資料２
科学技術・学術審議会
基礎研究振興部会（第19回）
令和7年9月5日

英国における研究環境について

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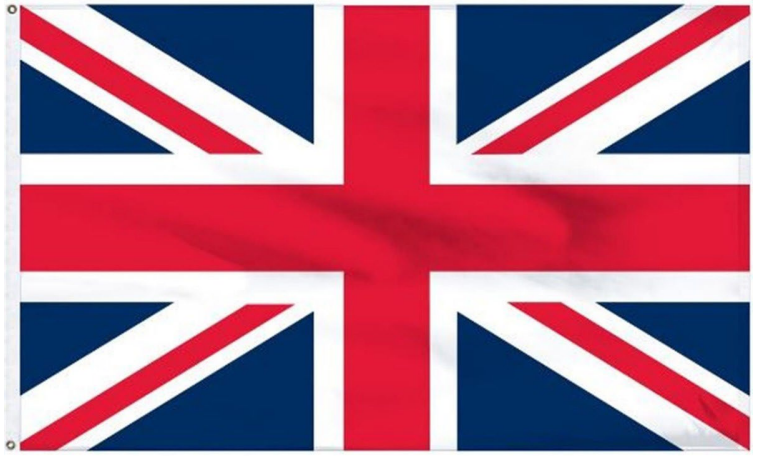


Mainly taken from: PANORAMIC VIEW REPORT, Science, Technology and Innovation, Policy Trends in Major Countries and Regions (2024) CRDS-FY2023-FR-01, CRDS, JST, https://www.jst.go.jp/crds/report/CRDS-FY2023-FR-01.html

