m£240.3 in 2020-21); Research Postgraduate Grant, £35.3 (m£35.9 in 2020-21); Universities Innovation Fund, m£13.5 (m£13.7 in 2020-21)<sup>31</sup>

- competitive grants awarded by UKRI councils: 391 awards representing m£272, or 9.7% of the UK total b£2.8 investment<sup>32</sup>

- Portfolio research: m£66.6 (2019-20 budget – this has increased to m£90.8 in the latest budget for 2021-22)<sup>33</sup>

- Global Challenges Research Fund allocated by the UK Department of Business, Energy and Industrial Strategy: m£11.8<sup>31</sup>

- EU research programmes: Horizon 2020: m£90.8 (2019), Interreg: m£70 across the whole period (2014-2020)<sup>34</sup>, or an average of m£10 per year. Scottish researchers have been particularly successful with EU funding, their H2020 contribution accounted for 11% of the UK's total, for a total of m€816.5 (2014-20). These schemes also include enterprise innovation, like the [Vanguard Initiative](#).

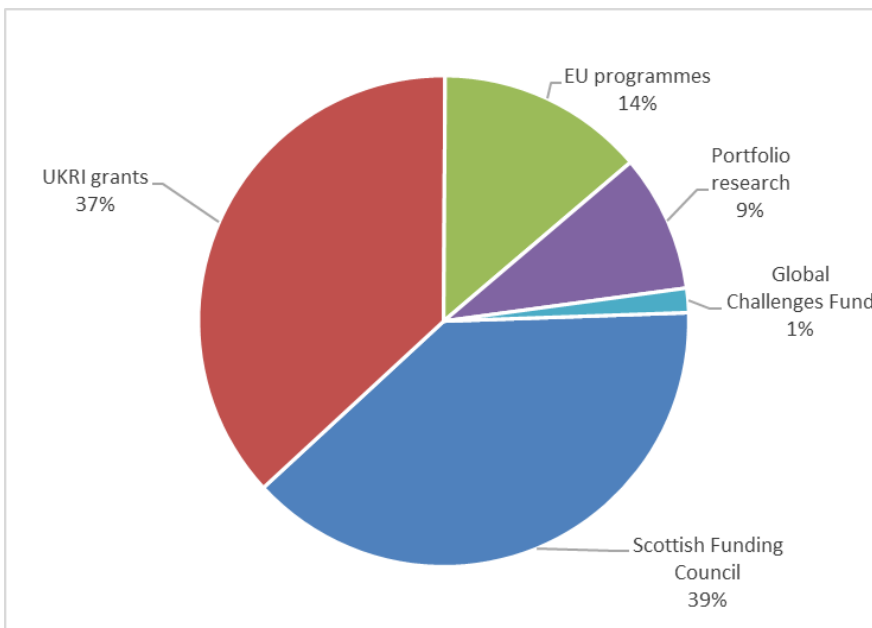
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<sup>31</sup> [Universities Final Funding Announcement 2019-20 \(sfc.ac.uk\)](#)

<sup>32</sup> [UKRI Competitive Funding Decision 2019-20 - UK Research and Innovation | Tableau Public](#)

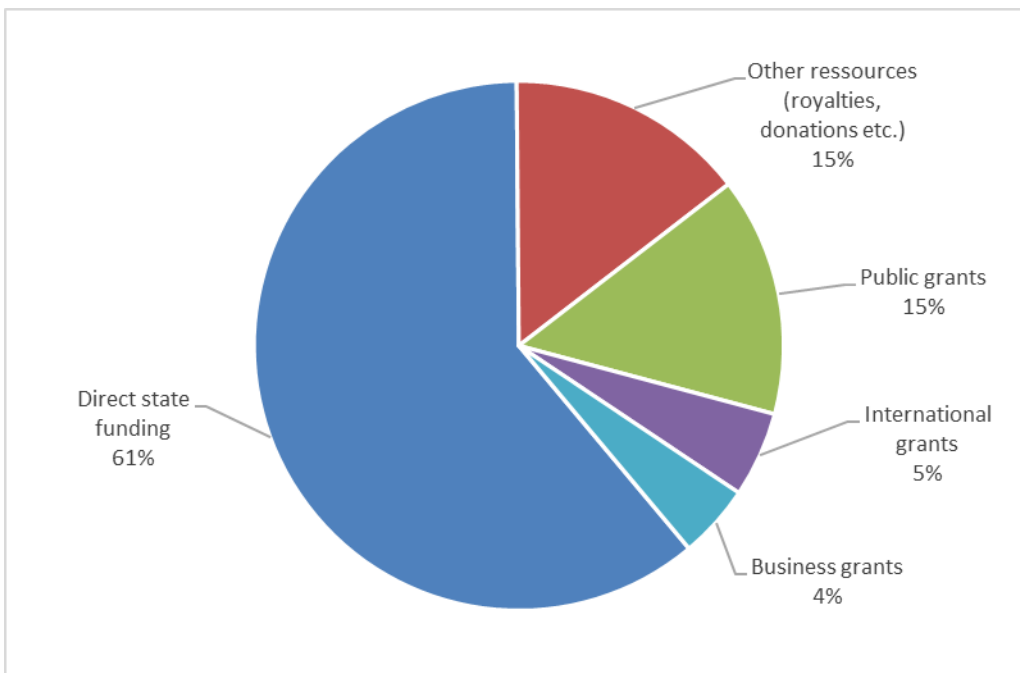
<sup>33</sup> [Scottish Budget 2019-2020 \(gov.scot\)](#)

<sup>34</sup> [European Territorial Cooperation Programmes 2021-2027: consultation report \(gov.scot\)](#)



**Figure 5 - Origin of public research funding in Scotland (2019)**

**French public research funding:** in 2017, state funded research represented 61% of public R&D of a total of b€20.5. The vast majority of those funds are issued by the Ministry for Research and Higher Education to public institutions (HEI's and research institutes) as well as innovation agencies and incentives for businesses. 15% of the remaining budget comes from public contracts and grants, which originate in majority from public entities such as ANR or the French Public Investment Bank. EU and other international sources represent 5% of funding, or b€1.1 (Figure 6).



**Figure 6 - Origin of public research funds in France (2017)<sup>8</sup>**

France received the second higher contribution from the Horizon 2020 programme (2014-2020), after Germany. The CNRS and the CEA are the two first



organisations with the greatest number of project participations. The country received 11% of the whole programme funding, representing b€6.9 over 7 years.

### 3. Typology of Franco-Scottish links and case studies

The mapping exercise uncovered a wide variety of links and partnerships between French and Scottish researchers and education organisations, each with different origins, barriers, and opportunities. This section gives an overview of these different relationships, including examples and case studies for each type.

#### 3.1 Informal individual connections

Researchers from both sides of the Channel can be involved in ad-hoc publications or work streams, outside of any dedicated project. These are perhaps the hardest to map comprehensively. They often originate informally through networking events such as conferences, but also through historical connections researchers have built throughout their careers. A typical example would be a Scottish researcher who has previously studied in France, or vice-versa, denoting the importance of staff mobility and the diasporas in both countries. These links can also originate through researchers' master degree or PhD students, who bring with them their own network of contacts, highlighting here the crucial role of student exchanges. The pandemic has dramatically reduced the opportunities for networking, as online platforms cannot replace discussions in a corridor or around a shared lunch during a conference. Brexit also complicated the movement of people, when face to face interactions are critical to foster collaboration, as researchers will be able to showcase their skills and brainstorm new ideas.

**Dr Barlagne is a researcher in agricultural and rural economics working in the Social Economic and Geographical Sciences research group at the James Hutton Institute in Aberdeen. She is French and native from Guadeloupe, where she studied. She received her PhD from the University of the French West Indies and the French National Institute for Agricultural Research (INRAE). She took her contacts with her when she moved to Scotland and is still regularly collaborating with colleagues at INRAE. Her research investigates the generation, uptake, and development of various forms of innovation within socio-ecological system. She also explores the link between agro-biodiversity management and food chains resilience. She has supervised PhD students in collaboration with French institutions. She is currently discussing internship arrangements for a master student, and trying to understand the consequences of Brexit and the pandemic over visas and travel. Some schools in France have been pushing for “digital internships”, however online delivery is unsatisfactory as an important element of those programmes it to allow students to gain practical skills and immerse themselves in another culture.**

### 3.2 Fellowships and staff mobility

In some instances, researchers may be involved in bilateral short to medium term mobility arrangements, or visiting fellowships. This usually involves senior scientists who are invited to share their expertise with colleagues and students, but it also extends to doctoral students. Those opportunities can revolve around a specific experiment that requires specialised equipment. Once again, there is no central repository of this type of exchange.

However, a number of such fellowships are funded through the Horizon programme and can therefore be tracked precisely. These are called Marie Skłodowska-Curie actions, and take the form of grants that encourage transnational, intersectoral and interdisciplinary mobility within Europe. Grants cover individual fellowships as well as staff exchanges (training networks are also part of this scheme but are covered in another section). The mapping exercise uncovered just over 70 fellowships grants funded by Horizon 2020 involving both French and Scottish actors.

Another major source of mobility funding from the EU is the Erasmus+ programme. Indeed, whilst this scheme tends to be associated with student exchange, it also incorporates wider education and training objectives, and specific calls are dedicated to staff mobility and adult learning. Unfortunately, the Erasmus+ project database only holds details about each sending organisation but does not include receiving countries. As an indication, France received just under 5,000 foreign staff

in 2018-19, and sent out 4,100. For the UK, those numbers were 4,700 incoming and 3,900 outgoing<sup>35</sup>.

Mobility agreements and fellowships can also be supported by national funding agencies, although to a smaller extent as those schemes are often dedicated to internal projects. The different sciences academies also offer dedicated mobility support, but most schemes target developing countries as the related funds originate from Official Development Assistance. All academies will also have fellows representing them internationally. There is no central repository for this type of funding and for this reason such fellowships were not included in the mapping exercise.

- [The Royal Society](#): UK's independent scientific academy. International funding includes International Exchanges, Collaborations Awards (part of the Global Challenge Research Fund), Newton International Fellowships for early career researchers and Wolfson Fellowships for researchers' recruitment.
- [The British Academy](#): UK's national academy for the humanities and social sciences. International funding includes: Newton fund International Fellowships (for incoming scientists), mobility grants (for developing countries only) and reciprocal schemes (selected countries only).
- [The Academy of Medical Sciences](#): UK's independent body representing biomedical and health research. International funding: Newton fellowships, Daniel Tumberg fellowships (Middle East only), Global Challenges fund (developing countries only).
- [The Royal Society of Edinburgh](#): Scotland's national academy, contributing to the advancement of learning and knowledge. International funding opportunities include: International bilateral visit programmes and fellowships with the countries with which the RSE has a formal Memorandum of Understanding (MoU) – France is not one of them; John Moyes Lessells Travel scholarships for career engineers; European Visiting research grants for scholars in the arts, humanities and social sciences. The RSE also recently announced a dedicated scheme at the occasion of COP26 for international climate change networks.
- [Académie des Sciences](#): the French Sciences academy. Like its British counterparts, it subsidises mobility agreements and international prizes with partners across the world (and in particular developing countries but also Germany), although it currently holds no direct MoU with the UK or Scotland.

Finally, there is a dedicated scheme between France and the UK which support early career researchers' mobility, the Alliance Hubert Curien programme. This

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<sup>35</sup> [Erasmus+ factsheets \(europa.eu\)](#)

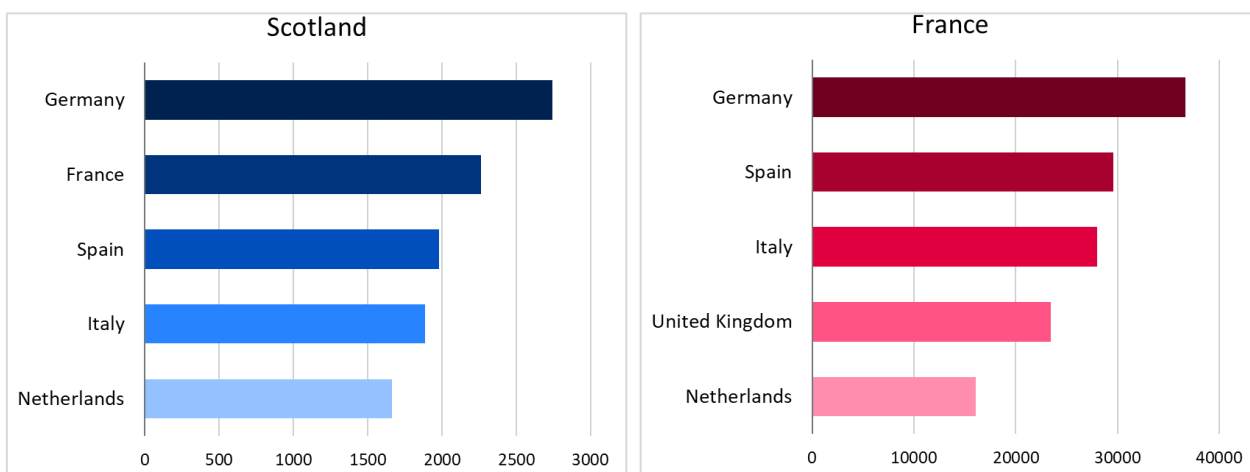
initiative is jointly funded by the UK and French governments and aims to encourage reciprocal mobility and joint collaboration between the two countries. Research groups can apply for funding which will cover travel, subsistence, and other joint costs over a two-year period. The scheme is managed in France by Campus France and in the UK by the British Council. This is the only bi-lateral funding scheme between France and the UK that could be identified. In 2020, there were 3 recipients in Scotland.

#### **Case study: Dr Fabien Massabuau, Hubert Curien programme recipient**

**Dr Massabuau is a physicist, working on wide bandgap semi-conductors for applications in UV sensors. He is based at the University of Strathclyde since September 2019, after spending several years in Cambridge where he obtained his PhD. He obtained his initial degree from the Ecole Centrale de Lyon. He is one of the recipients of the 2020 Alliance Hubert Curien Programme. Whilst the funding remains relatively modest as it only covers travel and subsistence costs, it will allow Dr Massabuau to travel to France and access specific equipment and expertise. The French team is also due to visit Scotland. The small award size means the application process is easy, which makes this type of funding highly beneficial to set up new long-term collaborations. Indeed, the larger cooperation programmes such as Horizon require significant investment and preparation. Mobility schemes however enable actors to test and demonstrate the value of their partnerships, which in turn will inform applications to larger grants. The main obstacle remains making sure such opportunities for mobility funding are visible and communicated upon, as their small size also means they can be difficult to find. This includes online platforms, but ambassadors and their networking activities also play a large role.**

### **3.3 Research projects with public partners**

This is the form most relations between France and Scotland take. The range of project is very wide, from multi-million pounds partnerships involving dozens of partners to smaller collaborations between two organisations. These projects are primarily driven by EU funding calls, which are dedicated to collaborative projects, and in particular the Horizon programme. France is the second country (behind Germany) in terms of number of collaborations with Scottish researchers under the Horizon 2020 programme (2014-20), denoting the importance of this country in terms of international cooperation. The UK is also a key partner in collaboration with French organisation, although it is behind Germany, Spain and Italy (Figure 7).



**Figure 7 - Number of collaborations with other countries within Horizon 2020 program<sup>36</sup>**

National grants can also include international partners, although to a smaller extent. The biggest of those funding calls for the UK is the Global Challenges Research Fund, which is part of the UK's official development assistance and addresses the United Nation sustainable development goals. It aims to maximise the impact of research and innovation to improve lives and opportunities in the developing world (not including France). In Scotland, the fund is delivered by the Scottish Funding Council. The other oversea programme in the UK is the Fund for International Collaboration, which involves 20 partner countries (not including France).<sup>37</sup> More generally, the funding calls of the different UKRI agencies can include international partners. 26 of such projects were identified through the mapping exercise.

