UK Research and Innovation

A guide to UKRI Research and Innovation Output data

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Contents

1. Introduction

This document provides a comprehensive guide to the UKRI research outputs published by UK Research and Innovation.

The key areas covered in this guide are:

- Background to published data
- Definitions and coverage
- Data processing

1.1 Uses and Users

UKRI has a responsibility to demonstrate the value and impact of research supported through public funding. The published data are used to report and engage with the academic community, the wider public and government to demonstrate the following:

Advocacy - justification for additional funding and explaining research impact.

Accountability – providing the evidence of delivery from our research funding.

Analysis – the base for tracking progress, productivity and impact of UKRI funded research.

Allocation – providing evidence to support prioritisation across different sectors/strategic aims or programmes.

Efficiency – used as replacement for final reporting, ensuring data is accessible and useable.

Openness – further details about impacts are shared via Gateway to Research.

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2. Background to published data

UKRI brings together the seven Research Councils, Innovate UK, and Research England into one organisation. The release of data here was published as tables and highlight figures in the UKRI Annual Report and Accounts 2021-22 and as a separate UKRI Investment and Outputs publication available here https://www.ukri.org/about-us/policies-standards-and-data/ data-collection

It includes data for Research Councils and Innovate UK. Research England are not currently included.

2.1 Historical Publications

Prior to the formation of UKRI research output data was published as an agreed set of common indicators in Research Councils Impact Reports. This UKRI wide publication replaces previous methodologies and as such the following webpages will no longer be updated:

https://ahrc.ukri.org/newsevents/publications/impactreports/

https://bbsrc.ukri.org/news/planning/impact-reports/

https://epsrc.ukri.org/newsevents/news/impactreport201617/

https://esrc.ukri.org/news-events-and-publications/publications/corporate-publications/impact-reports/

https://mrc.ukri.org/publications/browse/mrc-investing-for-impact-report-2017/

https://nerc.ukri.org/about/perform/reporting/reports/

https://stfc.ukri.org/files/stfc-impact-report-2017/

For the 2019 researchfish submission a consolidated Research Councils analysis was shared this will no longer be updated:

https://www.ukri.org/funding/information-for-award-holders/research-outcomes/what-we-do-with-the-outcomes-information-weve-collected/

Innovate UK did not previously publish or report on the data collected via their project completion form (PCF) which began in 2018.

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3. What is the UKRI research outputs data

The UKRI research outputs data release shows the instances of output types realised by year the award started between 2016 and 2023. It combines data obtained through researchfish for the Research Councils and Innovate UK's Project Completion Form.

The data from the two systems is combined and presented in a series of tables showing:

Collaborations: Research collaborations take the form of joint funding, exchanging expertise, access to wide ranging facilities and equipment, accessing datasets, working across different sectors. This indicator relates to new collaborations as reported after the award has started. One award can have many collaborations involving many collaborators.

Collaborator location: International collaboration shows that researchers are collaborating with organisations around the world and gaining access to internationally competitive facilities and infrastructure.

Engagement: Researchers engage with a wide variety of audiences and stakeholders to communicate research outcomes, disseminate knowledge, stimulate public awareness, and encourage public engagement and dialogue. The engagement activities indicator helps demonstrate the extent to which researchers are engaging with others including audiences outside academia.

Knowledge generation: Publications are a mechanism used to disseminate the findings of research to a wider audience; increasing the visibility of research, the diffusion of knowledge and the advancement of research.

Other types of knowledge generation: Other Knowledge Generation includes Artistic and Creative outputs, Research Models and Databases, Software and Technical Products, Research Tools and Methods, and Medical Products, Interventions and Clinical Trials.

Further Funding: This data includes additional funding from UKRI and other funders to continue or advance the research.

Intellectual Property (IP): This indicator includes the generation of patents, copyrights and trademarks as an output of the research. This data does not include Innovate UK as their current online survey collects data on IP used as part of the project.

Spinouts: This indicator includes the number of spinout companies initiated as an output of the research.

Full-time equivalent (FTE) jobs: This indicator includes the number of FTE jobs created as an output of Innovate UK funding.

Products, processes and services: This indicator summarises the number of products, processes or services with planned production within the year, as an outcome of Innovate UK funding.