- **英国における研究環境について**（構造、評価）
- **英国におけるプロジェクト**
- **英国における基礎研究の振興**

英国における研究環境について

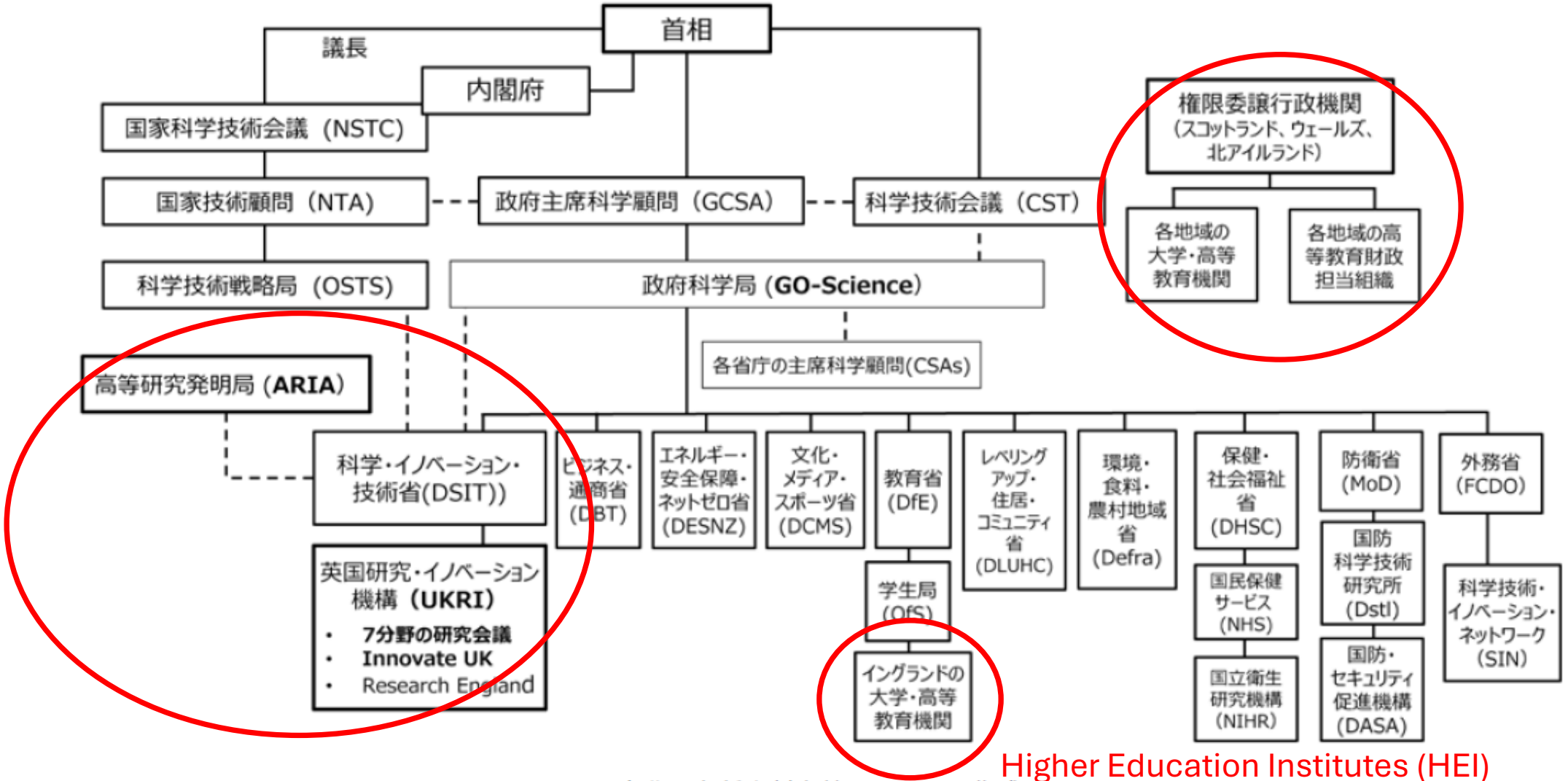
主要国の研究開発費と対GDP比（2021）

国・地域名	研究開発費（億ドル）	対GDP比（%）
米国	8,060	3.46
中国	6,676	2.43
EU27ヶ国	4,741	2.16
ドイツ	1,537	3.13
フランス	772	2.22
英国	978	2.91
日本	1,774	3.30

出典：OECD, Main Science and Technology Indicatorsのデータをもとに CRDS 作成; PANORAMIC VIEW REPORT, Science, Technology and Innovation, Policy Trends in Major Countries and Regions (2024), CRDS, JST [研究開発の俯瞰報告書,主要国・地域の科学技術・イノベーション政策動向（2024年) CRDS]

- 官民合わせた研究開発投資総額は増加傾向にあるが、金額自体はそれほど多くない。
- 研究開発費の対GDP比は2012年以降は漸増傾向。
- 政府研究開発費のうち、社会的・経済的目的別割合（2021年度）では、一般的な知識増強が全体の35％程度、保健が 約21％、防衛が13％程度。
- 研究者数は緩やかではあるが近年微増している。
- 2023年3月 科学技術枠組み（Science and Technology Framework）将来の革新的 5 技術分野（量子・AI・工学的 生物学・テレコム・半導体）振興へ3.7億ポンド以上の資金を投じ、10年間で英国を世界の科学技術の最前線に位置付けるよう、政府を挙げて取り組む計画

UK Structure



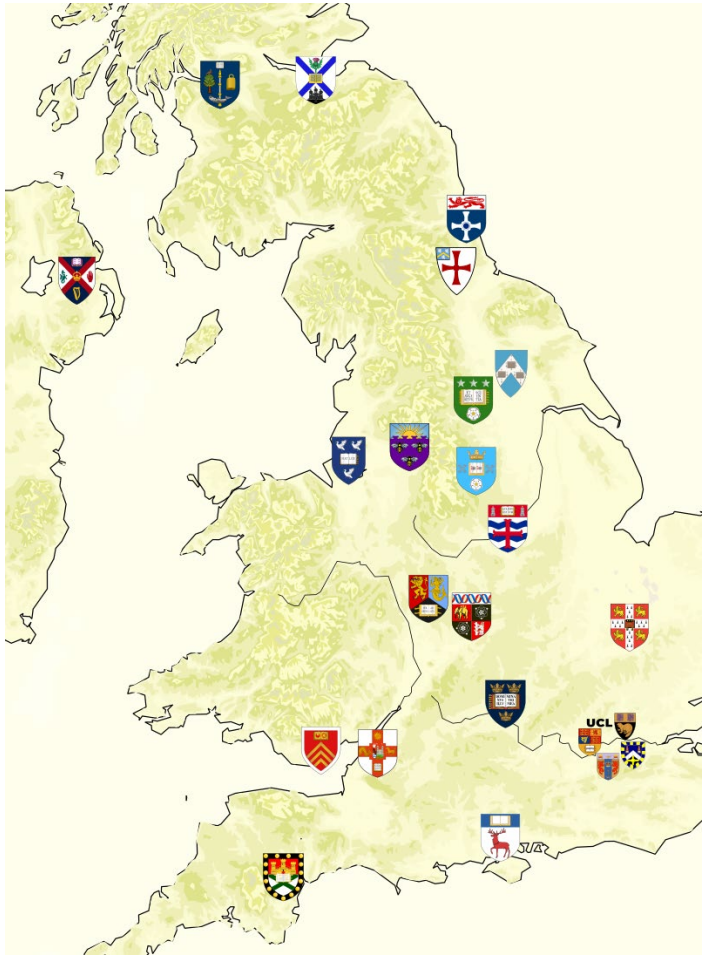
Higher Education Institutes (HEI)

出典：各種資料を基にCRDSで作成

PANORAMIC VIEW REPORT, Science, Technology and Innovation, Policy Trends in Major Countries and Regions (2024), CRDS, JST

Higher Education Institutes (HEI)

- Over 160 universities (college, polytechnic)
- Has subsidy of tuition fees from the government
- Examples: Oxford, Cambridge, UCL, Imperial, Edinburgh, etc.
- Russell Group – self-selected association of 24 public research universities.
- HEI participate in Research Excellence Framework (REF), the ranking of this will influence the allocation of quality-related (QR funding) funding from the government.



Five private universities where the government does not subsidies the tuition fees.

Research Centres

Receives funding directly from each council, but can also apply to all grant calls

Medical Research Council

funds research at the forefront of science to prevent illness, develop therapies and improve human health.