#### **Case study: Extreme-scale precision imaging in radio astronomy ([EIRA](#))**

This project led by Heriot-Watt University seeks to develop new algorithms to improve imaging techniques in astronomy, with secondary applications in medical imaging including magnetic resonance and ultrasounds. The Scottish team collaborates with Centrale Supélec in France. The project is funded by UKRI and the Space council.

In France, the *Agence Nationale de la Recherche* (ANR) also supports international collaboration within their main grant scheme (*appel à projet générique*). This is however only available for partner countries and does not include the UK (although Germany is). These bilateral agreements mean that evaluation of submissions is done by only one agency but funded by both parties. Most are open to all disciplines, but there are also dedicated agreements focusing on strategic themes such as energy or resistance to antibiotics. Like with the UKRI calls, the ANR grants can also include international partners, and 9 projects with Scottish organisations were identified. In addition to the bilateral agreements, the ANR also

<sup>36</sup> [Horizon dashboard - Country profiles \(ec.europa.eu\)](https://ec.europa.eu/horizon-dashboard/country-profiles)

<sup>37</sup> [Creating international opportunities \(ukri.org\)](https://ukri.org/creating-international-opportunities)

takes part in multilateral grant calls at the European level such as the [ERA-NET Co-fund](#) and the European Joint Programme Co-fund<sup>38</sup>. Under those schemes, several agencies within Europe, including ANR, will pool resources to fund projects in specific areas, and grants will be accessible to Scottish researchers – see case study box.

**Case study: [OCEANERA-NET](#) Co-fund**

**This co-fund is coordinated by Scottish Enterprise, and benefits from support under the Horizon ERA-NET scheme. Due to last from 2017 to 2022, this programme aims at coordinating the effort of 8 national and regional agencies from 6 European countries in the ocean energy area. The participants are: the Basque Country (Spain) and Spain, Brittany and Pays de la Loire (France), Ireland, Portugal, Scotland and Sweden. The co-fund total budget is just over m€9, of which m€3 of EU contribution under Horizon 2020.**

**The initiative supports collaborative research and development and encourages innovative projects towards commercialisation. Its key objectives are to maintain and grow Europe’s world leading position in ocean energy, to help bring innovative low carbon energy solutions closer to commercial deployment, drive down the cost of energy, create growth and jobs and reduce the environmental impact of the energy system. In addition to the joint call for project, the co-fund also supports joint activities to support knowledge transfer and exploitation of results. Its objectives are aligned with the strategic roadmap of the Ocean Energy Forum, a non-profit that represents the interest of Europe’s ocean energy and acts as a network of professionals in the sector (industrials but also research institutes).**

**Several ocean energy demonstration projects have already been supported by the co-fund, including a tidal turbine in Brittany, a floating module in Scotland and innovative thermal exchangers developed in Nantes. Those projects do not necessarily involve direct collaboration between France and Scotland, but others do. For example, the European Marine Energy Centre (EMEC) based in Orkney obtained a grant from the co-fund to create an integrated marine data toolbox with the help of several companies and research institutes in France as well as the University of Edinburgh. This project received just over m€1 from the co-fund.**

The origins of Franco-Scottish research projects links can be varied, although most of them can be traced back to networking and conference meetings. Many stakeholders involved in the interviews highlighted the serendipitous nature of such

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<sup>38</sup> [Transnational cooperation strategies \(anr.fr\)](#)

connections. Networking is an integral part of research, and it does not stop within the boundaries of academia. Friends and colleagues alike can be a source of information and new contacts and will span decades going all the way back to the individual's old professors and classmates.

**Case study: [ATLAS](#) and [iAtlantic](#)**

**These two projects are funded by H2020 and coordinated by the University of Edinburgh by the team of Pr. Murray Roberts. ATLAS started in 2016 and received just over m€9 of funding. It brought together 25 participants across Europe, including Marine Scotland and the Scottish Association for Marine Science (SAMS) as well as the *Institut Français de Recherche pour l'Exploitation de la Mer* (IFREMER). Its objective was to improve understanding of deep-sea ecosystems and develop a knowledge base that can inform the development of international policies to ensure Atlantic resources are managed effectively. When the project was wrapped up in 2020, with a final presentation to the European Commission, it had led to over 100 peer-reviewed publications (including in prestigious journals like Nature), 45 research expeditions, 23 workshops, and multiple coverage in media.**

**ATLAS was followed by a second H2020 project called iAtlantic, which started in June 2019 and will last until May 2023. It includes over 30 partners across the Atlantic, including Brazil, South Africa the US and Canada, as well as CNRS teams and the Sorbonne University in France and Heriot-Watt University in Scotland. Like its predecessor, its objective is to assess the health of deep and open-ocean ecosystems, the effects of global climate change and their implications for society, economy and planetary health. In addition to expeditions, iAtlantic seeks to build human and technical capacities through a teaching and mentoring programme. This is a particularly important element, especially for early career researchers such as Dr. Georgios Kazanidis, who elaborated on these benefits during his interview. Not only did his participation in the collaboration expand his network (in academia, business and policy), it also allowed him to access expertise, improve his knowledge and technical competences as well as transferable skills such as communication.**

**Both ALTAS and iAtlantic projects belong to the [All-Atlantic Ocean Research Alliance](#) which brings together science and diplomacy to enhance marine research and innovation cooperation from Arctic to Antarctica. This alignment is supported politically by several arrangements between countries across both sides of the Atlantic, including the Galway Statement on Atlantic Ocean Cooperation signed in 2013 between the EU, the USA and Canada; and the Belem Statement on Atlantic Research and Innovation Cooperation of**



**2017 between the EU, South Africa and Brazil. I should be noted that the UK's, and therefore Scotland's, participation to those schemes remains to be confirmed after Brexit.**

**Case study: the [Human Brain Project](#)**

The Human Brain project is one of the three Future and Emerging Technology Flagship initiatives of the Horizon 2020 programme. This 10-years initiative is one of the biggest research collaborations in the world and benefited from b€1 funding from the EU. It involves more than 500 researchers across 140 organisations in Europe. Its objective is to map and explore the human brain and its complexity, and build a research infrastructure to advance neuroscience, medicine, computing and brain-inspired technologies. The project is coordinated by Ecole Polytechnique Fédérale de Lausanne, and includes many French actors such as the CNRS, the CEA, Ecole Normal Supérieure, the Pasteur Institute, Université d'Aix Marseille etc. In Scotland, partners include the universities of Aberdeen, Edinburgh and Glasgow, who received nearly m€3.5 across the past 3 funding calls to support brain research.

### 3.4 Knowledge exchange projects with private actors

These types of project also make up a large proportion of collaborations between France and Scotland. They involve public institutions as well as businesses and other private interest groups and tend to be supported by funding schemes dedicated to competitiveness and innovation, such as Interreg. There are also several sub-funds within Horizon which specifically support public-private partnerships. It should be noted that the distinction between knowledge exchange and research projects is relatively fuzzy, as many public submissions nowadays tend to include at least one business partner, even if they only receive a small contribution. Indeed, commercial applications and “real-world” impact are increasingly important to research funders.

### **Case study: Joint Initiative for Hydrogen Vehicles across Europe ([JIVE](#))**

This project supports the implementation of the commitment set by the EU Directive on Alternative Fuels Infrastructure 2014, which required member states to develop policy and infrastructure for electric, gas and hydrogen transport. The framework includes a declaration of intent, several H2020 projects, and a deployment platform bringing together public transport organisations, manufacturers and finance organisations. Along Aberdeen and Dundee councils for Scotland, several French authorities are involved: Ile de France, Pau, Auxerre, Dijon, Montpellier, Toulouse...

The first JIVE project began in January 2017 and had for objective to upscale the deployment of hydrogen fuel cell buses. The next iteration, JIVE2, has received a m€25 contribution from H2020 for a total budget of over m€110. It will see the deployment of over 150 buses in 14 cities across seven countries. Some regions already have experience of the technology such as Cologne, which supports others like Auxerre to demonstrate the benefits of hydrogen buses. In addition to the deployment of buses, the project also includes a comprehensive data monitoring and assessment exercise to inform next steps for the sector, and a high-impact dissemination campaign with international conferences.

Scotland has been particularly successful with public-private collaboration funds in particular in the area of renewable energies (ocean energy, hydrogen etc). The future of these projects remains uncertain however, as the UK is yet to confirm whether it will continue to participate in the main innovation schemes following Brexit. Like with the public research sectors, EU funding is behind most of the collaborations, as national innovation and economic development funds tend to be even more centred on internal activities. Funding foreign companies to foster local jobs and growth may seem counter intuitive, however there is growing evidence supporting the value of global collaboration for competitive advantage<sup>39</sup>. Real competition is not the neighbour, it is on a global scale, which means there is potential for “co-optition”, or cooperation for competition. Shared governance and arrangements such as Interreg are working on this basis, and bring together businesses, policy makers and researchers to tackle global challenges.

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<sup>39</sup> [Regions and Innovation: Collaborating Across Borders \(oecd.org\)](#)

### **Case study: Integrating Tidal energy into the European Grid ([ITEG](#))**

This 5-years project started in 2017 and is supported by Interreg North-West Europe. It is led by EMEC in Orkney and involves Scottish company Orbital Marine Power as well as two universities in Normandy, the local economic development agency (*Agence de Développement pour la Normandie*) and Areva H2Gen, a French company specialised in water electrolysis (a technology required for the production of green hydrogen). Other partners include Belgium and the Netherlands. The project has a budget of m€11.8 and received m€6.5 of EU funding.

Its objective is to develop and validate an integrated tidal energy and hydrogen production and storage solution in Orkney. This type of technology addresses the issue of carbon emissions as well as grid export limitation which can be faced in remote communities. It brings together a low-cost tidal turbine with a custom-build electrolyser for hydrogen production, coordinated by an onshore energy management system. This integrated solution means that electricity can be either sent to the national grid or stored as hydrogen depending on the level of demand.

## **3.5 Research infrastructure and training**

A number of H2020 project are dedicated to the development of research infrastructures that are accessible to all researchers in Europe. These facilities provide resources and services for research communities to conduct research and foster innovation. They can also be used beyond academia for education or public services. Infrastructures include scientific equipment or sets of instruments, but also collections and archives of scientific data, computing systems and communication networks. The development of EU research infrastructures is overseen by [ESFRI](#), the European Strategy Forum on Research Infrastructures.

### **Case study: Environmental research infrastructures building FAIR services for research, innovation and society ([ENVRI-FAIR](#))**

**This project, funded by Horizon, seeks to connect existing environmental research infrastructures. Understanding the earth needs an interdisciplinary approach based on harmonised and easy-to-use data and services. The overarching goal is to improve those digital assets and connect them to the emerging European Open Science Cloud. The project has an overall budget of m€19 and is coordinated by the Forschungszentrum Jülich, an interdisciplinary research centre based in Germany and one of the largest of its kind in Europe.**

**ENVRI-FAIR brings together 13 environmental research infrastructures that each observe elements of life, air, land and water. These were initially established to serve a specific science community and focused a certain aspect of phenomena on Earth. However, the interlinked nature of our plant requires coordination to transcend disciplinary boundaries and achieve a holistic understanding of the environment. The project therefore brings together 37 partners from 13 EU countries. This includes the University of Stirling in Scotland, and in France the CNRS, IFREMER, INRAE, the BRGM and the Université de Versailles. Other UK institutions involved: UKRI, the National Oceanography Centre and the Plymouth Marine Laboratory.**

In addition to access to equipment and services, a number of H2020 infrastructure projects also provide dedicated training for researchers, technical staff and industry stakeholders. This can include training courses as well as dedicated fellowships and PhD programmes.

#### **Case study: Aquaculture infrastructures for excellence in European fish research ([AQUAEXCEL](#))**

This Horizon research infrastructure project aims to support the sustainable growth of the aquaculture sector in Europe. It has been running since 2011, and over the years it has received nearly m€30 of European funding, with the most recent programme launched in November 2020 and due to end in October 2025. The project is coordinated by INRAE (with IFREMER as the other key French partner). It integrates 40 European aquaculture research facilities, covering all scientific fields from genetics to technology through immunology, physiology and nutrition. The Institute of Aquaculture of the University of Stirling will receive over €600,000 as part of the latest call.

The latest iteration seeks to extend its field to shellfish, algae and recyclers (insects, marine works). It also incorporates industry through collaboration with the European Aquaculture Technology and Innovation Platform. The project subsidises access to its facilities through regular calls for transnational access. In addition, it provides networking activities and services such as a virtual laboratory that allows to run experimental protocols online. Aquaexcel also incorporates a comprehensive free training programme which aims to educate researchers as well as industry stakeholders on the latest topics through face-to-face but also distance learning.

### **3.6 Networks and consortiums**

Consortiums are groups of organisations that seek to pool resources and knowledge to tackle a specific issue. There is a wide variety of research and education networks in Europe and across the world which will include both Scottish

and French members. These can be supported through the diverse European programmes but can also rely on their members for funding or on national grants.

**Case study: [One Ocean Hub](#)**

This is an independent programme for collaborative research for development funded by UKRI through the Global Challenges Research Fund from 2019 to 2024 (total budget m£18, delivered by the Natural Environment Research Council). It is a community of scholars from 22 international universities and research centres, working together with over 30 partners across the globe including UN agencies, national and regional governments, charities and media organisations. The Hub is led and hosted by the University of Strathclyde. The other Scottish actors are the University of Edinburgh, Heriot Watt University, SAMS and the Glasgow School of Arts; in France, the main research centre involved is INSERM, and UNESCO is also involved as a partner.

The mission of the One Ocean Hub is drive integrated ocean governance for equitable and inclusive sustainability. It will specifically address the challenges and opportunities of South Africa, Namibia, Ghana, Fiji and Solomon Islands, through collaborative, transdisciplinary research that bridges current disconnections in law, science and policy to balance multiple ocean uses with conservation.

Once of the major source of funding for research network is COST, the European Cooperation in Science and Technology. Founded in 1971, this is the EU's longest running European framework for research collaboration. Its mission is to networking opportunities for researchers and innovators in order to strengthen Europe's capacity to address scientific, technological and societal challenges. COST received funding under the various research and innovation framework programmes such as Horizon. Its main instrument is the creation of research networks called COST Actions. These offer an open space for collaboration amongst scientists across Europe and beyond. The actions are bottom-up, meaning researchers can create a network based on their own interests and ideas, and multi-stakeholders, often involving the private sector, policy makers as well as civil society. In 2019, the UK led 223 COST Actions, and involved organisations received a total of m€1.7. Scotland participated in 278 actions The UK is amongst the highest in terms of total number of individual participations in all action activities, with 100% of representation across the years. In comparison, France led 138 projects only in 2019, for a total budget of m€1.1<sup>40</sup>.

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<sup>40</sup> [COST country profile - United Kingdom and France \(cost.eu\)](#)

**Case study: [Dynamics of Placemaking](#)**

This COST action started in November 2019 (until November 2023) and is co-chaired by Dr Zsuzsanna Varga from the University of Glasgow. The French partner is Pr. Gilles Gesquière from Université de Lyon. Placemaking is a concept referring to the practices and strategies undertaken by locals (urban citizens, governments, and other interested actors) to invest in places with specific cultural characteristics. This can involve urban planning and urbanism, but also social practices include online communities, applications and other digital tools. This action seeks to document and analyse how placemaking activities re-imagine and reinvent public space and improve citizens' involvement in urban planning. It also aims to explore the role and potential of digital tools to record, transform, produce and disseminate a citizens' knowledge about the urban spaces throughout Europe's cities.