4. Definitions

The following calculations are used across all output types:

Award: Innovate UK PCF submissions for individual awards may be completed by multiple project partners. An award is defined as an Innovate UK project or a Research Council award and does not reflect the number of project partners completing submissions.

Year Award Started: All output types with the exception of spinouts are grouped by the year the award started. This allows consistency between the data collected by Research Councils and Innovate UK.

Number/instances of output type: Each output is assigned a unique ID. A distinct count of this ID is used to calculate the number/instances of the output type.

Number of awards with 1 or more instance of an output type: The distinct count of the grant references reporting one or more instances of an output type.

Total number of awards: Is the total number of awards in the respective outcomes system. Where an output type includes both Research Council and Innovate UK data the combined total from the two systems is used**.**

Percentage of the total awards:

$$= \left(\frac{number\ of\ awards\ with\ 1\ or\ more\ instances\ of\ an\ output\ type}{total\ number\ of\ awards\ in\ the\ system}\right) X\ 100$$

4.1 Table 10: Awards

Research Council and Innovate UK data

Number of UKRI awards started: Distinct count of awards funded by UKRI (includes Research Council and Innovate UK)

Number in Researchfish: Distinct count of awards in Researchfish

Number of awards with a Project Completion Form (PCF): Distinct count of awards that have submitted a PCF return

Number of participants completing a PCF: Distinct count of the combination of award reference and participants that have submitted a PCF return

Total of awards reporting an outcome: Combination of Distinct count of awards in Researchfish and Distinct count of awards that have submitted a PCF return

4.1 Table 11: Collaborations

Research Council data only.

Number of collaborations: A collaboration is a group of collaborators. Each collaboration is assigned a unique ID. A distinct count of this ID is used calculate the number of collaborations.

Number of collaborators: A collaborator is an organisation involved in a collaboration. Each collaborator is assigned a unique ID. A distinct count of this ID is used to calculate the number of collaborators.

The Number of Collaborators is broken down by the organisation type: Academic/University/Learned Society; Charity/Non-Profit; Private; Public (including NHS Trusts); and Other (includes unknown and organisations which have multiple organisation types).

4.2 Table 12: Collaborator location

Research Council data only.

The number of awards and collaborators is broken down by the country that the collaborator is based in. Any collaborators with an unknown country are excluded.

First the country is determined as UK or International. If the country is not “United Kingdom” then it is marked as international, else it is marked as UK.

For each award the number of UK and International collaborators is counted, and each award is assigned to UK only, International only or Both using the below logic:

Location	Number of UK collaborators	Number of international collaborators
UK only	1+	0
International only	0	1+
Both	1+	1+

4.2 Table 13: Engagement

Research Council data only.

Instances of Engagement Activities: Each engagement activity is assigned a unique ID. A distinct count of this unique ID is used to calculate the instances of engagement activities.

4.3 Table 14: Knowledge Generation

Research Council and Innovate UK data.

Number of publications: Each publication is assigned a unique ID. A distinct count of this ID is used to calculate the number of publications.

Types of publications: The number of publications is broken down by the publication type: Book; Book Chapter; Journal article; and Other Publication (includes monographs, consultancy reports, policy briefings, technical reports, preprints and theses).

4.4 Table 15: Other Knowledge Generation

Research Council data only.

Instances of Other Knowledge Generation: each publication is assigned a unique ID. A distinct count of this ID is used to calculate the instances of other knowledge generation.

Types of Other Knowledge Generation: The instances of other knowledge are broken down by the publication type: Artistic and Creative; Medical Products, Interventions and Clinical Trials; Research Models and Databases; Research Tools and Methods; Software and Technical Products.

4.5 Table 16: Further Funding

Research Council and Innovate UK data.

Instances of Further funding: Each instance of further funding is assigned a unique ID. A distinct count of this ID is used to calculate the instances of further funding.

4.6: Table 17: IP

Research Council data only.

Instances of IP: Each instance of IP is assigned a unique ID. A distinct count of this ID is used to calculate the instances of IP.

4.7 Table 18: Spinouts

Number of spinouts: The Company Registration Number was used as a unique identifier to count the spinout companies reported as outcomes of research funding.

4.8 Table 19: Full-Time Equivalent (FTE) jobs created

Innovate UK funding only.

Number of awards: This is a distinct count of the projects with FTE jobs created as a result of the funding and does not reflect the number of project participants reporting FTE jobs created.