Research Centres
Laboratory of Molecular Biology
Laboratory of Medical Sciences
Health Data Research UK
UK Dementia Research Institute
The Francis Crick Institute

Centres and Units in:
Infections and Immunity Board
Molecular and Cellular Medicine Board
Neurosciences and Mental Health Board
Population and Systems Medicine Board

Biotechnology and Biological Sciences Research Council

invests to push back the frontiers of biology and deliver a healthy, prosperous and sustainable future

Research Centres
Babraham Institute – advancing research for lifelong health
Earlham Institute – decoding living systems
Institute of Biological, Environmental and Rural Sciences – breeding resilient crops
John Innes Centre – exploring plant and microbial diversity
The Pirbright Institute – controlling viral diseases
Quadram Institute – promoting health through food and microbes
The Roslin Institute – pioneering animal bioscience
Rothamsted Research – connecting lab to field to farm

Natural Environment Research Council

driving force of investment in environmental science.

Research Centres
British Antarctic Survey
British Geological Survey
National Centre for Atmospheric Science
National Centre for Earth Observation
National Oceanography Centre
UK Centre for Ecology &Hydrology

https://www.ukri.org/

Science funding

- 高等教育機関への研究資金は、基盤的経費に相当するブロック・グラントと競争的研究資金の2つの流れがあり、「デュアル・サポート・システム」と呼ばれる

- ブロック・グラントの 配分額は、2011年に新設された評価制度である研究卓越性枠組（Research Excellence Framework：REF）に基づいて決定される。

➢ REF2021の評価項目（相対的比重):「研究成果（60％）」、「研究のインパクト（25％）」、「研究環境（15％）」

「研究のインパクト」:研究が学術以外の「経 済、社会、文化、公共政策やサービス、国民の健康、環境や生活の質向上」に与えた影響の大きさを測定 するものである。

➢ 2023 年6月、次回2028 年の実施に向けて、新たな評価の構想が発表された。国による評 価重点の変化として、

ⅰ）個人の業績よりも、健全・動的・包摂的な研究への組織・分野の貢献を重視し、

ⅱ）研究や研究課程への広範な貢献 (IMPACT)を重視する点を挙げている。

- 英国における研究環境について
- **英国におけるプロジェクト**（競争的研究費や研究者に対する評価・審査の方法）
- 英国における基礎研究の振興

Science funding route 1a:

UK government

DSIT: Department of Science Innovation and Technology

Advanced Research + Invention Agency ARIA

2023年、ビジネス・エネルギー・産業戦 略省（BEIS）とデジタル・文化・メディア・スポーツ省（DCMS）の科学・技術・イノベーション関連部 門を統合して科学・イノベーション・技術 省（ Department of Science Innovation and Technology, DSIT）を設置した。

9 UK Research Councils

- 2018年4月に分野別の7つのresearch council、Innovate UK, Research Englandという9つの資金配分機関を、英国研究・イノベーション機構（UKRI）という一つの法人組織にまとめた. 傘下機関は、研究プログラムやプロジェクト実施について自主・自律の裁量権を有し、UKRIや所管　　省庁から干渉を受けず に、措置された予算を執行する.
- UKRIでは各機関の独立性と柔軟性を最大限に活かし、研究分野間の連携 強化、学際的研究分野への対応、 さらには基礎研究成果をイノベーション創出につなげるファンディングに重点を置いている.

Medical Research Council

Natural Environment Research Council

Innovate UK
UK's national innovation agency supporting business-led innovation in all sectors, technologies and UK regions.

Biotechnology and Biological Sciences Research Council

Economic and Social Research Council
economic, social, behavioural and human data science.

Research England
Supports English higher education providers, to create and sustain the conditions for a healthy and dynamic research and knowledge exchange system in the higher education sector.

Engineering and Physical Sciences Research Council
creates knowledge in engineering and physical sciences for UK capability to benefit society and the economy.

Arts and Humanities Research Council
research across the whole range of the arts and humanities.

Science and Technology Facilities Council
supports research in astronomy, physics, space science and operates world-class research facilities for the UK.

https://www.ukri.org/

Annual report and accounts 2024 to 2025 https://www.ukri.org/publications/annual-report-and-accounts-2024-to-2025/

Science funding route 1a: Example

Biotechnology and Biological Sciences Research Council

https://www.ukri.org/councils/bbsrc/

The Biotechnology and Biological Sciences Research Council (BBSRC) supports research in areas including:

- Plants
- Microbes
- Animals (including humans)
- Tools and technology underpinning biological research.

This includes support for innovation from bioscience research – for example, in **collaborative programmes of research** that connect academic and industry partners.

We fund investigations on all scales, from molecules, cells and tissues to whole organisms, populations and landscapes.

- BBSRC Standard Research grant – maximum £2M (BBSRC will fund 80% of the full economic cost), duration of this award is up to five years,
- Follow-on Funding (FoF) to bridge the gap between bioscience research and achieving economic and societal benefit.
- Call grants (can be joint with other Research Councils): specific topics or area, standing in for the government to organise the grant application (for example: Transdisciplinary research to tackle antimicrobial resistance—a funding to undertake ambitious transdisciplinary research to tackle antimicrobial resistance (AMR). Co-Funded by Department for Environment, Food and Rural Affairs (Defra) and National Institute for Health and Care Research (NIHR); 国際科学パートナーシップ基金（International Science Partnerships Fund, ISPF)、インド・スイス・南アフリカ・イスラエル, etc と二国間協パートナーシップ
- Fellowships/Personal Grants for researchers at various stages (most are joint with other Research Councils): UKRI Metascience AI early career fellowships; 2025 BBSRC Fellowships scheme; Future Leaders Fellowships: round 10

Science funding route 1a: Example (currently relooking into the assessment process)

BBSRC Standard Research Grant assessment process

Assessment areas: The assessment areas we will use are:

- vision
- approach
- applicant team and capability to deliver
- ethics and responsible research and innovation (RRI)
- resources and cost justification

Expert review: invite experts to review application independently, against the specified criteria for this funding opportunity.