Research consortium have recently become particularly important to tackle global challenges such as climate change but also the more recent Covid pandemic. Indeed, the coordination of research around prevention and treatment of the most serious health threat of this century. France and Scotland have been involved in the fight against the disease, including through European and international collaboration frameworks and networks.

**Case study: Corona Accelerated R&D in Europe ([CARE](#))**

CARE is the largest European research initiative addressing Covid. It is a coalition of research institutions and pharmaceutical companies, with partners from the USA and China. The project has received funding from Horizon 2020, the European Federation of Pharmaceutical Industries and Association, the Bill and Melinda Gate Foundation, the Global Health Drug Discovery Institute and the University of Dundee. Dundee is contributing m€5 which were awarded to its drug discovery unit by the Covid-19 Therapeutics Accelerator. CARE's overall budget is m€77 over 5 years, with an EU contribution amounting m€36 and the other m€39 funded by partners. The project is coordinated by INSERM, with the assistance of two pharmaceutical companies.

The consortium addresses two key goals: the development of therapeutics for emergency response, and long-term strategies to discover treatments for future outbreaks. Amongst the 37 partners, there are 2 Scottish actors (the Drug Discovery Unit of the University of Dundee and the University of Edinburgh), which are the only UK-based academic members of the consortium, and 3 French partners (INSERM, CEA and the Institut de Recherche Internationales Servier). Exscientia, a University of Dundee spin-out company now based in Oxford leading in AI-driven drug discovery and design is also a member of CARE.

### 3.7 Student exchanges and dual degrees

This type of relations was not initially the core focus of this report; however they rose to the fore in January 2021 as the UK announced it would not take part in Erasmus+, the EU's programme to support education, training, youth and sport in Europe. It benefited from a total budget of b€14.7 between 2014 and 2020, and the new 7-years scheme will receive nearly twice this amount. The programme offers mobility and cooperation opportunities for higher education but also adult learning, vocational training and schools including early childhood care. This includes grants supporting individuals to go learn abroad, but also strategic partnerships supporting the development of innovative practices and cooperation.

#### **Case study: Erasmus Mundus Master Degrees**

Erasmus Mundus joint master degrees are international study programmes delivered by a consortium of HEIs and funded Erasmus+. Study must take place in at least two of the programme countries, across a minimum of 12 months to a maximum of 24 months. The successful completion of the programme leads to the award of a joint degree or multiple degrees awarded by HEIs of the consortium. The UK will still be able to participate in this scheme despite its withdrawal from Erasmus+.

In Scotland, the University of Glasgow has been particularly active in setting up such arrangements, with 9 active programmes in 2021, one of which involves a French partner, the University of Aix-Marseille. The international master in South European Studies, [EUROSUD](#), is coordinated by Glasgow and involves partners in France, Greece, Spain, Portugal and Italy. The programme runs over 2 years and aims to examine Southern Europe as a distinct region, around themes such as democracy and protest, migration, social and economic change, nationalism and trade.

The other Erasmus Mundus programme involving both French and Scottish partners is [ACES](#), a joint degree in Aquaculture, Environment and Society. It is coordinated by the University of Crete, alongside the University of the Highlands and Islands, the University of Nantes and Radboud University in the Netherlands. The programme lasts for 2 years and focuses on practical and theoretical skills, including internships with businesses, to address the major scientific, technological and social obstacles facing the sustainable development of the global aquaculture industry.

In the UK, Erasmus+ supported nearly 55,000 participants in 2019 for a total funding amount of m€144. Over half of this goes to higher education, and a quarter to vocational training. France is the number two receiving country for UK students

and staff, behind Spain but above Germany. Two Scottish HEIs (the universities of Glasgow and Edinburgh) are in the top 3 institutions, showing the importance of the scheme for Scotland. In the same year, France sent over 100,000 participants abroad, with the UK being the second most popular destination, behind Spain<sup>41</sup>.

### **Case study: Erasmus+ student exchanges**

The Erasmus+ student exchange programme is open to universities as well as other Higher Education institutions. Organisations must sign and implement a common quality framework, the Erasmus Charter for Higher Education. In Scotland, there were 32 institutions accredited in 2020, including all the Universities but also colleges across the country. HEIs can have anywhere between 1 to over 30 agreements in place with French counterparts.

In 2019, France was the third most important destination for outgoing students with 385 students from Scottish universities studying in France. This figure captures all means of studying abroad, including Erasmus+. Looking exclusively at Erasmus+, French students were the first biggest cohort coming into Scotland through the scheme. In 2019/20, 595 French students came to Scotland under Erasmus+.

One of the major benefits of the Erasmus+ programme is the economies of scale brought by the common framework. HEIs are working under a shared charter and can access a unique infrastructure which makes applications and handling of students and staff grants extremely easy. In addition to this integrated logistical support, Erasmus+ also provides opportunities for strategic partnerships and cooperation through initiatives such as Centres for Vocational Excellence, Teachers Academies or European Universities. The programme supports policy and curriculum development via schemes such as Jean Monnet Actions (financial support to offer new content on European studies) or the European Youth Together actions (promoting young people's participation in European public life).

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<sup>41</sup> [Erasmus + factsheets \(ec.europa.eu\)](https://ec.europa.eu/erasmus-plus/factsheets)



### **Case study: Erasmus+ European Universities**

This initiative aims to strengthen strategic partnerships between HEIs across the EU. It is one of the flagship initiatives to build a European Education Area. European Universities are transnational alliances that promote European values and identity and seek to revolutionise the quality and competitiveness of higher education in Europe. Together, European Universities will bring together a new generation of creative Europeans able to cooperate across languages, borders, and disciplines to address societal challenges and skills shortages in Europe.

The University of Glasgow was one of the two successful Scottish applicants of the 2019 call with the creation of [CIVIS](#), the European Civic University, which also involves the University of Aix-Marseille in France. The University of Edinburgh joined the [UNA Europa](#) alliance with another 7 universities including Université Paris 1 Pantheon-Sorbonne. The European Universities alliances will receive EU funding (m€5 per organisation for a 3-year period) to support their engagements towards increased mobility of staff and students, pooled expertise and resources for joint curricula and economic development of their respective regions. However, UK institutions will not be able to renew their participation under the next Erasmus+ funding call.

Participation of Scottish and UK institutions in the Erasmus+ programme will be extended after the announcement of the country's withdrawal, as already approved schemes and funding will continue to be honoured, including those beyond 2020 and the end of the transition period. It is also possible that the UK will be able to participate to some of the schemes as a third-party country. In December 2020, the UK Government announced the creation of a new m£100 programme, the Turing scheme, aimed at providing support for around 35,000 students towards placements and exchanges overseas<sup>42</sup>. However, this initiative will only fund outgoing students, and this lack of reciprocity has been heavily criticised by EU actors.

European HEIs will need to arrange bi-lateral agreements with UK organisations and provide funding for their students to come to study in Scotland. This may prove difficult especially for smaller institutions with limited resources, as universities will need to prioritise the development of bi-lateral agreements with those HEI's where they have the most outgoing students. Funding will also be difficult to justify given the small number of students involved for each destination. Finally, the Turing scheme only support higher education students, whilst the Erasmus+ programme encompasses teachers, researchers, schools, and adult learners.

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<sup>42</sup> [New Turing scheme to support thousands of students to study and work abroad \(gov.uk\)](#)

The withdrawal from the UK also means that new regulations remove any distinctions between EU students and any other international students. EU law required HEIs to provide spaces for incoming students under the same tuition structure as their national students. In Scotland, this meant that EU nationals benefited from free tuition, like Scottish students. With this change, EU students will now be required to pay international fees, which are not enforced by the government and are set by each university<sup>43</sup>. Some HEIs have already set out dedicated scholarship programmes, however the lack of funds means these opportunities will move to a merit-based system rather than encompass all students.

In addition, Brexit will increase the administrative burden for new visiting students who now require a visa to come study in the UK for more than 6 months and will be required to pay visa fees as well as a healthcare surcharge. Moreover, visiting students will not be eligible to benefits anymore unless they obtained settled status. This includes tuition support and scholarships which are handled in Scotland by the Student Awards Agency Scotland.

Note that aside the Erasmus+ scheme, there are government programmes in Scotland ([Saltire Scholarships](#)) and the UK ([GREAT Scholarships](#), [Chevening Awards](#), [Commonwealth Scholarships](#)) that offer support for international students. However French nationals are not eligible for these, as they tend to focus on non-EU territories.

### 3.8 Institutional links and agreements

This type of link is related to strategic partnerships signed at the highest level between governments or their agencies. There is very little evidence of such agreements between France and Scotland, although with Brexit it is likely that this type of collaboration will increase. The most significant example was the signature of an Education Statement of Intent between the French minister of national education and the Scottish cabinet secretary for education and lifelong learning in 2013. This document affirms both countries joint vision for educational co-operation, including the mobility of learners and teachers, although this was limited to school education. The statement was refreshed in 2018, and work is underway to update it this year. At the time of writing, no institutional agreement between the research agencies in France (ANR but also the different research institutes) and Scotland (SFC) had been identified.

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<sup>43</sup> The Scottish Government took the decision not to treat EU students differently as without EU regulations there is no legal basis for doing so. This could have opened the country to challenges from both international and UK students who might have argued for their right to free tuition.

### **Case study: CNRS International Research Laboratories**

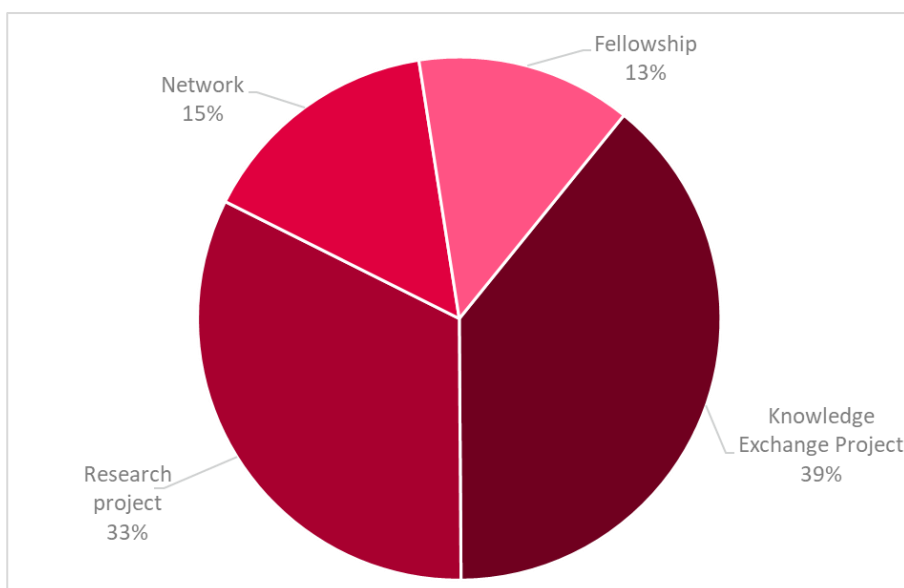
These prestigious laboratories have long-term partnerships with the CNRS and foreign research institutions. There are two in the UK. The first is the [Maison Francaise d'Oxford](#), which was founded at the end of the Second World War on the joint initiative of the Universities of Paris and Oxford. It is operated jointly by the CNRS and the French Ministry of European and Foreign Affairs and is part of a network of research institutes established abroad ([UMIFRE](#), *Unites Mixtes des Instituts Français de Recherche à l'Étranger*). It acts as a hub of Franco-British academic collaborations, first and foremost with the University of Oxford. It hosts a team of French scientists from the Institute for the Humanities and Social Sciences of the CNRS who lead an interdisciplinary programmes, conferences and seminars. It is also home to junior researchers and research students.

The second is the [Abraham de Moivre](#) laboratory, located within Imperial College London. This joint research institute was created in 2018 and specialised in mathematics. It seeks to serve as a hub for collaborations between the French and UK mathematics communities. It includes a fellowship programme that support extended stays of French academics at the Imperial and supports visits of UK researchers in French labs as well as joint networks, workshops and conferences.

## 4. Mapping and stakeholder engagement results

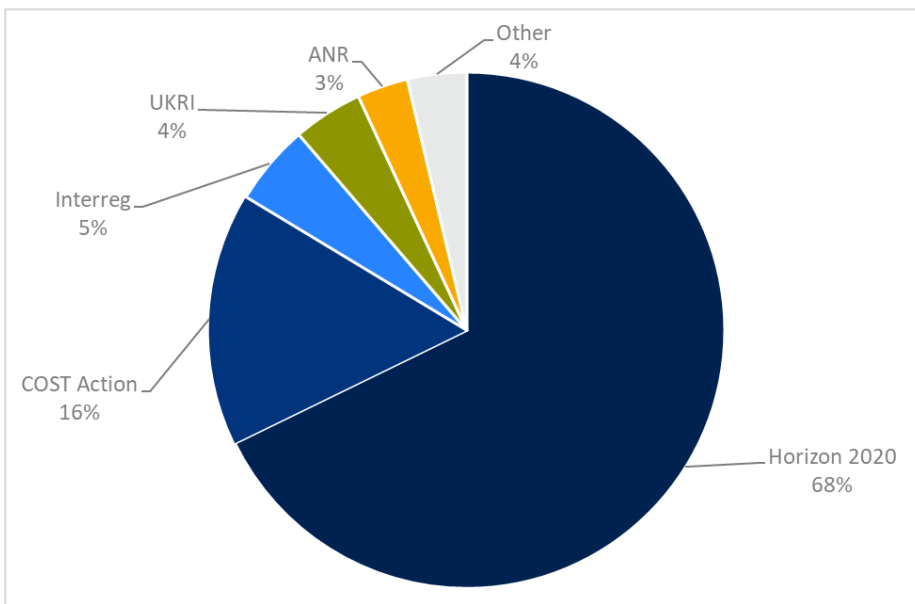
### 4.1 Franco-Scottish links database

The desk-based mapping exercise yielded a total of 596 individual research links between France and Scotland. These include research projects funded by national and EU agencies (with private and public partners) as well as networks and fellowships (Figure 8). A further 246 education links were identified, which include the Erasmus+ student exchange destinations and joint degree programme (university networks such as the European Universities were counted as network under the research database). Whilst those lists are far from exhaustive, they still allow a comprehensive overview of the links between the two countries.