Number of FTE jobs created: The number of jobs were capped to a maximum of 10 FTE jobs per project before being summed across all projects.

4.9 Table 20: Products, Processes and Services

Innovate UK funding only.

Summarises the number of products, processes and services with planned production within the year, as an outcome of funding.

5. Data Processing

The section below outlines how the UKRI researchfish data and Innovate outcome data is combined to produce a finalised data set for release.

5.1 Data Collection

researchfish

Research Councils have consistently used the researchfish system to collect outputs and outcomes data since 2014. Recipients of funding are required yearly to report emerging outputs, outcomes and impacts for the duration of their award and generally for 5 years beyond the end of the grant funding.

Once a year there is a formal submission period when researchers are required to confirm that their outcomes information is accurate and up to date. The data in this report is taken from the submission period that ended in March 2023.

The number of outputs reported changes with each submission year as new outputs can be recorded for all awards in the system. This publication is to share the updated number of outputs for awards starting between 2017 and 2022 as of the 2023 submission period.

For example, in the 2018-19 Annual Report Annex A Knowledge Generation table 59% of awards starting in 2016 reported a publication outcome. The percentage increased to 78% following the 2020 researchfish submission, and to 84% following the 2021 submission period.

Project completion form

Innovate UK use their Project Completion Form to obtain outputs and outcomes data from their funded research. This online survey tool has been used since February 2018 and is completed once for each project towards the end of the award.

The PCF data has recently been cleaned by matching responses to the Project Number and Participant Name fields within the Innovate UK Transparency data. This has led to an improvement in the quality of PCF data used for this year's Annual Report publication.

5.2 Data Linking

The two collection processes ask different questions and collect different data. There are two tables where data was able to be linked: Knowledge Generation and Further Funding.

5.3 Data Removed

Deduplication: efforts have been made to remove duplicate publications using Digital Object Identifiers (DOIs).

Outcomes with reported dates (e.g. publication date, date of engagement activity, etc) prior to the year in which the award started have been removed.

Outcomes with an unknown outcome date have been removed.

This data release does not report studentship outcomes.

5 of the 16 common outcomes collected by researchfish are not included. These are:

- Influence on Policy, Practice, Patients and the Public
- Next Destination
- Awards and Recognition
- Other Outputs & Knowledge / Future Steps
- Use of Facilities & Resources

5.4 Data Quality

The following should be considered when reviewing the UKRI output data.

The data are self-reported by researchers and is not validated.

Awards starting in more recent years are expected to have fewer outputs than awards starting in older years due to the nature of research and the time lag of realising outputs and outcomes.

The data are not meant to be exhaustive of all outcomes realised.

The number of total awards available to report outputs changes over time due to internal processes for example grants changing their start dates, incorrectly classified grants being wrongly submitted as part of the set.

6. Dashboard

Alongside the data release is a dashboard showing a visual representation of the UKRI output data. The dashboards only contain data for the Research Councils.

The following calculation has been applied:

Exponential Smoothing: This is a predicted forecast algorithm which attempts to find a regular pattern in measures that can be continued in the future, at least 5 data points are required to estimate a trend. Simple Exponential Smoothing iteratively forecasts future values of a regular time series, from weighted averages of past values of the series. The model computes the next level or smoothed value from a weighted average of the last actual value and the last level value. The method is exponential because the value of each level is influenced by every preceding actual value to an exponentially decreasing degree—more recent values are given greater weight.

6.1 Overview

This has high level figures for total awards with outputs; percentage of total awards in the system with outputs; value of awards with outputs and number of Research Organisations (ROs) with outputs.

The two graphs show the number of awards with outputs and the number of outputs. The x-axis can be changed to show output type; award start date or output date. It can be filtered by output type; UKRI Council; award year; and output year.

6.2 Publications

Number of awards with x publications: shows the frequency distributions of publications, e.g. how many awards have 1 publication, 5 publications, 10 publications etc.

Time-lag between award start date and publication date in years: the frequency distributions for the length of time in years between an award starting and a publication reported, attributed to that award.

Award year to publication year cohorts: colour coded cohorts based on the year the award started. Shows the range of publication years for each cohort.

% of total awards with a Publication (actual/predicted): the percentage of the total awards in the system that have a publication attributed to them. Actual shows the figures as of 31/03/2023. Predicted forecasts the expected percentage for the latest two years using exponential smoothing.