Panel: Following expert review, we will invite experts in the panel (Research Committee A: Animal disease, health and welfare; Research Committee B: Plants, microbes, food and sustainability; Research Committee C: Genes, development and STEM approaches to biology; Research Committee D: Molecules, cells and industrial biotechnology; Research Committee E: Fellowships and other personal awards and providing key mentoring support) to use the evidence provided by reviewers and your applicant response to assess the quality of your application and rank it alongside other applications after which the panel will make a funding recommendation.

Timescale: We aim to complete the assessment process within six months of receiving your application.

Feedback: We will give feedback with the outcome of your application based on a summary of the combined discussions that took place during the discussion period and the meeting itself. Feedback does not include reasons why an application is or isn't funded.

https://www.ukri.org/manage-your-award/reporting-your-projects-outcomes/

Science funding route 1:

Reporting project outcomes

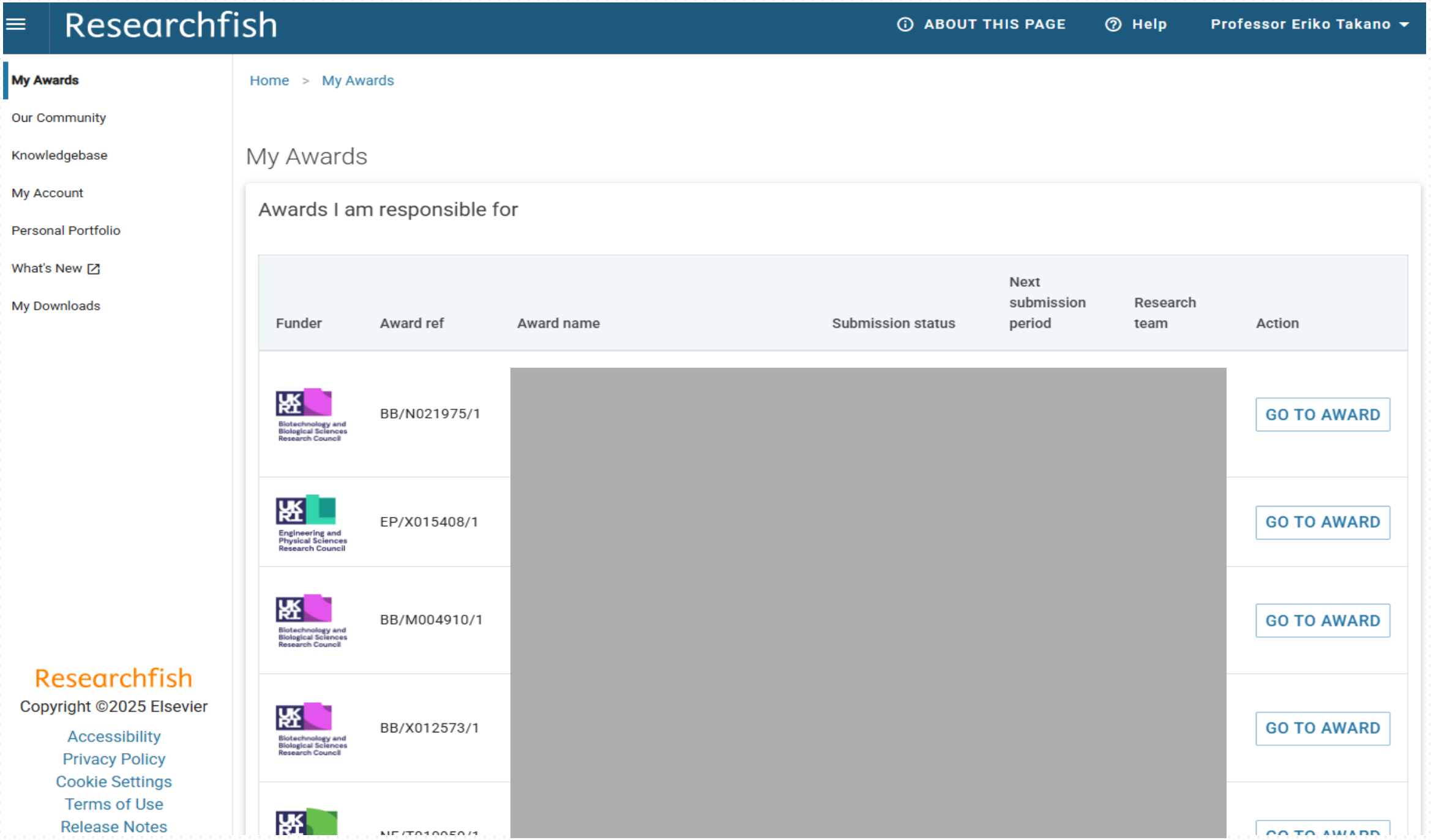
Research grant or fellowship supported by a research council, will need to report your research outcomes through Researchfish.