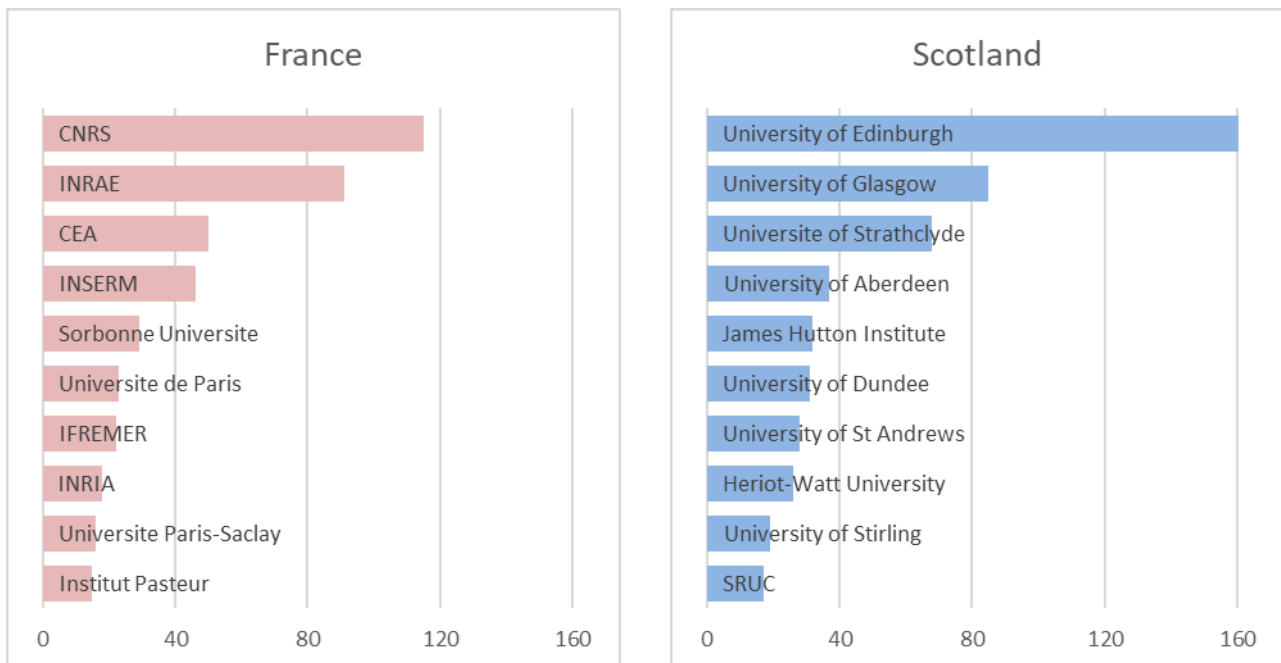
**Figure 8 - Type of Franco-Scottish links (n = 596)**

A vast majority of research links are funded through EU programmes (Figure 9). Note that this result may be somewhat biased by the fact that collaborations at the individual level are not included. Although funded at the national level through universities own grants and internal budgets, these links are not centralised and would therefore be too difficult to identify. Still, the importance of EU funding is not surprising as these schemes are designed to encourage international collaboration, whilst national funding tends to be focused on internal projects. Whilst Horizon is the major source of support for such links, other EU schemes also have a significant role in supporting Franco-Scottish research cooperation. The participation of the UK, and by extension Scotland, in such programmes should therefore be encouraged. Alternatively, national schemes encouraging international collaboration could be put in place to fill in this gap.



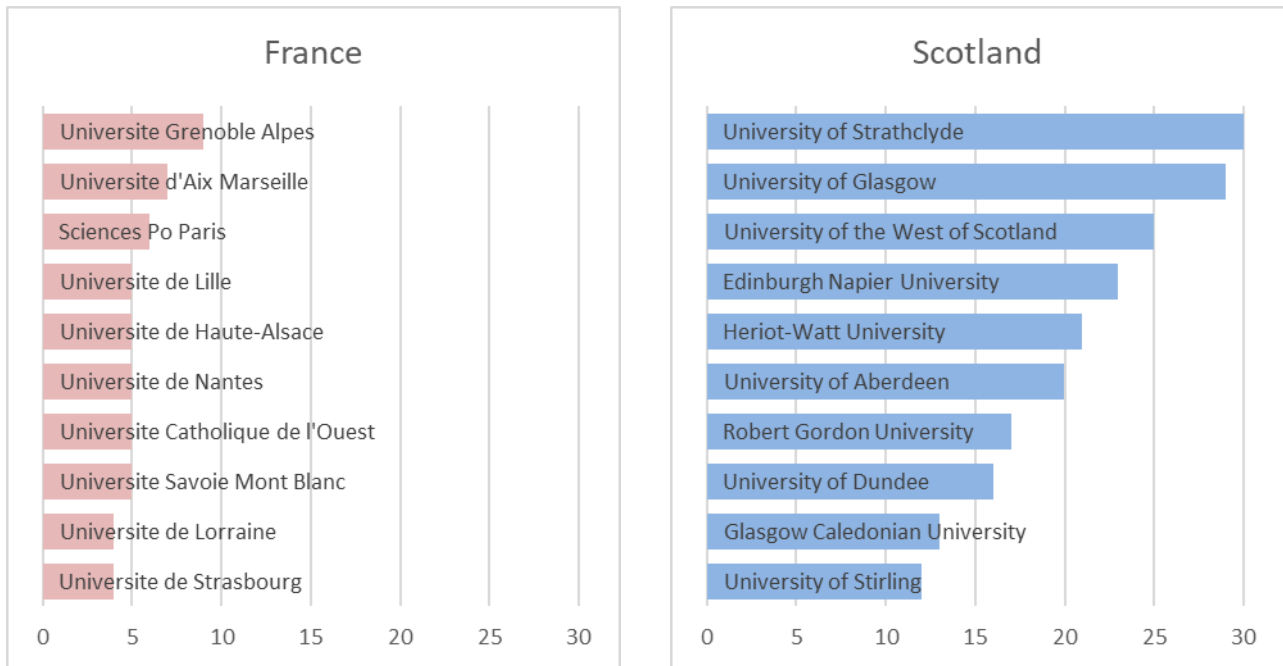
**Figure 9 - Origin of funding for Franco-Scottish research links (n= 596)**

When looking at the participation of organisations in research links, the major institutes and universities in both France and Scotland were unsurprisingly the most active in links between the two countries. The University of Edinburgh clearly ranks first with 159 projects, nearly half that of the second organisation (University of Glasgow). Whilst universities dominate the top 10 positions in Scotland, one research institute, the James Hutton Institute, does appear in 5<sup>th</sup> position, thus highlighting the importance of such actors aside from HEIs. In France, CNRS teams were the most involved with over 100 projects, although it is important to remember that most of these represent UMRs which will be based in universities (Figure 10).



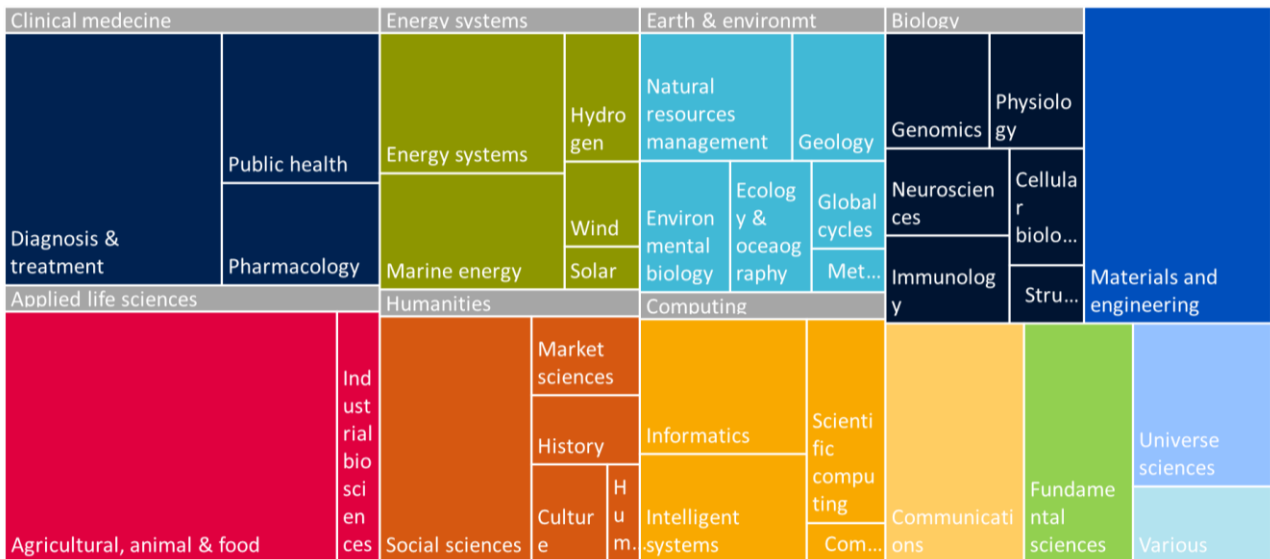
**Figure 10 - Top 10 organizations involved in Franco-Scottish research links.**

When looking at education links, the ranking changes drastically both in France and Scotland, as universities will have very different engagement strategies. In Scotland, the University of Edinburgh for example may be the biggest HEI but it has far less Erasmus+ agreements with France than Strathclyde and Glasgow. Similarly, the dominance of Paris based institutions is much weaker when it comes to Erasmus+ destinations for Scottish students (Figure 11).



**Figure 11 - Top 10 organizations with Franco-Scottish education links**

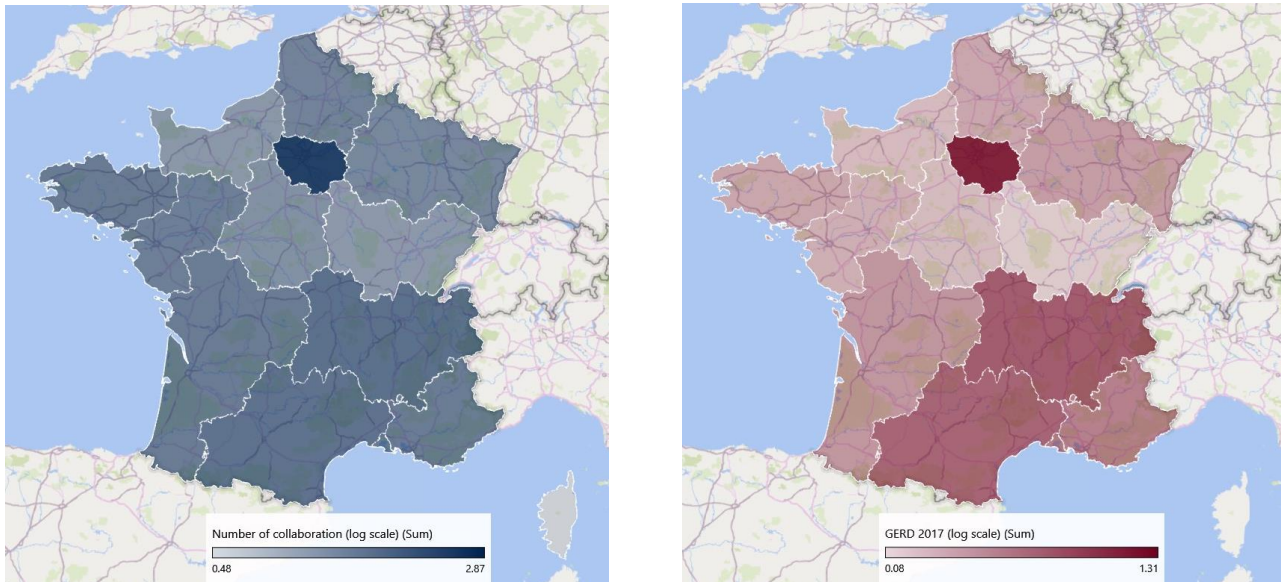
Each link within the research database was allocated a unique subject field and sub-field. This classification can be quite arbitrary, especially projects which are multi-disciplinary or related to economic and sustainable development. Despite those limitations, this exercise allows to identify several fields in which research links between France and Scotland are particularly developed (figure 12).



**Figure 12 - Franco-Scottish research links by field and sub-field (n=596)**

Medicine and health research is the most common field, with projects covering new drugs, imagery, treatment and diagnostic development. The Universities of Edinburgh, Glasgow and Edinburgh are the most active in Scotland in this area, whilst in France the key partner is INSERM. The second major field is applied life sciences, and in particular research on agriculture, animal health, nutrition, and food. In this area, the key institutions are INRAE, James Hutton and SRUC. It is a particularly active field of strategic importance for both countries, which addresses the global challenges of climate change and economic recovery. Energy system is the third most important field, showcasing the salience of decarbonisation and green transports in France and Scotland. The main Scottish organisations involved in this area are the Universities of Strathclyde, Edinburgh and EMEC. French actors are Innosea (a marine energy consultant), Centrale Nantes and Electricite de France, which shows that industrial partners are attracted by research expertise in Scotland.

The database also allows an examination of the geographic repartition of research and education links. It should be noted that in the case of French research organisations, Paris is over-represented as many institutions will be logged under their head office, when the actual research could be based somewhere else in France. This is particularly the case for research institutes. Logarithmic scales have been used for the maps below to counterbalance this dominance.



**Figure 13 - Repartition of research links with Scotland (a) and GERD in 2019 (b)<sup>8</sup>**

The first main finding relates to this geographical repartition of the research links between Scottish organisations and France. The regional GERD shows that regions are more active than others in terms of research and development, in particular Ile de France, Occitanie and Auvergne Rhone-Alpes (Figure 12b). Paris is of course a major scientific centre, but other cities benefit from high expertise through historic links with specific disciplines: aerospace in Toulouse, technology and innovation in Grenoble. Still, the French partners involved in collaborations with Scotland are spread out across the country. The regions mentioned above attract a good number of research links, but other are likewise active, especially coastal regions such as Nouvelle Aquitaine, Pays de la Loire and Brittany (Figure 12a). These strong connections may be the result of shared local interest and expertise around marine science and energy.



The repartition of research links in Scotland shows a concentration in the central belt, which is not surprising given that the major universities of the country are in that area. Still, several other hotspots can be observed that correspond to organisations very active in international research: SAMS in Oban (West Coast) and EMEC in Orkney. Aberdeen also attracts several collaborations with French actors, thanks to its university and historical ties with the energy sector (Figure 13a). In France, the research hotspots are: Paris, Toulouse, Grenoble, Nantes, Bordeaux, Rennes, Lyon and Montpellier (Figure 13b).

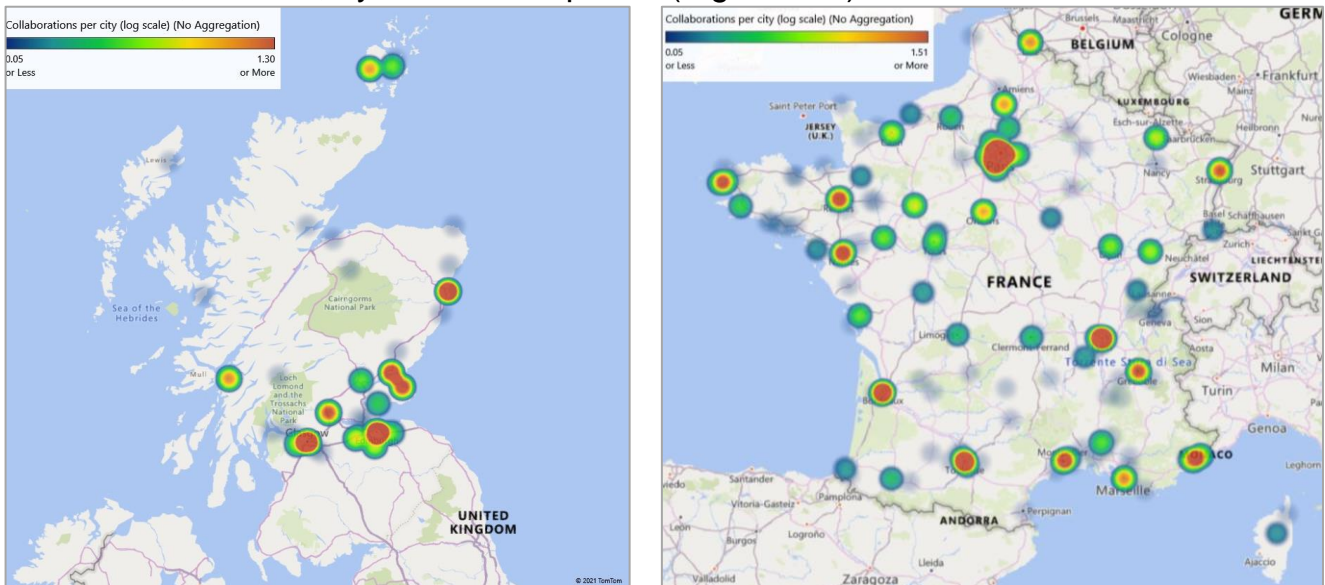


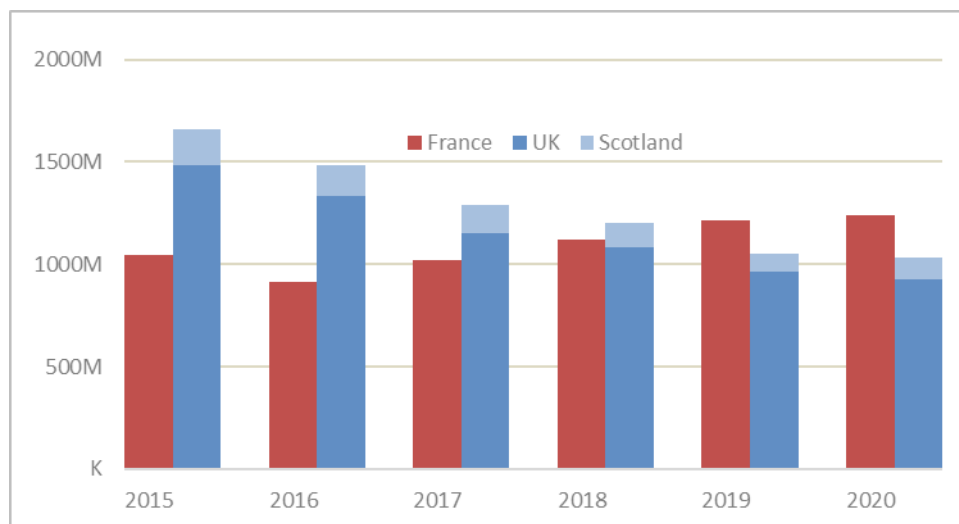
Figure 14 - Repartition of research links in Scotland (a) and France (b)

## 4.2 Qualitative findings: barriers

**Resources:** overall, the most common challenge mentioned by stakeholders against increased Franco-Scottish collaborations is the lack of funding and time. Even if both parties are highly motivated, the relationship will cease the minute funding ends. Academia is a highly competitive environment, and whilst actors recognised the value of collaboration and international partnerships, at the end of the day researchers and HEIs have to go where the money is. Funding schemes and programmes such as Horizon or the Global Challenge Fund are therefore essential to support links between France and Scotland. Lack of funding is associated with lack of time and other resources which are themselves required to prepare applications for grants. This means that smaller schemes can sometimes be particularly impactful, especially when setting up a new collaboration, as the process is easier and will require less investment.