Average number of publications per award: the average number of publications per award for each and all publication types.

Number of publications: the number of publications for each and all publication types.

6.3 Collaborations

Map: to show the global scale of the countries our researchers collaborate with.

Number of awards with collaborations and collaborators: the number of awards with collaborations, the number of collaborations with these awards and the number of collaborators with these awards.

Average number of collaborations and collaborators per award: the average number of collaborations and collaborators per award.

% Total Awards with a Collaboration (actual/predicted): the percentage of the total awards in the system that have a collaboration attributed to them. Actual shows the figures as of 31/03/2023. Predicted forecasts the expected percentage for the latest two years using exponential smoothing.

Awards involving UK or international based collaborators: the number of awards broken down by the location of the collaborator: UK only, International only or Both.

Collaborators based in UK or internationally: the number of collaborators broken down by the location of the collaborator: UK only, International only or Both.

Collaborator sector: the number of collaborators broken down by the sector of the collaborator: Academic/University/Learned Society; Charity/Non Profit; Other (including unknown); Private; and Public (including NHS Trusts).

6.4 Other Knowledge Generation

Number of awards with x outputs: shows the frequency distributions of other knowledge generation, e.g. how many awards have 1 publication, 5 publications, 10 publications etc.

Time-lag between award start date and output date in years: the frequency distributions for the length of time in years between an award starting and a publication attributed to that award.

Award year to output year cohorts: colour coded cohorts based on the year the award started. Shows the range of output years for each cohort.

% total awards with other knowledge generation (actual/predicted): the percentage of the total awards in the system that have an instance of other knowledge generation attributed to them. Actual shows the figures as of 31/03/2023. Predicted forecasts the expected percentage for the latest two years using exponential smoothing.

Average number of outputs per award: the average number of outputs per award for each and all other knowledge generation types.

Number of outputs: the number of other knowledge generation outputs.

6.5 Engagement

Time-lag between award start date and engagement date: the frequency distributions for the length of time in years between an award starting and an engagement activity attributed to that award.

Global reach: the number of engagement activities broken down by the reach of the engagement: Local; Regional; National; International.

Number of engagements: the number of engagement activities.

Average number of engagements per award: the average number of engagement activities per award for each and all engagement types.

% of total awards with engagement activities(actual/predicted): the percentage of the total awards in the system that have an engagement activity attributed to them. Actual shows the figures as of 31/03/2023. Predicted forecasts the expected percentage for the latest two years using exponential smoothing.

Primary audience: the number of engagement activities broken down by the primary audience: Industry/Business & Professionals; Public; Academic; Other audiences; Policymakers/Politicians; Charities.

6.6 IP

Number of awards with x instances of IP: the frequency distributions for the length of time in years between an award starting and an instance of IP attributed to that award.

Time taken between award start date and date protection granted: the frequency distributions for the length of time in years between an award starting and an instance of IP attributed to that award.

Protection granted: instances of IP broken down by the level of protection granted.

Average instances of IP per award: the average instances of IP per award.

% of total awards with IP (actual/predicted): the percentage of the total awards in the system that have an instance of IP attributed to them. Actual shows the figures as of 30/06/2020. Predicted forecasts the expected percentage for the latest two years using exponential smoothing.

Is the IP licenced? instances of IP broken down by whether the IP is licensed, unlicensed or commercial in confidence.

6.7 Further Funding

Number of awards with x instances of further funding: the frequency distributions for the length of time in years between an award starting and an instance of IP attributed to that award.

Time taken between award start date and further funding start date: the frequency distributions for the length of time in years between an award starting and an engagement activity attributed to that award.

Instances of further funding: the instances of further funding broken down by the type of funding: Capital/infrastructure (including equipment); Fellowship; Other type; Research grant (including intramural programme); Studentship; Travel/small personal.

Average instances of further funding per award: average instances of further funding per award broken down for each and all funding types.

% of total awards with further funding (actual/predicted): the percentage of the total awards in the system that have an instance of further funding attributed to them. Actual shows the figures as of 31/03/2023. Predicted forecasts the expected percentage for the latest two years using exponential smoothing.

Map: to show the reach of countries our researchers go on to receive further funding from.

7. Contacts

Data questions:

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General enquiries:

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