Evaluating impact
The data help us to evaluate the impact of our investments, helping us learn what works and inform the development of future strategies. The findings of our evaluations are made available to the wider community on our evaluation reports page

Transparency
The data is used to hold us to account and ensure we are transparent about what our funding has delivered. Each year the data is used extensively within our annual report and accounts to demonstrate our progress and achievements for the year.

Analysing outcomes
The data enable analysis of the outcomes and impacts of research across the wider community. To do this, the data is made available on Gateway to Research and in our interactive research output dashboards

https://www.ukri.org/manage-your-award/reporting-your-projects-outcomes/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Professor Eriko Takano
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Submission status
Next submission period
Research team
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Cookie Settings
Terms of Use
Release Notes

My Awards
Our Community
Knowledgebase
My Account
Personal Portfolio
What's New
My Downloads

Publications	12
Collaborations & Partnerships	1
Further Funding	0
Next Destination	3
Engagement Activities	5
Influence on Policy, Practice, Patients & the Public	0
Research Tools & Methods	0
Research Datasets, Databases & Models	3
Intellectual Property & Licensing	0
Medical Products, Interventions & Clinical Trials	0
Artistic & Creative Products	0
Software & Technical Products	0
Spin Outs	0
Awards & Recognition	21
Other Outputs/Outcomes	0
Use of Facilities & Resources	0

Additional Funder Questions

Animal Use	✔
Key Findings	✔
Narrative Impact	✔
Secondments, placements and internships to or from other organisations	✔

Title	Reverse engineering the soil microbiome: detecting, modeling, and optimizing signal impacts on microbiome metabolic functions
Award Reference	NE/T010959/1
Research Organisation	University of Manchester
Principal Investigator/Award Holder	Professor Eriko Takano
Funding Organisation	Natural Environment Research Council
Funding Value	[redacted]
Funding Start Date	[redacted]
Funding End Date	[redacted]
Research organisation sharing	Full Share
Award Type	Research grant (including intramural programme)
Funder Project URL	gtr.ukri.org

DOWNLOAD AWARD AND OUTCOME DATA

Lay Summary

Overview: Our project will provide fundamental insights into the roles of signals in mediating the ecology of soil microbes and suppression of plant diseases. This work establishes a foundation for engineering functional soil microbiomes for precision agriculture. Our team consists of experts in soil ecology, genetic engineering, metabolomics, and community modeling from the UK and USA. Objectives: 1) Develop and test genetic recorder (GR) strains to 'listen and report' on signals in the soil that regulate primary and secondary metabolic

UKRI Natural Environment Research Council

Natural Environment Research Council

Research Team

Name	Role
Eriko Takano	Principal Investigator/Award Holder
Rainer Breitling	Team Member

MANAGE TEAM

ADD DELEGATE OR TEAM MEMBER

Science funding route 1b:

Advanced Research & Invention Agency (ARIA)

https://www.aria.org.uk/

- 2023年1月25日議会の開始命令を受けて正式な設立に至った
- 2025年度まで8億ポンド/5年間, £110 million funded, with an additional £300 million allocated for later in the initial five-year period.
- ARIA 設計には、研究イノベーションに関する英全国の考え方が反映されている
- ARIAは、既存の助成基盤と重複することなく、補完するものである
- ARIAは、ファンディング選択について、省庁の指示を受けない。基金は、独立した裁量と、技術専門家であるプログラム・ディレクター(PD)達の判断に基づいてる
- ARIAは、他のファンディング組織や政府におけるような、何段階にもわたる承認・レビューの対象とならない。アジャイルかつ、効率的であり、独自の組織・方法・手順を実験する権限を付与されている

PD	学術的背景	研究の焦点
Angie Burnett	植物生物学（作物の環境ストレス対応） 食物安全性	・ヒトの食物システムにおける植物理解の変容 ・ヒトの食物システム変革への植物利用
David 'davidad' Dalrymple	AI 安全性、神経科学、ソフトウェア工学	科学者・エンジニア（ヒト）による実世界現象の数学的説明開発・改良を支援する、LLM を利用したソフトウェア・ツール
Jacques Carolan	応用物理学、神経科学	脳に関する理解の変革を目的としたツール創出への物理学・工学的連理の適用
Gemma Bale	医学的治療学、ニューロ・オプティクス （実世界の環境での非侵襲的脳モニタリング）	・人間と地球の健康を改善するための光学 ・人間の健康モニターから気候変動観測まで、多様な応用にわたる非侵襲的な光学マッピングとセンシング
Sarah Bohndiek	バイオメディカル物理学 （腫瘍の進化をモニターするための光学イメージング技術）	
Mark Symes	電気化学、電気化学技術	エネルギー変換とグリーン燃料生産 グリーン水素
Jenny Read	視覚神経科学、昆虫の立体深度知覚	・小さい脳に複雑な能力を備えた昆虫に学ぶロボット工学：立体深度知覚、飛行制御、メタ認知、計数 ・完全に非毒性成分に生分解可能な複雑ロボット
Suraj Bramhavar	クラウド・コンピューティング、シリコン・フォトニクス技術	AI コンピューティングを持続的に拡張して社会のすべての人に利益をもたらすことができる代替ハードウェア・パラダイムの創出

PANORAMIC VIEW REPORT, Science, Technology and Innovation, Policy Trends in Major Countries and Regions (2024), CRDS JST

https://assets.publishing.service.gov.uk/media/66a388fa0808eaf43b50d7eb/aria-annual-report-and-accounts-2023-24.pdf

Science funding route 2:

Academies and Charities

- **National Academies**: Independent bodies of leading scholars that provide funding for new research and act as forums for debate.