**Brexit:** the uncertainty brought by the UK's withdrawal from the EU was also a common cause of issues for stakeholders. Participant reported that Brexit had already impacted collaborations even before the end of the transition period, and

especially their participation in EU programmes. Indeed, the number of successful projects for UK and Scottish partners under the Horizon 2020 scheme has been decreasing since 2015 (except in 2020 when Scotland saw a slight increase in its net contribution), whilst France has been increasing steadily since 2016 (Figure 15).



**Figure 15 - Horizon 2020 Net contribution (€) per year and per country<sup>44</sup>**

Even if programme guidelines and rules for application panels clearly stated that the UK remained fully eligible and could not be discriminated upon, the uncertainty led many actors to become hesitant to include UK partners. Scottish actors would also be reluctant to put a lot of effort and resources in applications before knowing details of the UK's participation in EU schemes. Similarly, several participants encountered difficulties with staff recruitment, with EU candidates refusing positions due to the uncertainty over their right to work in the UK.

The UK's announcement to remain within the Horizon program was met with clear relief by stakeholders, as this scheme is designed for collaboration and therefore essential to support relationships across the Channel. Despite this good news, many participants were still awaiting further information on the practical arrangements of the UK's participation in Horizon before committing to new projects.

In addition, Brexit brought forward many other difficulties, especially around the circulation of people and goods. Visa requirements are likely to impact staff and student mobility given the extra cost and administrative burden. This means reduced access to dedicated facilities and fieldwork. Fluxes of equipment and samples will also be affected. For example, the plant specimens sent by the James Hutton Institute are now accompanied with a UK-based safety certificate, which is

<sup>44</sup> [Horizon dashboard - Implementation figures - Funded projects \(ec.europa.eu\)](https://ec.europa.eu/horizon-dashboard/implementation-figures/funded-projects)

no longer sufficient for exports to the EU. This is likely to cause delays which will damage the viability of the samples.

Further to practical concerns, the impact of Brexit will extend to strategic objectives, as the UK will no longer be aligned to EU policies. Domestic replacement schemes may not be focused on international cooperation (see example of Turing), and will require dedicated resources. The UK will also lose access to the EU's public tendering system, thus reducing opportunities for Scottish companies to access calls. Overall, Brexit means less skills will come in, and less ambassadors will come out.

**Covid:** the research and education sector was impacted by the pandemic like the rest of the society. Many institutions had to re-direct resources to urgent projects, and many international collaborations were stalled as universities focused on the delivery of online teaching and other administrative tasks. Travel restrictions led to the cancellation of conferences and networking events. Whilst the digital format means that logistical issue can be avoided (some participants noted it can be difficult to access Scotland), and events can touch a wider audience, it also removes the opportunity for informal conversations.

Participants reported that online meetings were enough to keep their exiting contacts alive but are not suited to set up new collaborations. As previously mentioned, many Franco-Scottish cooperation links originate from informal contacts, such as a conversation around a coffee at the end of a conference session. Digital settings cannot replicate the creative environment of a live workshop. Participants raised the issue of funding schemes and large agencies not recognising the value of face-to-face interactions, especially when the pandemic pressures on travel came to reinforce the challenge of carbon footprint.

**Strategy:** amongst Scottish participant, a common theme was the lack of a national approach to research and international cooperation. Unlike France, there is no central repository of expertise (such as Campus France) nor common strategy (like the ANR), and devolution has made an already fragmented sector even more complex (although one could argue the French landscape is equally complicated). For example, the SFC does not have jurisdiction over the research institutes involved in the RESAS programme. Each institution has its own strategic priorities (both in areas of expertise and geographical reach).

There is little coordination around research objectives and international cooperation between the Scottish Government, public sector agencies (SDI, Scottish Enterprise, Highlands and Islands Enterprise, Scotland Europa), HEIs, research institutes and the groups like research pools and innovation centres. A notable exception is Connected Scotland, which brings together the British Council Scotland, the Royal

Society of Edinburgh, SFC, the Scottish Government, Universities Scotland and Scottish Enterprise agencies. Its objectives are to develop joint working to support the sector, but this network remains focused on higher education and the development of student recruitment in emerging markets, and does not include research institutes.

**Competition:** another common obstacle is the competitive nature of academia and funding grants. Participants mentioned that intentions toward cooperation can sometimes be mistaken for competition, especially when research institutes are also involved in commercial activities. For example, BioSS has developed strong expertise in mathematical modelling for agriculture and would be willing to collaborate with INRAE on common academic project. However, it has been difficult for them to identify the right partner within the organisation as INRAE has nearly 270 research units and some of their teams see BioSS as a direct competitor for their industrial contracts.

Internally, whilst Scotland benefits from the reputation of the UK as a major research player, it also means Scottish organisations are in direct competition with other institutions in England, Wales and Ireland. Many French organisations do not differentiate between Scotland and the UK, although this is changing. This issue extends to competition between HEIs and research institutes within Scotland. Many partners from smaller institutions expressed concerns as the largest actors and consortiums tend to focus attention. Similarly, highest ranked institutions and established partnerships can monopolize funding and opportunities.

**Communication:** some stakeholders mentioned having difficulties to identify the right contacts and maintain them over time. Relationships rely on individuals, which make staff turnover, and the restructuring of the French sector in recent years<sup>45</sup> particularly challenging. Brexit also brought changes in responsibility, with international teams now taking over from EU departments when dealing with relationships with the UK. It is also more difficult for participants to find adequate partners outside of their usual circles in academia and specialist industry sectors, highlighting further the need for a centralised platform to showcase expertise. Communication issues extend to the lack of understanding of France and Scotland's respective funding structure and opportunities, and in particular information related to the changes brought by Brexit. Small grants such as the

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<sup>45</sup> The Loi de Programme pour la Recherche of 2003 encouraged closer research partnerships between universities and research institutes. This resulted in many universities mergers, with an added objective to increase international visibility. The results of those successive reforms are still quite debated, with many pointing out that consortiums only resulted in wider territorial inequalities and low added value.

Hubert Curien Alliance have very little visibility due to their size, despite their potential to initiate more significant partnerships.

The language barrier was not mentioned as a major issue, as English is now widely accepted and spoken within the French scientific community. An exception would be in humanities and social sciences, as some theoretical concepts can be difficult to translate. A participant also highlighted that language could be behind the reluctance of small French businesses to take part in international projects, alongside a different corporate culture focused on local connections.

**Recognition of international collaboration:** linked to the lack of funding, this issue was mentioned mostly by Scottish actors in relation to the Research Excellence Framework (REF). The REF is the UK's system to evaluate research impact of British higher education institutions. Its objective is to provide accountability for public investment in research and achieve an efficient allocation of resources. In Scotland, the REF informs the value of the block grant each university will receive from SFC. Participants noted that the REF prioritises individual institutional performance rather than cross-university or international collaboration (even if papers get more citations if with international authors). External engagement and cooperation should be incorporated in the assessment. By extension, travel and networking should be recognised as key element of the academic craft (for ECR but also for more senior researchers). Sitting on an international panel is clearly a result of excellent research and expertise for example, but at the moment it is not recognised officially.

**Challenges for education:** the withdrawal of the UK from Erasmus+ brought issues specific to education and student exchanges, which are critical to skill development but also the development of youths' careers and network. French and Scottish partners unanimously expressed their disappointment at this decision, and highlighted the lack of reciprocity of its replacement, the Turing scheme. Indeed, the UK's programme will only fund outgoing students. In addition, France was not initially amongst the list of priority countries (the UK government later explained this was the result of an administrative error), and more generally the global agenda means that EU countries will now compete with other English-speaking territories.

Fees are at the heart of the issue around student exchange, as under the Erasmus+ framework incoming and outgoing students were exempted from tuition. A national agreement is unlikely given the business model and autonomy of Scottish universities in this area, and the Scottish Government confirmed it would not be able to continue to fund fees for EU students. HEIs will therefore need to set up individual bi-lateral agreements, which may jeopardise the existing links involving a low number of students and smaller institutions with limited resources.

Timing has been complicated by the late release of the Turing scheme guidance, leaving HEI's very little notice to include the scheme in their recruitment season.

Furthermore, the Turing scheme only covers student exchange in higher education, when Erasmus+ includes strategic cooperation, staff mobility, internships, service learning, policy development, humanitarian work etc. for all stages of education from small children to adult learning. The new Erasmus+ programme also calls for more synergies with Horizon, in particular through European Universities alliances, thus recognising the importance of skills and cooperation for research.

### 4.3 Opportunities and recommendations

This research projected clearly demonstrated the value and breadth of links between France and Scotland. Whilst collaborations have been severely impacted by Brexit and the Covid pandemic, all participants warmly expressed their willingness to continue to work together. Research and education partners are chosen due to their expertise, not their nationalities or geographical locations. All academics will engage in international relationships, as this is the best way for them to use and publicise their knowledge. Collaboration is an essential element of research, which foster innovation and should be encouraged at all stages of researchers' education and careers. This means supporting mobility of students, early career researchers, but also involve businesses and policy makers.

**“ Research does not stop at borders “**

**Common interests:** France and Scotland already share a long history of cooperation, from the Auld Alliance through the Enlightenment, which continues today through a common commitment for green recovery and climate change mitigation. French stakeholders are increasingly aware of the distinctive expertise and priorities of Scotland, thus bringing a competitive edge which should be exploited. Brexit has led many organisations to seek and encourage bi-lateral opportunities to fill in the gaps left by EU programmes, and the continued participation in Horizon will continue to support collaborative activities. EU funding is an essential element of international cooperation, providing researchers with access to resources otherwise not available in their own countries, and the opportunity for actors to take on ambitious projects they could not tackle alone, and work across borders.

The global challenges faced by the world will require cooperative solutions and encourage the alignment of French and Scottish research strategies. Both countries have committed to tackle climate change through COP21 in Paris and COP26 in Glasgow, and the international attention those events brought. Net zero, the transition to green economy, agriculture and food, are amongst the common themes of interest for researchers in France and Scotland. Energy systems, and in particular marine energy, also represent a major opportunity for shared research

**“ International collaboration is indispensable to tackle global challenges “**

and industry partnerships. Scotland is a recognised expert in the field and shares with France an extensive coastline with excellent potential for deployment. Other major common themes include the fight against Covid; circular economy; anti-

microbial resistance; robotics and AI; biosciences.

**Networking support:** Operational support for existing and new collaboration between France and Scotland will rely strongly on existing EU support, but it does not depend solely on such large-scale programmes. Small funding pots towards short-term scientific missions or networking activities to establish new contacts were amongst one of the suggestions from participants. Low-risk grants mean easy application, making them more open as they need less investment and preparation. Despite their small-scale, these grants will act as a starter pack for setting up new collaborations and demonstrate their value for future applications to other programmes, especially for ECR building up their network. To be effective, such opportunities need to be structured around a strict agenda and deliverables, requiring evidence of activity and impact. The COST action format is particularly efficient and could be adapted to bi-lateral networks. It also provides a guide for the involvement of industry and the public sector.

The rise in digital delivery and online meetings also brings opportunities for remote networking. This is particularly useful in the early stages of a research project, when partners are less inclined to spend time and resources on travel. Digital technologies also remove the obstacle of logistics, especially for stakeholders located in remote areas. Like with face-to-face events, this format requires to be structured around a shared objective to be efficient. This can be a shared project or a funding call, which will focus actors towards actionable points.

**Information and communication:** many stakeholders expressed a need for clear guidance on the existing and upcoming support for international collaboration. The uncertainty brought by Brexit reinforced the demand for clarity and proactive guidance related to the position of the UK in the different EU programmes, and

what this means for day-to-day operations. This information needs to be communicated on both sides of the channel, and whilst participants realise information may not always be available, they appreciate having a single point of contact that would provide consistent updates. Proactive outreach and engagement should take full advantage of the diverse channels available: social media, conferences, international and national fairs and research events.

A possibility would be a shared platform showcasing information on Scottish expertise and funding system, based on the models of Campus France's research platform. The research pools and innovation centres have already started to work in this direction however the existing platform would benefit from the integration of other research actors and in particular non HEI institutes. This tool should be complemented with promotion of existing partnerships and opportunities for collaborative projects and funding, thus allowing stakeholders to find new organisations and individuals interested in similar themes. Participants also mentioned the potential formed by the French and Scottish diaspora and alumni networks, which represent a large source of informal contacts and links.

**Strategic alignment and institutional agreements:** at higher level, a key opportunity to support Franco-Scottish links, and international cooperation in general, lies in the alignment of nationally funded research projects and programmes. This could be done between the two countries through institutional agreements such as a joint funding calls between ANR and SFC/UKRI, or ministerial support towards the inclusion of Scotland within the European research community. Within Scotland, the sector would also benefit from a better integration of research strategies within Scottish Government priorities. A dedicated national perspective would tie up existing framework (export plan, economic strategy, green recovery etc.) and stakeholder actions. The difficulty lies in finding a way to unify the sector for enhanced representation abroad, whilst keeping the diversity of capabilities and objectives across all research actors.

The research pools, innovation centres and SEFARI have been successful in drawing attention on expertise rather than affiliation, however they will require further support to further develop international cooperation. The research pools' plans for their next funding call, if approved by SFC, will incorporate internationalisation as a key pillar. Actions will be based on an audit of international strategic relationships currently supported by partner universities. Better knowledge of existing links is indeed essential to support the development of future collaborations.