Examples include:

The Royal Society: For science.
The British Academy: For the humanities and social sciences.
The Royal Academy of Engineering: For engineering.
The Academy of Medical Sciences: For medicine.

- **Wellcome Trust**: A global charitable foundation that funds research into health.

- **Other Major Charities**: British Heart Foundation, Cancer Research UK, the Nuffield Foundation, Gates Foundation, Bezos Earth Fund, Chan Zuckerberg Initiative, etc. also provide significant funding for specific areas of research.

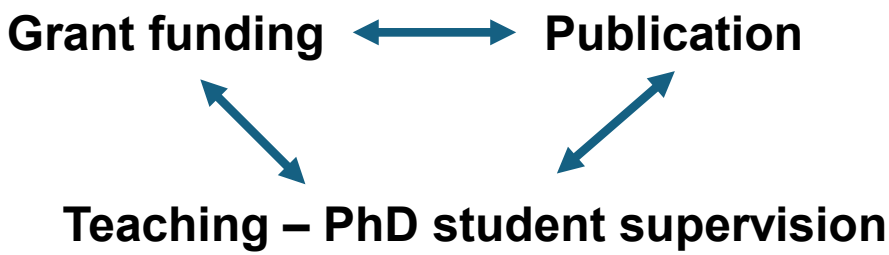
- **Industry**

- 英国における研究環境について
- 英国におけるプロジェクト
- **英国における基礎研究の振興**（教育と基礎研究）

Promotion of basic research

UK University academic staff:

- Teaching only
- Research only
- Teaching and Research: required to conduct both teaching and research (obtaining grants)



PhD studentship:

- All PhD positions must be funded by UKRI or each institution (tuition fee + living cost)
- All PhD projects are advertised and candidates appointed through competition
- UKRI funded PhD positions are through Research Council large training grants: e.g. Centre for Doctoral Training (EPSRC, NERC); Doctoral Training Studentships (DTP); BBSRC Collaborative Awards in Science and Engineering (CASE) -- training by spending three to 18 months with a CASE partner in a workplace outside of the academic environment /industry (financial contribution).

Thoughts

Research scale and output

- Japan and the UK have research communities of comparable size and funding levels.
- Both publish in journals of similar quality and receive a comparable level of citations.

Funding systems

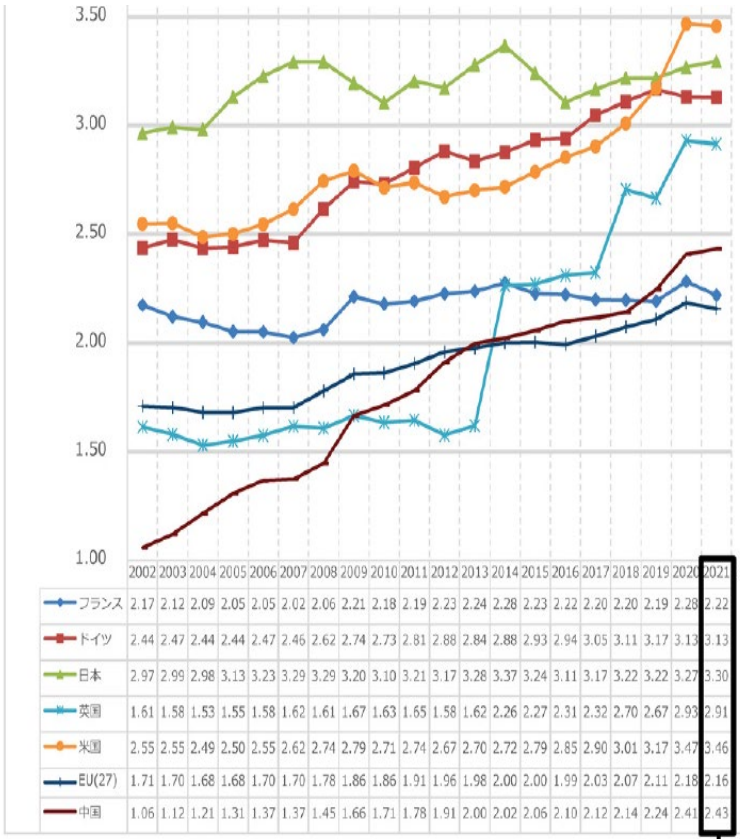
- The UK has a more competitive funding model.
- It includes both strategic project calls and investigator-driven proposals.
- PhD funding differs: UK doctoral students are fully funded through competitive schemes.

Research environment

- The UK places greater emphasis on collaborative, multidisciplinary research.
- This is reflected in patterns of international co-authorship and journal submissions.

What is good research?
Many high impact factor publications? Number of Nobel prize winners? The number of UG and or PhD students?
Research providing impact/solution for the national economy and environment through/with industry? Being socially responsible and forward-looking?

主要国・地域のGDPに占める研究開発費総額の割合の推移



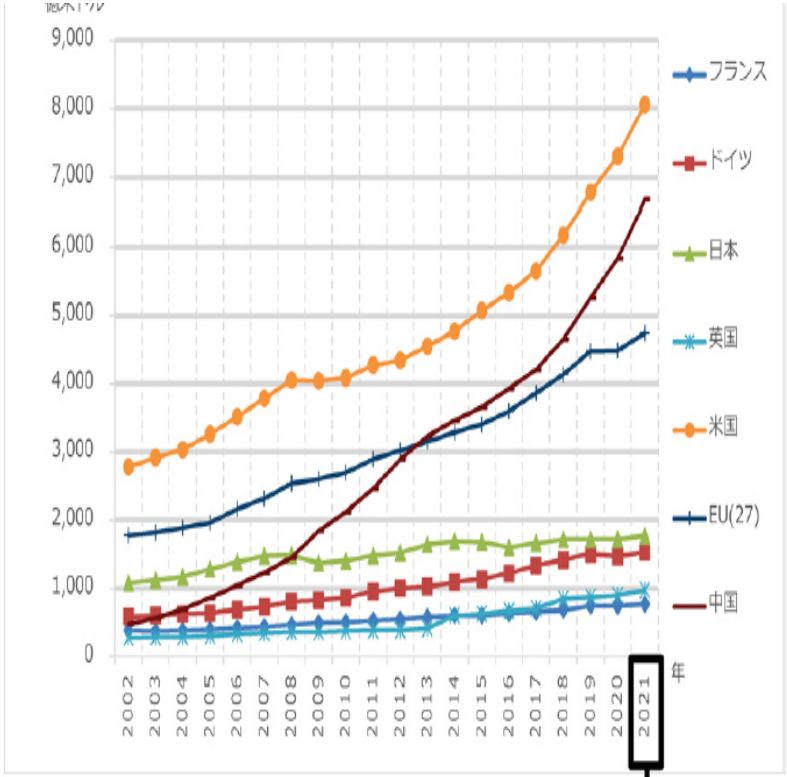
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
フランス	2.17	2.12	2.09	2.05	2.05	2.02	2.06	2.21	2.18	2.19	2.23	2.24	2.28	2.23	2.22	2.20	2.20	2.19	2.28	2.22
ドイツ	2.44	2.47	2.44	2.44	2.47	2.46	2.62	2.74	2.73	2.81	2.88	2.84	2.88	2.93	2.94	3.05	3.11	3.17	3.13	3.13
日本	2.97	2.99	2.98	3.13	3.23	3.29	3.29	3.20	3.10	3.21	3.17	3.28	3.37	3.24	3.11	3.17	3.22	3.22	3.27	3.30
英国	1.61	1.58	1.53	1.55	1.58	1.62	1.61	1.67	1.63	1.65	1.58	1.62	2.26	2.27	2.31	2.32	2.70	2.67	2.93	2.91
米国	2.55	2.55	2.49	2.50	2.55	2.62	2.74	2.79	2.71	2.74	2.67	2.70	2.72	2.79	2.85	2.90	3.01	3.17	3.47	3.46
EU(27)	1.71	1.70	1.68	1.68	1.70	1.70	1.78	1.86	1.86	1.91	1.96	1.98	2.00	2.00	1.99	2.03	2.07	2.11	2.18	2.16
中国	1.06	1.12	1.21	1.31	1.37	1.37	1.45	1.66	1.71	1.78	1.91	2.00	2.02	2.06	2.10	2.12	2.14	2.24	2.41	2.43