Further to a national plan or strategy, stakeholders involved in supporting links between France and Scotland (and international research partnerships in general) should develop activities and interactions with universities commercial engagement



and internationalisation offices, as well as internationally focused public agencies. This includes SDI and the national Enterprise agencies, but also Scotland Europa, a membership-based organisation that promotes the countries' interests across the EU. In addition, Scottish actors will benefit from closer association and representation within the UK organisations working to develop international collaboration: the British Council, the Science and Innovation Network and Universities UK International. The latter recently published a white paper on the future of international partnerships<sup>46</sup>, with findings and recommendations that echo many of this report.

**Education opportunities:** French actors recognise that Scotland has excellent universities and is attractive for students (because of the English language but also the culture). For example, 57.8% of outgoing student mobility from Aix-Marseille to the UK was in Scottish Universities. With the UK's withdrawal from Erasmus+, education opportunities will need to evolve into bilateral arrangements, unless participation as a third-party country can be guaranteed. Like for research-based relations, this relies on time and resources, which may disadvantage smaller institutions and links that involve only a low number of students.

To replicate the economies of scale brought by Erasmus+, a national framework could be explored. Another solution may be a common "middleman" which would act as information broker and matchmaker, helping stakeholders from both countries to identify potential partners and opportunities. Regardless of the arrangement, funding will remain the core issue, especially for students coming to the UK. Regions in France may be able to provide scholarships, as they already support less privileged students with mobility grants. This however raises the issue of funding based on merit versus universal provision.

Further to classic student exchange, there is also scope for new type of mobility such as short-term programmes, or hybrid online delivery. Transnational arrangements (distance learning, branch campuses, joint degrees) are another option, and whilst other territories (Asia and Middle East) have until now been the priority for Scottish providers, there has been a sharp increase in Transnational Education agreements in the European Union, in particular through collaborative provision<sup>47</sup>.

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<sup>46</sup> [Future international partnerships \(universitiesuk.ac.uk\)](https://www.universitiesuk.ac.uk/future-international-partnerships)

<sup>47</sup> [The scale of UK higher education transnational education 2018-19: Scottish providers \(universitiesuk.ac.uk\)](https://www.universitiesuk.ac.uk/the-scale-of-uk-higher-education-transnational-education-2018-19-scottish-providers)

## 4.4 Suggestions for future research

This research project provides an overview of research and education links between France and Scotland and showcased the breadth and variety of collaborations between the two countries. The data collection was not designed to be exhaustive and quantitative findings should therefore only be considered as indicative. Whilst the range of sources currently means a comprehensive list is impossible, the increase in available data and unification under open portals could bring this objective closer in coming years. An example of these developments is the Horizon Dashboard and its interactive graphs and maps, which could inspire innovative formats for the delivery of future mapping exercise.

The overview presented in this report could also be further developed through an extensive exploration of international strategies of individual institutions and organisations, as well as regional plans in France. This should allow the identification of shared themes and priorities, thus paving the way for an integrated national strategy.

## Annex I – Interview guide

### Setting up

Introduce the project

Paris-Hub: launched in 2018, one of the Scottish Government overseas offices, tasked with improving international reputation, protect Scotland's interests, increase investment, help trade and promote research & innovation capability.

Interviewer: French doctoral researcher based at the University of Edinburgh business school, working on evaluation of powers and governance of the Scottish Food and Drink industry.

Research project: three months part time, supported by the Scottish Graduate School of Social Sciences. Objectives are to provide evidence base to support strategic planning for the Hub, and help the team demonstrate benefits of such partnerships, identify barriers and showcase possibilities for future collaborations.

Ethics and consent

Participation in this research is entirely voluntary. The interview will be recorded, and information may be used by the Scottish Government for internal reports as well as external communications. Anonymity can be granted upon request, and participant can withdraw or refuse to answer questions at any time. Information provided will be held securely and confidentially. Result of the research project can be made available upon request.

### General information

Organisation details

Short history, remit, type of institution (public, private, non-profit).

Areas of expertise, cooperation and funding links with key institutions in Scotland, UK and Europe.

Participant details

Role within the organisation, background and experience.

### Existing links with France

General

Overall number and value of existing collaborations.

Type and remit of existing links: forma/informal; research project, training, consortium, business, knowledge exchange, education....

Key priority areas for collaborations. Probe links with climate change and renewable energies.

Origin of the key collaborations: funding, networking, formal/informal set up.

Barriers and opportunities

What were the key challenges in setting up the collaborations.

What are the main benefits of working with France, what makes France research attractive.

What type of support was available when building relationships (internal and external).

Do they already have support/interaction with the Scottish Government.

### **Future collaborations with France**

Barriers and opportunities

How will existing collaborations be continued and/or replaced.

Impact of Brexit and Covid crises.

Which areas would the organisation like to strengthen links in or create new ones.

SG support

What type of support would they benefit the most from?

Any support or infrastructure currently missing?

Would they be willing to be featured in future communications and case studies.

## Annex II – Online survey

### Section 1 – Set up

#### *Project introduction*

This survey is presented by the Scottish Government Hub in Paris. Launched in 2018, it is one of the overseas offices tasked with improving Scotland's reputation, protect Scottish interests, increase investment in the country, help trade and promote its research and innovation capability.

The objective of this survey is to gather information on the existing relationships between France and Scotland in the area of research & innovation. It also seeks to identify barriers and opportunities for future collaborations. Its results will support the future strategic planning of the Paris Hub, and help its team demonstrate the benefits of Franco-Scottish partnerships to diverse stakeholders.

### Section 2 – About you

#### *Participant details*

Participation in this research is entirely voluntary, you can withdraw or skip questions at any time. You can come back to each section and amend your answers at any time. The information you provide will be used by the Scottish Government for internal reports related to the research project and may also be included in external communications.

\* Denotes mandatory questions.

What is your name? \*

What is your email address? \*

What is your organisation? \*

Name

Address

Your position

What is your area of expertise \*

Please indicate how you wish your response to be handled and, in particular, whether you are content for your response to be published externally. If you ask for your response not to be published, we will still take account of your views in our analysis, but we will not publish your response, quote anything that you have said or list your name, role or organisation. We will regard your response as confidential,

and we will treat it accordingly. To find out how we handle your personal data, please see our privacy policy.

The Scottish Government would like your permission to publish elements of your response. Please indicate your preference \*

Publish response with name

Publish response only (anonymised)

Don't publish

I confirm that I have read the privacy policy and consent to the data I provide being used as set out in the policy \*

Consent

### **Section 3 – Existing links with France/Scotland**

What type of partnership with France/Scotland are you currently involved with? (multi-choice)

Research project

Knowledge exchange project

Network or consortium

Fellowships (including PhD)

Mobility exchange

Other: text box

What is the partnership timeline?

Start date:

End date:

Ongoing or not applicable: text box

How is the partnership funded? (multi choice)

National Research Programme (UKRI, ANR, SFC)

National Development Programme (Scottish Enterprise, CNER)

European Research Programme (Horizon)

European Development Programme (Interreg, COST)

Other: text box

What is the overall financial value of the partnership? (open-ended)

Text box

What is the main objective/impact of the partnership? (open-ended)

Text box

Who are the Scottish/French partners involved? (open-ended)

Partner 1: Text box

Partner 2: Text box

Partner 3: Text box

Other partners: Text box

How were you first introduced with the Scottish/French partner(s)? (multi-choice)

Networking (conference, event...)

Scientific publications

Historic links

Other: text box

What made you choose this/these partners? (open-ended)

Text box

On a scale of 0 (poor) to 10 (high), how would you rate the expertise of each country in your area (single choice)

France: Scale 0 to 10, I don't know

Scotland: Scale 0 to 10, I don't know

#### **Section 4 – Support, Barriers and opportunities**

Do you have any concerns over the future of this partnerships, in particular in the context of Brexit and the Covid pandemic? (open-ended)

Text box

Did you receive any support from the Scottish Government or any of its agencies when establishing the partnership? (single choice)

No - (Conditional) Are you aware of any support from the SG or its agencies? (open-ended)

Yes - (Conditional) Please specify what type of support you received (open-ended)

What were the main challenges you encountered when setting up the partnership? (open-ended)

Text box

Are you willing to set up new partnerships in the future?

No - (Conditional) What are the barriers preventing you from considering such partnerships? (open-ended)

Yes - (Conditional) Which areas of research would you like to strengthen or create links in? (open-ended)

What type of support would you like to receive? (open ended)

Text box

### **Section 5 – Follow up**

Would you like to be included in the Paris Hub newsletter? \*

Yes

No

We will share your response internally with other Scottish Government policy teams who may be addressing the issues you discuss. They may wish to contact you again in the future, but require your permission to do so. Are you content for Scottish Government to contact you again in relation to this survey? \*

Yes

No

Thank you for taking the time to participate.



## Annex III – Scottish Universities profiles

Student and staff members were obtained from the Higher Education Statistics Agency (2018-19). The rest of this information was gathered from HEI's websites.

- **Abertay University (Dundee):** <https://www.abertay.ac.uk/>

Founded in 1888, gained University status in 1994. Academic staff: 200. Administrative staff: 250. Students: 4,355 (70 French and 680 non-UK). Schools: design and informatics; applied sciences; business, law and social sciences; graduate school. Could not find evidence of international partnership in teaching.

Research themes: creative industries (games, creative technologies, digital culture), security (cyber security, forensic psychology, forensic science, law), environment (life and environmental systems, sustainable technologies business governance and policy, food and nutrition), society (mental and physical health, learning and education, governance and social responsibility).

Could not find indications of formal research partnerships on the website. Several researchers are collaborating regularly with French colleagues, with the most prolific/interesting collaboration being:

- Christopher Watkins: working with international partners including one from the Institute for Advanced Study in Toulouse on national income & kissing – he got an Ig-Nobel for it.
- Ruth Falconer, working with international colleagues including a Professor at AgroParisTech on soil.
- Corinne Jola ran projects with the Centre National de la Dance and Fabrique Autonome des Acteurs on neurosciences and performing arts.

Erasmus+ destinations in France: IDRAC Business School

- **Edinburgh Napier University:** <https://www.napier.ac.uk/>

Founded in 1964, gained University status in 1992. Academic staff: 640. Administrative staff: 780. Students: 13,595 (155 French and 2,850 non-UK). Schools: business, applied sciences, arts & creative industries, computing, engineering & the built environment, health & social care. Transnational Education partners: China, Honk Kong, Myanmar; Singapore; Sri Lanka, Switzerland.

Research themes: sustainable communities, information society, wellbeing.

Could not find indications of formal research partnerships on the website. Some featured collaborations include French partners, such as Christophe Thuemmler's work on [Fi-Star](#), a €17m project on mobile and internet technology for healthcare

funded by European commission, along with 43 European partners including a French company called Easy Global Market.

Erasmus+ destinations in France: Brest Business School, Université Catholique de Lyon, La Rochelle Tourisme School, IPAG Business School, ISIT Paris, Montpellier Business School, Université d'Aix Marseille, Université de Tours, Université de Haute-Alsace, Université Savoie Mont Blanc, Université Toulouse Jean Jaurès.

Member of [ISEP](#) (International Student Exchange Programme), a non-profit organisation based in the US and making study abroad accessible to all. French members are: Aix-Marseille, INSA Lyon, IEP Rennes, Uni of Minnesota Montpellier, Le Havre Normandie, Paul-Valery, Savoie Mont-Blanc, Angers, Caen, Franche-Comté, Lille, Nantes, Picardie, Réunion.

- **Glasgow Caledonian University:** <https://www.gcu.ac.uk/>

Founded in 1875, gained university status in 1993. Academic staff: 710. Administrative staff: 685. Students: 16,860 (45 French and 2,105 non-UK). Schools: computing, engineering and built environment; Glasgow school for business and society; health and life sciences; GCU London. Affiliate: Glasgow Caledonian New York College. Transnational Education Partners: Algeria, Bangladesh, China, India, Malaysia, Mauritius, Oman, Singapore, South Africa, USA.

Research themes: inclusive societies, healthy lives, sustainable environments. The UN Sustainable Development Goals are at the heart of their research strategy.

Could not find indications of formal research partnerships on the website. Several researchers are collaborating regularly with French colleagues, and in particular in Grenoble. Most prolific/interesting collaboration are:

- Slobodan Mickovski: works on ground engineering with CIRAD, UNESCO & University of Grenoble
- Kate McAulay: chemical science and gels with Institut Laue-Langevin

Erasmus+ destinations in France: Université Catholique de Lyon, ENI Tarbes, Ecole Spéciale des Travaux Publics, Ecole Supérieure de Commerce et Management, ESCE International Business School, INSA Toulouse, Institut Supérieur de Gestion, Université Grenoble Alpes, IUT A Lille, KEDGE Business School, NEOMA Business School, Toulouse 1, Toulouse Business School.

- **Glasgow School of Art:** <https://www.gsa.ac.uk/>

Founded in 1845. Not a university, degrees and diplomas are awarded by the University of Glasgow. Academic staff: 170. Administrative staff: 280. Students: 2,285 (40 French and 805 non-UK). Schools: Mackintosh school of architecture;

school of design; school of fine arts; innovation school. Affiliate campuses: Highlands and Islands, Singapore. Transnational education partners: France (Audencia Business School in Nantes – MSc in Management and Entrepreneurship in the Creative Economy), although this is no longer offered in 2021.

Research themes: architecture, urbanism & the public sphere; design innovation; digital visualisation; education in art, design & architecture; contemporary art & curating; health & wellbeing; material culture; sustainability.

Could not find indications of formal research partnerships on the website. Research contributions database not searchable by geography.

Erasmus+ destinations in France: Ecole Camondo, Ecole d'Architecture de Paris, EESAB, ENSA Versailles, ENSCI, Beaux-Arts de Paris, ERBAN, Paris College of Art.

- **Heriot-Watt University (Edinburgh):** <https://www.hw.ac.uk/>

Founded in 1821, gained university status in 1966. Academic staff: 785 (plus 200 on oversea campuses and 10,500 on international programmes). Administrative staff: 1,015 (plus 140 overseas). Students: 10,935 (plus over 5,000 overseas; 240 French and 3,160 non-UK). Schools: energy, geosciences, infrastructure and society; engineering and physical sciences; mathematical and computer sciences; social sciences incorporating Edinburgh Business School; textiles and design. Affiliate campuses: Scottish Borders, Orkney, Dubai, Malaysia, as well as strong online offering. Transnational Education Partners: Australia; Azerbaijan; Bahrain; Bangladesh; China; Egypt; Germany; Greece; Honk Kong; Ireland; Jamaica; Jordan; Maldives; Mauritius; Nigeria; Norway; Portugal; Russia; Singapore; Spain; Sri Lanka; Swaziland; Sweden; Switzerland; Trinidad & Tobago; Uganda; Ukraine; UK. France is not mentioned as one of the TNE partners but the international students' pages mentions long-standing partnerships with around 100 IUTs, engineering faculties (Bretagne-Sud, Le Mans, Grenoble) and Grandes Ecoles (SUPELEC, ESME-SUDRIA, ENSAM, POLYTECH Tours & Orleans).

Research themes: blue economy; health technology; quantum and ultra-fast photonics; smart construction; social disadvantage; the National Robotarium; zero-carbon futures; the Lyell Centre (earth and marine sciences).

Could not find indications of formal research partnerships on the website. Several researchers are collaborating regularly with French colleagues:

- Yoann Altmann and Pr. Stephen McLaughlin: working on sensors and image processing with University of Toulouse (where Dr. Altmann did his studies) as well as Paris Saclay.
- David Kevin Woolf: working with IFREMER on marine renewable energies and carbon cycles.