2021年のデータ（単位：パーセント）

米国	日本	ドイツ	英国	中国	フランス	EU27か国
3.46	3.30	3.13	2.91	2.43	2.22	2.16

出典：OECD, Main Science and Technology Indicatorsのデータをもとに CRDS 作成

主要国・地域の研究開発費総額の推移（2002 ～21年）

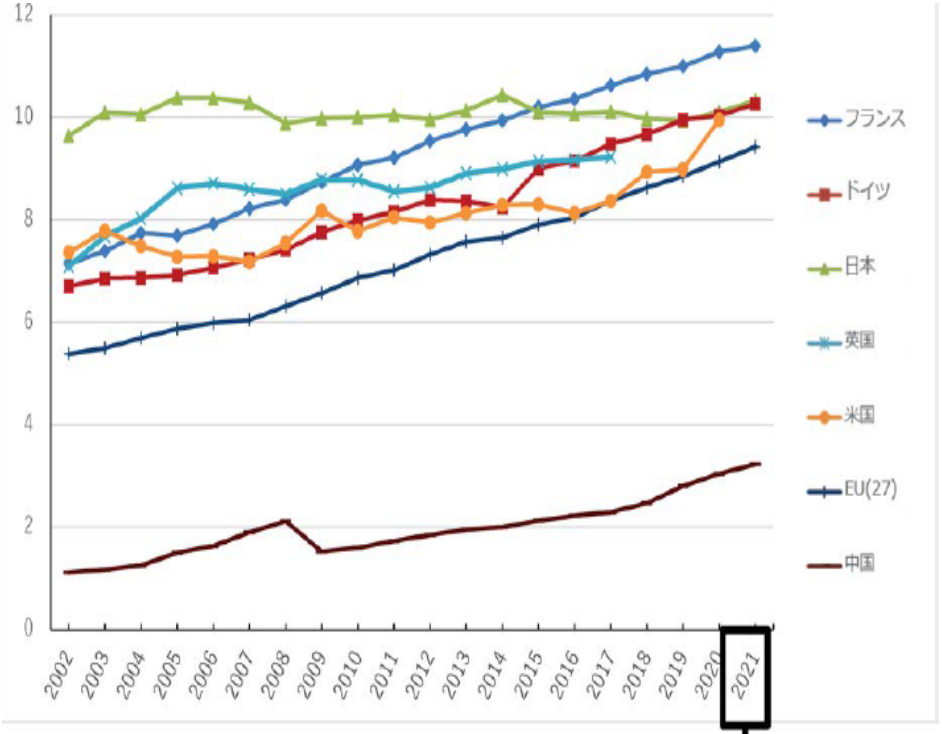


2021年のデータ（単位：億米ドル。億米ドル未満は四捨五入）

米国	中国	EU27か国	日本	ドイツ	英国	フランス
8,060	6,676	4,741	1,774	1,537	978	772

出典：OECD, Main Science and Technology Indicatorsのデータをもとに CRDS 作成

主要国・地域における、被雇用者1,000 人あたりの研究者数の推移（2002 ～21 年）

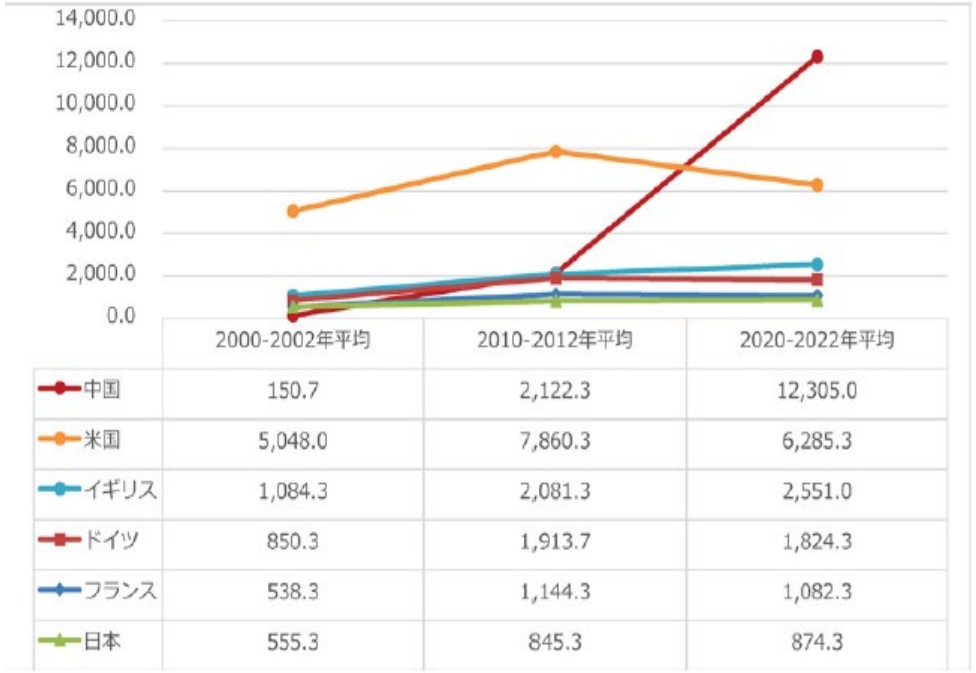


2021 年のデータ（単位：人。0.01 人未満を四捨五入して表記）

フランス	日本	ドイツ	米国	EU27 か国	英国	中国
11.40	10.33	10.27	9.95（2020 年）	9.43	9.23（2017 年）	3.22

出典：OECD, Main Science and Technology Indicatorsのデータをもとに CRDS 作成。
なお米国の 2021 年、および英国の 18～21 年についてはデータが公表されていない。

トップ1%論文数（整数カウント）の推移



	2000-2002年平均	2010-2012年平均	2020-2022年平均
中国	150.7	2,122.3	12,305.0
米国	5,048.0	7,860.3	6,285.3
イギリス	1,084.3	2,081.3	2,551.0
ドイツ	850.3	1,913.7	1,824.3
フランス	538.3	1,144.3	1,082.3
日本	555.3	845.3	874.3

出典：ScopusをもとにJST作成;

国際共著論文の状況（2020-2022 年平均）

	国際共著論文数	総論文数
日本	34,230.7	97,034.0
	35.28%	100%
英国	87,055.0	123,128.7
	70.70%	100%

出典：ScopusをもとにJST作成

PANORAMIC VIEW REPORT, Science, Technology and Innovation, Policy Trends in Major Countries and Regions (2024) CRDS-FY2023-FR-01, CRDS, JST