- Gary Douglas Couples: geo-mechanical research, Université Grenoble Alpes.
- Audrey Repetti: neural networks with Paris Est & Paris Saclay, did her studies in France.
- Dorrik Stow: sedimentologist, working with University of Bordeaux & Montpellier.
- Sebastian Geiger and Florian Doster: management of geo-resources, working with Total and Institut Français du Pétrole.
- George Goussetis: microwaves and antenna engineering, working with Thales Alenia Space and European Space Agency.
- Antonin Chapoy: chemical engineering, gas hydrates and hydrocarbons, working with PSL Research & Ecole des Mines (where he got his PhD).
- Martin R.S. McCoustra: surface science, with Université Paris Est.
- Gareth W. Peters: statistics and modelling, with ESC Rennes.

Erasmus + destinations in France: ENSCL Lille, Université de Lorraine, CPE Lyon, Université Paris-Saclay, Université Paris Est Marne-la-Vallée, Université Bourgogne Franche Comte, Université de Pau et des Pays de l'Adour, Université Grenoble Alpes, Université Lumière Lyon 2, Université Sorbonne Nouvelle, ISIT Paris, Université de Nantes, Université de Tours, Université de Haute-Alsace, Université Catholique De L'Ouest, Université de Bretagne Sud, Université de Strasbourg, ESSCA Angers, Sciences Po, Université Paris Sciences & Lettres, ENSAIT.

• **The Open University (online):** <http://www.open.ac.uk/>

Founded and gained university status in 1969. Academic staff: 2,265.

Administrative staff: 3,240. Students: 122,360 (across whole of UK; 15 French and 320 non-UK). Schools: faculty of arts and social sciences; the open university business school; open university law school; faculty of science, technology, engineering and mathematics; faculty of wellbeing, education and language studies; institute of educational technology; knowledge media institute. Affiliates: FutureLearn Limited (online courses with multiple partners across the world including in France the French Foundation for rare diseases; Grenoble Ecole de Management; Institut Français de la Mode); OU Worldwide Limited. Transnational Education Partners (website mentions up to 27 countries but not all listed): Arab Open University, Botswana, China, Ethiopia, Honk Kong, South Africa, Uganda. Affiliated research centres: Gambia; Italy, Kenya, Thailand, UK, USA, Vietnam

Research themes: citizenship and governance; technology enhanced learning; international development; health and wellbeing; space.

Research repository does not allow searches by geography.

- **Queen Margaret University (Edinburgh):** <https://www.qmu.ac.uk/>

Founded in 1875, gained university status in 2007. Academic staff: 220.

Administrative staff: 200. Students: 5,225 (35 French and 1,115 non-UK). Schools: arts, social sciences and management (business school; media communications and performing arts; psychology, sociology and education); health sciences (dietetics, nutrition & biological sciences, physiotherapy, podiatry & radiography; nursing; occupational therapy and arts therapy; speech and hearing sciences; the institute for global health & development). Transnational Education Partners: Canada, Greece, Egypt, India, Nepal, Singapore, UK.

France is not mentioned within showcased international collaborations for Europe (countries listed: Tunisia, Ireland, Netherlands, Germany, Belgium, Spain, Switzerland, Sweden, Greece, Norway, Austria, Slovenia, Latvia). Research repository not searchable by geography.

Erasmus + destinations in France: Ecole Supérieure de Commerce

- **Robert Gordon University (Aberdeen):** <https://www.rgu.ac.uk/>

Founded in 1750, gained university status in 1992. Academic staff: 515.

Administrative staff: 670. Students: 12,335 (70 French and 2,025 non-UK). Schools: Aberdeen business school; applied social studies; computing; creative & cultural business; engineering; Gray's school of art; health sciences; law; nursing, midwifery & paramedic practice; pharmacy & life sciences; Scott Sutherland school of architecture & build environment. Affiliate: RGU Orkney. No known Transnational Education Partners.

Research repository is not searchable by geography.

Erasmus + destinations in France: Université d'Angers, Brest Business School, Université Clermont Auvergne, Ecole Supérieure d'Art de Clermont, Clermont Business School, ENSA Grenoble, ENSAP Lille, Université de Limoges, Université Catholique de Lyon, Université Claude Bernard Lyon 1, Kedge Business School, ESCE, ENSA Paris-La Villette, IFSI Paris, ESADSE, Toulouse Business School, Université Paul Sabatier.

- **Royal Conservatoire of Scotland (Glasgow):** <https://www.rcs.ac.uk/>

Founded in 1947, gained degree-awarding powers in 1993. Academic staff: 120. Administrative staff: 165. Students: 1,280 (French 15 and 415 non-UK). Departments: Academic innovation; Research and Knowledge Exchange; school of dance, drama, production and film; school of music. No known affiliates or Transnational Education Partner.

Research repository is not searchable by geography.

Erasmus + destinations in France: CNSMD, CNSAD.

- **SRUC Scotland's Rural College** <https://www.sruc.ac.uk/>

Founded in 2012 through merger of land-based colleges of Barony (1953), Elnwood (1972) and the Scottish Agricultural College (1899). Academic staff: 365. Administrative staff: 655. Students: 1,760 (French 5 and 80 non-UK). Campuses: Aberdeen, Ayr, Cupar; Barony in Dumfries & Galloway; Edinburgh and Oatridge in West Lothian. Subject areas: agriculture; animal care; business; professional cookery; animal sciences; biological sciences; conservation; engineering; environment; equine & horse care; forestry & arboriculture; garden design; golf; horticulture; landscaping; poultry; sustainability; rural & estate skills; agriculture and renewable technology; veterinary nursing. Affiliates: SAC Consulting (advisory services to rural and agricultural sector, 23 offices across Scotland); veterinary services. No Transnational Education Partner identified.

Research themes: animal & veterinary sciences (behaviour & welfare; breeding & genomics; biomarkers laboratory; diseases; integrative animal sciences; monogastric science; pig research centre); crop & soils systems (crop protection and applied practice; soil science & systems; visual evaluation of soil structure); future farming systems (beef & sheep research centre; carbon management centre; dairy research centre; epidemiology research unity; farm management research; hill & mountain research centre; smarter farming); rural economy, environment and society (behavioural change & innovation; food marketing; policy analysis; land use; sustainable ecosystems); rural policy centre.

France not mentioned within showcased international collaborations. Most papers with French contributors are with INRAE and its different departments. Dale Sandercock is one of the most prolific authors working with French partners on animal pain.

Erasmus + destinations in France: AgroSup Dijon, Université Sorbonne Paris Nord, ENSA Toulouse

- **The University of Edinburgh** <https://www.ed.ac.uk/>

Founded in 1582, gained university status in 1582. Academic staff: 4,535. Administrative staff: 5,945. Students: 34,275 (250 French and 13,185 non-UK). Schools: college of arts, humanities & social sciences (business; divinity; economics; college of art; Moray House school of education and sport; health in social science; history, classics and archaeology; law; literatures, languages and culture; philosophy, psychology and language sciences; social and political sciences; centre for open learning); college of medicine & veterinary medicine (Edinburgh medical school; Royal (Dick) school of veterinary studies); college of science & engineering (biological sciences; chemistry; engineering; geosciences; informatics; mathematics; physics and astronomy). Subsidiaries: Edinburgh Innovations (innovation management service); Edinburgh University Press; Edinburgh Technology Fund Limited (investment activities); Honk Kong Centre for Carbon Innovation; Old College Capital (investment activities); UoE Accommodation Limited; UoE HPCx Limited (high-performance computing through ARCHER); UoE Estates Services Company Limited); FinTech Scotland (financial technology centre).

The University of Edinburgh has a Dedicated international development team and website (<https://www.ed.ac.uk/global>), and a research institute focusing on Europe and the European Union (<http://www.europa.ed.ac.uk/>).

Research repository is not searchable by geography.

Erasmus + destinations in France: ESCE, Sciences Po, HEAR, ESSEC, HEC, Kedge Business School, Université Paris Sciences & Lettres, Neoma Business School, ENSCL Lille, Université Grenoble Alpes, Université de Haute-Alsace, ENSAD.

Transnational Education Partners: Africa (Mastercard Foundation); China (Joint Institute with Zhejiang University; Low Carbon College in Shanghai) are the two showcased on the public website. In addition, UoE has over 270 agreements with other institutions, of which 210 are with foreign institutions including 40 with China, 24 with India and 22 with USA.

The University of Edinburgh is a member of several university networks that include French HEIs:

- [Una Europa](#), an alliance of 8 leading universities, along with Université Paris 1 Panthéon-Sorbonne. Projects include joints degrees as well as research around the themes of cultural heritage; data science and artificial intelligence; European studies; one health; sustainability.
- The [Coimbra Group](#), an association of long established European multidisciplinary universities of high international standard launched in 1985 (French members: Université de Poitiers, Université Paul Valery Montpellier and Université de Montpellier).

- [LERU](#), the League of European Research Universities, alongside Sorbonne Université, Université Paris-Saclay and Université De Strasbourg.
- [UNICA](#), an institutional network of Universities from the capitals of Europe, with French partners Université Sorbonne Nouvelle, Université Paris Sciences & Lettres and Sorbonne Université.

- **University of Aberdeen** <https://www.abdn.ac.uk/>

Founded in 1495, gained university status in 1495. Academic staff: 1,165. Administrative staff: 1,425. Students: 14,775(French and non-UK). Schools: business school; divinity, history and philosophy; education; language, literature, music and visual culture; law; social science; biological sciences; medicine, medical sciences and nutrition; psychology; engineering; geosciences; natural and computing sciences; postgraduate research school. Affiliates and Transnational Education Partners: AFG College, with dedicated campus in construction (Qatar); Africa; Australia (alliance with Curtin university).

Research themes: energy transition; social inclusion & cultural diversity; environment and biodiversity; data and artificial intelligence; health, nutrition and wellbeing.

France is mentioned in one of the showcased research projects, [HABIT](#), an instrument developed by the department of planetary science for mars missions. The team works with collaborators from Thales, the ESA Headquarters and CNRS. Other notable researchers collaborating with France:

- Pete Smith: greenhouse gas/carbon modelling and mitigation, director of Scotland's Climate Change Centre of Expertise, working with colleagues at INRAE, CNRS, AgroParisTech.
- Heather Wallace: biochemistry and pharmaceutical research in cancer therapy, toxicology evaluator for the European Commission, publishing with colleagues at INRAE and Université de Toulouse.

Erasmus + destinations in [France](#): Université Grenoble Alpes, Brest Business School, Université de Pau et des Pays de l'Adour, Université de Bordeaux, Sorbonne Université, Université de Rennes 1, Université Paris II Panthéon-Assis, Université De Picardie Jules Verne, Université Catholique De L'Ouest, Université Bordeaux Montaigne, Université Savoie Mont Blanc, Université Rennes 2, Université de Haute-Alsace, Université de la Réunion, Sciences Po Lille, Sciences Po Lyon, Sciences Po Rennes, Université Lumière Lyon 2, Université de Strasbourg, INSA Lyon.

University of Aberdeen is part of the [Aurora](#) universities network, launched in 2016, alongside Université Grenoble Alpes.



- **University of Dundee** <https://www.dundee.ac.uk/>

Founded in 1881, gained university status in 1967. Academic staff: 1,520.

Administrative staff: 1,595. Students: 15,915 (70 French and 2,615 non-UK).

Schools: Duncan of Jordanstone College of Art & Design; business; dentistry; education and social work; health sciences; humanities; life sciences; medicine; science and engineering; social sciences. Affiliates: International College Dundee. Transnational Education partners: Australia, China, Norway, Germany, Malaysia, Singapore, India, Thailand, Italy, France (articulation agreements with University of Toulouse Capitole 1, Université de Cergy-Pontoise, Institut National des Sciences Appliquées).

France is mentioned in one of the showcased research streams: CERN partnership working on upgrading the Large Hadron Collider. Other notable researchers with many connections with France:

- Chim Lang: cardiology and clinical pharmacology, with colleagues at Université de Lorraine and CHU de Nancy.
- Sysan Willy: biological chemistry and drug discovery, with Université of Toulouse, Limoges, Aix-Marseille.

Erasmus+ destinations in France: ENSA Limoges, Université de Pau et des Pays de l'Adour, Université Clermont Auvergne, Beaux Arts Nantes, ENSA Normandie, Université Toulouse 1 Capitole, Université Paris-Saclay, Cy Cergy Paris Université, Université Grenoble Alpes, EESAB, TALM, Sup'Biotech, Université Catholique De L'Ouest, ULCO, ENSAPV, Sciences Po Toulouse

- **University of Glasgow** <https://www.gla.ac.uk>

Founded in 1451, gained university status in 1451. Academic staff: 3,235.

Administrative staff: 3,105. Students: 30,805 (275 French and 9,685 non-UK).

Schools: Adam Smith business school; dental school; chemistry; computing science; critical studies; culture & creative arts; education; James Watt school of engineering; geographical & earth sciences; humanities; interdisciplinary studies; law; life sciences; mathematics & statistics; medicine, dentistry & nursing; modern language & cultures; physics & astronomy; psychology; social & political sciences; veterinary medicine. Affiliates and Transnational partners Netherlands; Germany, Canada, USA, Australia; Malaysia, China. France is mentioned as an exchange destination (several universities & schools are listed), with a joint Master degree at Aix-Marseille under Erasmus.

Research themes: precision medicine & chronic diseases; cultural & creative economies; future life; one health; addressing inequalities; the nano & quantum world.

No highlighted research mentions French partners. Research repository is not searchable by geography.

Erasmus+ destinations in France: Audencia, Université de Strasbourg, ENSMA, Université de Toulouse, Université Catholique de Lille, SKEMA Business School, Université de Lille, CPE Lyon, Université Grenoble Alpes, ENSCL Lille, Sigma Clermont, Université Paris II Panthéon-Assas, Université Lumière Lyon 2, ISIT Paris, Université Sorbonne Nouvelle, Université de Caen Normandie, Université Toulouse Jean Jaurès, Ecole du Louvre, IESA, Université d'Aix Marseille, Sciences Po Lyon, Sciences Po, Université Clermont Auvergne, Université Savoie Mont Blanc, Institut Polytechnique De Grenoble, Université Nice Sophia Antipolis, Université Paris-Saclay, ENSAI.

Offers a postgraduate research programme (PhD, MLitt, MPhil, MRes) in French within the school of modern languages and cultures. Leads on an Erasmus Mundus Master in South European studies with Aix-Marseille as well as partners in Spain, Greece and Italy.

The University of Glasgow is a founding member of The Guild of European Research-Intensive Universities (French member: Université de Paris) and CIVIS, a European Civic University (with Université d'Aix-Marseille).

- **University of St Andrews** <https://www.st-andrews.ac.uk/>

Founded in 1410, gained university status in 1413. Academic staff: 1,195. Administrative staff: 1,370. Students: 10,570 (95 French and 4,820 non-UK). Schools: faculty of arts (schools of art history; classics; economics and finance; English; history; international relations; management; modern languages; philosophical, anthropological and film studies; music centre); divinity (school of divinity); medicine (school of medicine); science (schools of biology; chemistry; computer science; earth and environment sciences; geography and sustainable development; mathematics and statistics; physics and astronomy; psychology and neuroscience). Affiliates: International Education Institute. Transnational partners: China, France (Université de Lorraine Nancy – MSc in Advanced Systems Dependability; Université Charles-de-Gaulle Lille, Paris Ouest Nanterre La Défense and Sorbonne Nouvelle Paris – International Master in Audio-visual and cinema studies), Germany, Italy, Ireland, Russia, USA.

Research repository is not searchable by geography.

Erasmus+ destinations in France: ENSCL Lille, Sciences Po, Sciences Po Strasbourg, Sorbonne Université, Université de Perpignan, Université Toulouse Jean Jaurès, Ecole du Louvre, Université Paul Valéry Montpellier

Offers a postgraduate research programme in French (MLitt or PhD) within the school of language, literature, film, and visual culture.

St Andrews is a member of the [Europeaum](#), a network of 17 leading European Universities, along with Université Paris | Pantheon-Sorbonne.

There are two Collaborative Research Grants programme currently active, aimed at fostering international research, with Germany and USA. The university also funds Global Fellowships for scholars in established academic positions to visit (no French hosts in 2019-20).

- **University of Stirling** <https://www.stir.ac.uk/>

Founded in 1967, gained university status in 1967. Academic staff: 715. Administrative staff: 865. Students: 12,500 (70 French and 2,830 non-UK). Schools: faculties of arts and humanities (communications, media and culture; history and politics; law and philosophy; literature and languages); health sciences and sport; natural sciences (aquaculture; biology and environmental sciences; computing science and mathematics; psychology); social sciences; Stirling management school. Affiliates: Innovation Park; university of Stirling Venues; INTO study centre. Transnational partners: Brazil, [France](#) (EM Strasbourg - integrated masters), Indonesia, Japan, Germany, Oman, Singapore, Spain, United Arab Emirates, Vietnam

Research themes: cultures, communities and society; global security and resilience; living well. Research programmes: ageing and dementia; being connected; cultural heritage; contextual learning in humans and machines; digital society and culture; environmental change; extremes in science and society; health and behaviour; global food security; home, housing and community; human security, conflict and cooperation; mobile cognition.

Research repository is not searchable by geography.

Notable researchers with link to France:

- Christina Johnston: senior lecturer in French (completed PhD in French at University of Glasgow), contemporary cinema and social politics in France.
- Fiona Barclay: senior lecturer in French (as above), working on postcolonial France and North African immigration

Erasmus+ destinations in France: ESSEC, Université de Limoges, Université de Lorraine, EM Normandie, Sciences Po, Université de Perpignan, EM Strasbourg, Université de Tours, Université Catholique De L'Ouest, Université Catholique de Lyon, Université Clermont Auvergne, Université d'Aix Marseille.

- **University of Strathclyde** <https://www.strath.ac.uk/>

Founded in 1796, gained university status in 1964. 1,650. Administrative staff: 1,930. Students: 22,640 (115 French and 4,155 non-UK). Schools: faculties of

engineering (architecture; biomedical; chemical & process; civil & environmental; design, manufacturing & engineering management; electronic & electrical; mechanical & aerospace; naval architecture, ocean & marine); science (computer & information sciences; mathematics & statistics; physics; pure & applied chemistry; institute of pharmacy and biomedical sciences); humanities and social sciences (centre for lifelong learning; education; government & public policy; humanities; law; psychological sciences & health; social work & social policy); business school. Affiliates: International Study Centre (pathway programmes), MBA Centres in Bahrain, Greece, Malaysia, Oman, Singapore, Switzerland, UAE. Transnational partners: China, Egypt, France (Toulouse Business School – MSc business & management, global master's in industrial management), Germany, Greece, India, Italy, Malawi, Malaysia, Norway, Peru, Poland, Saudi Arabia, Singapore, Spain, United Arab Emirates, USA.

Strategic research themes: advanced manufacturing & materials; energy; health & wellbeing; innovation & entrepreneurship; measurement science & enabling technologies; ocean, air & space; society & policy.

No showcased research mentions French connections, but some scholars have regular collaboration with France:

- Victorita Dolean Maini: mathematics algorithms, recipient of Prix Bull-Joseph Fourier (rewards R&D in computer simulation) in 2015 with colleagues from CNRS
- Bernhard Hidding: physics, laser & plasma beams, worked with Paris Saclay & others.
- Efren Guillo Sansano: electronic and electrical engineering with Grenoble
- Atilla Incecik, naval engineering & offshore systems with Université Paris-Est

Erasmus+ destinations in France : ENSAP Lille, ENSA Paris-La Villette, ENSASE, Université de Lorraine, Université Paris Sciences & Lettres, Université de Pau et des Pays de l'Adour, Université Paul Sabatier, Université de Nantes, CPE Lyon, Sorbonne Université, IMT Mines Ales, Université Grenoble Alpes, INSA Rennes, Institut Polytechnique De Grenoble, Université Bourgogne Franche Comte, Université De Picardie Jules Verne, Université Catholique De L'Ouest, Université de Tours, Université Paris 8 Vincennes Saint Denis, Université d'Angers, Université Lyon 3 Jean Moulin, Université d'Aix Marseille, Université Toulouse 1 Capitole, INSA Lyon, UTT, Université Claude Bernard Lyon 1, Université Nice Sophia Antipolis, Sciences Po Lyon, Sciences Po Aix, Sciences Po

Member of ISEP (International Student Exchange Programme), non-profit organisation based in the US and making study abroad accessible to all. French members are: Aix-Marseille, INSA Lyon, IEP Rennes, Uni of Minnesota Montpellier,

Le Havre Normandie, Paul-Valery, Savoie Mont-Blanc, Angers, Caen, Franche-Comté, Lille, Nantes, Picardie, Réunion.

• **University of the Highlands and Islands** <https://www.uhi.ac.uk/en/>

Founded and gained university status in 2001. Academic staff: 85. Administrative staff: 215. Students: 9,525 (20 French and 335 non-UK). Based on 13 colleges and research centres (plus 70 local learning centres): Argyll, Inverness, Lews Castle, Moray, North Highland, Orkney, Perth, Shetland, West Highland, Highland theological colleges; NAFC marine centre, Sabhal Mòr Ostai, Scottish Association for Marine Science. No known transnational partners.

Research institutes: health & innovation (biomedical sciences; rural health & wellbeing; nursing & midwifery; healthcare innovation); society, identity, landscape and knowledge (cultural and natural landscapes/ecosystems; identity and heritage; sustaining communities; pedagogy; Northern studies; agronomy); humanities and arts (archaeology; history; creative industries; literature; language sciences; Gaelic language and culture); marine, environmental science and engineering (marine ecology; aquaculture; energy; terrestrial science; physical oceanography; technology; environmental studies).

No showcased research mentions French connections, but some scholars have regular collaboration with France:

- Leslie King (visiting professor in Environment and Sustainability): participated in Paris COP21 and engaged with communities to address challenge of Paris agreement.
- Claire Gachon (ENS graduate): molecular phycoecology & seaweed pathogens, with Museum National d'Histoire Naturelle amongst other collaborations

Erasmus+ destinations in France: Université de Strasbourg, Université Jean Monnet Saint-Etienne, Université Grenoble Alpes

Offers an Erasmus Mundus Master degree in aquaculture, environment and society lead by the Universities of Crete, in partnership with Nantes (see <https://www.emm-aces.org/>).

**University of the West of Scotland (Paisley)** <https://www.uws.ac.uk/>

Founded in 1836, gained university status in 2007. Academic staff: 590. Administrative staff: 670. Students: 17,025 (160 French and 1,985 non-UK). Schools: business & creative industries; computing, engineering & physical science; education & social sciences; health & life sciences. Campuses: Ayr, Dumfries, Lanarkshire, Paisley, London. Transnational partners: Cyprus, France (ECORIS Chambery, ICADEMIE Aix-en-Provence, IFC Avignon, TALIS Bordeaux – all part of the UNIS Group – MBA programme), India, Italy, Ireland, Malaysia, Mauritius, Russia, Seychelles, Singapore, Sri Lanka, United Arab Emirates.

Research themes: health, society and sustainability. Subject areas: business & enterprise; computing; education; engineering; health; media & culture; science; social sciences; sport & exercise.

No showcased research mentions French connections, but some scholars have regular collaboration with France:

- Marcus Scheck: nuclear physics & spectrometry, with the Grand Accélérateur National D'Ions Lourds amongst others
- Severin Guillard: research fellow, working with Paris-Est Creteil and others on music and hip-hop.

Erasmus+ destinations in France: ECORIS, ICADEMIE, IFC, TALIS, IMT Lille, INSA Rennes, Université d'Aix Marseille, Université de Bretagne Occidentale, Université de Haute-Alsace, Université de Lorraine, Université de Perpignan, Université de Montpellier, Université d'Angers, Université de Caen Normandie, Université Jean Monnet Saint-Etienne, Université Paris Est Marne-la-Valle, Université Claude Bernard Lyon 1, Université de Toulon, Université de Lille, Université Le Havre Normandie, Université Grenoble Alpes, Université Savoie Mont Blanc, Université de Reims Champagne-Ardenne, Université de Nantes, IPAC.

International programme: MSc Quality Management (International) in partnership with Université of Angers.

## Annex IV – French public research institutes profiles

- **CNRS** <http://www.cnrs.fr/>

Founded in 1939, multidisciplinary research organisation with over 30,000 staff. It has a presence in most universities and maintains over 1100 research units in France and abroad. Its scientific teams are split in 10 Institutes (similar to UKRI's research committees) organised around disciplines: biological sciences; chemistry; ecology and environment; humanities and social sciences; engineering and system sciences; mathematical sciences and their interactions; physics; information sciences and technologies; nuclear and particle physics; earth sciences and astronomy.

The CNRS is a major player in international science, with 60% of its publications involving at least one foreign laboratory. The top 3 partners are the US, Germany and the UK. The organisation has set up structure cooperation mechanisms, including 80 international research laboratories located within partner universities (in the UK, the only ones currently active are at the Imperial College London and the Maison Francaise d'Oxford).

- **CEA** <http://www.cea.fr/>

Atomic and Alternative Energy Commission, accounting for 14% of public research funding. Founded in 1945, it employs 16.000 staff around 4 missions: defense; nuclear energy; technological research for industry; basic research. It operates 9 centres in France and participates in the 5 national alliances. Welcomes 800 foreign scientists and engineers per year to fulfil its international policy and research agenda.

- **BRGM** <https://www.brgm.fr/>

National geological service, working on applications of earth sciences, management of resources and risks on and below the earth's surface. Founded in 1959, its network of 28 regional offices employs 700 engineers and researchers. Active in higher education through ENAG, the national school of geoscience applications.

- **CIRAD** <https://www.cirad.fr/>

Centre for International Cooperation on Agricultural Research for Development, working to promote sustainable agriculture adapted to climate change. It was founded in 1984 and employs 1,650 staff including 800 researchers in 30 research unites and 13 regional directories. The organisation supports agricultural

development in countries of the global South and is organised in 3 departments: biological systems; performance of production and systems; environment and society. It collaborates directly with over 100 pays in Africa, Asia and South America.

- **CNES** <https://cnes.fr/>

National Centre for Space Research, responsible for developing France's space and leading contributor to the European Space Agency. Founded in 1961, it employs over 2,300 staff across 4 centres (including the launching centre in French Guyana). Main scientific missions: access to space; earth, environment and climate; consumer and mass-market applications; science and innovation; national security applications.

- **IFÉ** <http://ife.ens-lyon.fr/ife>

French Institute of Education. Founded in 2011 and integrated within the École Normale Supérieure of Lyon. It conducts research and training (3 activities: interface & incubator, training, mediation & expertise) across 3 priorities: education professions and territories; teaching in higher education; learning and didactics.

- **IFPEN** <https://www.ifpenergiesnouvelles.fr/>

French Institute of Petroleum and Energies Nouvelles, research and training organisations in the fields of energy, transportation, the environment, basic research and innovation-oriented research. Founded in 1944, it employs over 1,600 staff and is over 50% funded by industrial partners. Their four research themes are: sustainable mobility; renewable energies; responsible oil and gas; climate, environment and circular economy. The institute works with over 100 international partners in projects consortiums or bilateral contracts.

- **IFREMER** <https://wwz.ifremer.fr/>

French Research Institute for Exploitation of the Sea. Founded in 1984, it employs over 1500 researchers, engineers and technicians. Operates in 5 centres, one for each of the country's coast, and 26 sites in metropolitan and overseas France. Its research focuses on the effects of climate change, marine biodiversity, prevention of pollution and sea products quality.

- **INED** <https://www.ined.fr/>

National Institute of Demographic Research. Founded in 1945, it employs 250 people across 11 research units. Its missions are the study of populations in France and abroad, knowledge dissemination and training. Given its remit on the study of



worldwide population, it is active internationally including with visiting scholar programmes and partnership agreements.

- **INERIS** <https://www.ineris.fr/>

National Institute on the Industrial Environment and Risk Management. Founded in 1990, it employs 600 staff in 4 locations. Its mission is to assess and prevent acute and chronic risk to humans and their environment. Scientific priorities: accidental risk; chronic risks; ground and underground risks.

- **INRAE** <https://www.inrae.fr/>

National Research Institute for Agriculture and Environment, formed in January 2020 by the merger of INRA, the National Institute for Agricultural Research, and IRSTEA, the National Research Institute of Science and Technology for the Environment and Agriculture. The institutes carries out research on agriculture, food and the environment around six major themes: climate change and risks; agroecology; biodiversity; food & global health; bioeconomy; society and regional strategies. It employs 11,500 staff across 18 centres. Internationally, INRAE is collaborating with several countries on associated laboratories and research networks and is also very active at the European level.

- **INRIA** <https://www.inria.fr/>

National institute for research in computer science and innovation. Founded in 1967, it now employs over 3,500 researchers and engineers across 9 research centres, with close relationships with large industrial groups such as Total or Microsoft. Its scientific work is divided into 9 research areas: algorithms & quantum computing; high performance computing; digital education; artificial intelligence; software; frugal digital; digital health; data science; digital security.

- **INSERM** <https://www.inserm.fr/>

National institute for health and medical research, only public research body in France devoted entirely to human health. It was founded in 1964 and now employs over 13,000 staff in universities and hospitals, across 330 sites in France and abroad. Made up of 9 thematic institutes: molecular and structural basis of life sciences; cell biology, development and evolution; genetics, genomics and bioinformatics; neurosciences, cognitive sciences, neurology, psychiatry; cancer; immunology, inflammation, infectiology and microbiology; physiopathology, metabolism, nutrition; public health; health technologies. INSERM has over 6,000

cooperative arrangements with foreign partners, more than half of which are in Europe, although the main partner remains the US with 20%.

- **IFSTTAR (Université Gustave Eiffel)** <http://www.ifsttar.fr/>

French institute for the science and technology of transportation, land use and urban networks. Became the Université Gustave Eiffel by merger with Université Paris-Est Marne-la-Vallee in 2020, it employs just over 1,000 staff across 6 sites. Created in 2011 by the merger of the French National Institute for transport and Safety Research and the French Central Laboratory of Roads and Bridges. It carries out targeted research and consulting services, with five departments: materials and structures; geotechnical engineering, environment, natural hazards and earth sciences; components and systems; transport, health and safety; planning, mobilities and environment. IFSTTAR is engaged in many European and international partnerships, with a network of over 600 European partners.

- **IRD** <https://www.ird.fr/>

Development Research Institute. Conducts research between people and their environment, with a southern focus. Created in 1944, it operates 36 representative offices abroad and employs 7,000 people. It is active in more than 50 countries in Africa, Asia, Latin America and oversea French territories. Its research units are organised in 5 departments: continent internal and surface dynamics; ecology, biodiversity and functioning of continental ecosystems; oceans, climates and resources; health and society; societies and globalisation.

- **IRSN** <https://www.irsn.fr/>

Institute on radiation protection and nuclear safety, research and expertise on nuclear and radiological risks. Established in 2002, it employs nearly 1,800 staff across 11 sites in France grouped under protection of human being; environment and nuclear safety. IRSN is a recognised “Technical Safety Organisation” operating services in 39 countries. They also participate in international research programmes.

- **ONERA** <https://www.onera.fr/>

National Aerospace Research Office. Founded in 1946, it now employs nearly 2,000 people. Leader in aeronautical, space and defence research, with 25% of its

work under European cooperation. Organised in 7 departments: basic & experimental aerodynamics; electromagnetism & radar; space environments; physical measurements; composite materials & structures; optics; planning & synthesis.



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The Scottish Government  
St Andrew's House  
Edinburgh  
EH1 3DG

ISBN: 978-1-80201-053-4

Published by the Scottish Government, June 2021