Data enhancement and analysis of the REF 2021 Impact Case Studies

Cagla Stevenson, Jonathan Grant, Martin Szomszor, Cecilia Ang, Devika Kapoor, Salil Gunashekar and Susan Guthrie
Preface

The Research Excellence Framework (REF) is a process of expert review to assess the excellence of academic research conducted at universities in the United Kingdom (UK), undertaken by the four UK higher education funding bodies. Research England and UK Research and Innovation (UKRI) commissioned RAND Europe, together with Electric Data Solutions and Different Angles, to conduct a study to understand the research impact of the UK higher education sector as represented by the REF 2021 Impact Case Studies (ICSs). The study aimed to address the following two objectives:

• Collect and enhance 2021 REF ICS data to provide the REF team with a structured dataset supporting further development of the REF 2021 online database; and
• Quantitatively and qualitatively analyse the ICSs to examine the broader societal impacts of research at Higher Education Institutions (HEIs).

The study provides an in-depth examination of UK higher education Impact Case Studies using a mixed-methods research approach that involved a range of quantitative and qualitative analyses such as topic modelling, geotagging, text searches, bibliometric analysis, infographics and deep dives. This report is intended for a range of stakeholders including those interested in the REF and research assessment, higher education research as well as those interested in the impact of HEIs on society.

We would like to thank the project team at Research England and UKRI for their valuable feedback and support throughout this project. In particular we would like to thank Duncan Shermer, Julianne Pigott, Steven Hill, Catriona Firth, Marie-Helene Nienaltowski, and Jennifer Moloney. We would also like to thank our quality assurance reviewers at RAND Europe, Kate Morley and Joe Francombe, for their critical review and feedback on the report.

We would like to thank Clarivate for providing access to bibliometric information from the Web of Science and bespoke institution-to-sector mappings which supported analysis of the underpinning research provided in this report. In addition, we are grateful to Soapbox for their work in designing some of the data visualisations, and Overton for providing access to their database. Finally, we would like to thank Jess Plumridge for helping to lay out the report and Clare Watkinson for copy-editing.

RAND Europe is a not-for-profit research organisation that aims to improve policy and decision making in the public interest, through research and analysis. RAND Europe’s clients include European governments, institutions, non-governmental organisations and firms with a need for rigorous, independent, multidisciplinary analysis. Electric Data Solutions provides bespoke analysis to universities, funders and publishers to help them understand their unique contribution to the global research system. Different Angles Ltd is a consultancy that focuses on the social impact of universities and research.

For more information about RAND Europe or this document, please contact:

Sue Guthrie
(Director, Science and Emerging Technology)
RAND Europe
Eastbrook House, Shaftesbury Road
Cambridge CB2 8DR
United Kingdom
Email: sguthrie@randeurope.org

1 Research Excellence Framework (2023a).
The Research Excellence Framework (REF)\(^2\) is a system for assessing the quality of research undertaken in UK Higher Education Institutions (HEIs) and a key aspect of the UK research landscape. Institutions make submissions that are assessed through expert review by subpanels for the 34 subject-based Units of Assessment (UoAs) under the guidance of four main panels: Panel A (Medicine, health and life sciences), Panel B (Physical sciences, engineering and mathematics), Panel C (Social sciences) and Panel D (Arts and humanities). This assessment is based on the quality of research outputs, the impact of research beyond academia, and the environment supporting research. REF defines impact as ‘the effect on, change or benefit to the economy, society, culture, public policy or services, health, the environment or quality of life, beyond academia’.\(^3\) REF 2014 and REF 2021 used Impact Case Studies (ICSs) to help assess research impact beyond academia. ICSs are short five-page documents detailing a project’s impact and underpinning research. The corpus of over 6,000 REF 2021 ICSs provides a rich resource for analysis and showcases the research undertaken at UK HEIs. This study aimed to analyse these ICSs to investigate their research impact’s nature and beneficiaries, underpinning research and relationship to the UK government’s priority policy areas. Where appropriate, the study also analyses the differences between REF ICSs submitted in 2021 vs. 2014.

We used a diverse methodological approach building on a previous analysis of the 2014 REF ICSs.\(^4\) The work comprises a mix of quantitative and qualitative methods, including topic modelling, text searches, analysis of ICS-associated metadata, bibliometric analysis and qualitative analysis of ICS content. We also conducted several deep dives examining ICSs relating to three policy priorities: COVID-19, net zero and Place.\(^5\) Below, we outline our key findings from the analysis.

**UK HEIs have had a significant and diverse societal impact**

One key observation when reading and reviewing a sample of ICSs is that research at UK HEIs has significantly impacted society and the economy in the UK and globally. This study’s analyses reinforce this conclusion. HEIs’ research impacts were diverse, spanning 79 unique impact topics ranging from ‘cancer diagnostics and therapy’ and ‘intelligence and cyber security’ to ‘pollution and air quality’ and ‘language and linguistics’. 

---

5. This refers to the broad political priority area around regional and geographical inequality, also referred to as ‘levelling up’.
**Impact pathways are complex, diverse and unique**

We explored pathways from research to impact by linking the underpinning research in the ICSs with the corresponding impact topics and UoAs. The detailed alluvial diagram in Figure 1 illustrates the results, showing that impact arises from various disciplines; ICSs across all four main REF Panels (A–D) contributed to the impact topics. Examining the underpinning research disciplines showed that 72% of ICSs were based on publications with two or more Fields of Research (FoRs). Mapping out the different impact routes shows that no single pathway exists. Given the diversity of impact pathways, developing a balanced and comprehensive set of impact metrics to capture this range of activities would be challenging.

**Impact was global, national and local**

Research at UK HEIs has had an impact globally, with almost every country benefitting from the research (Figure 2). Moreover, exploring the ‘flow’ of impact between UK regions showed that impact was often ‘exported’ from the region where the research was conducted to other UK areas. The South East of England was the biggest ‘exporter’, distributing 69% of its impact to other regions. This finding is particularly relevant for the ‘levelling up’ discussion, where many metrics typically used to explore research and innovation (R&I) focus on input measures (e.g. the research investment location). As this impact analysis shows, examining which institutions receive funding provides a partial picture of the role R&I plays across UK regions.
Figure 1. Alluvial diagram illustrating pathways to impact from underpinning research to resulting impact.

Note: The alluvial diagram above links the underpinning research (extreme left, classified by FoR) with the resulting impacts (extreme right) by panel and UoA (middle). The colours represent the four main Panels: Panel A (pink), Panel B (blue), Panel C (purple), and Panel D (green). Readers can zoom into specific sections of this figure to read the text. A high-resolution file of this image can also be downloaded alongside the report.
Figure 2. The global impact of ICSs
ICSs offer data for analysing research impact characteristics

Analysing the ICSs provided useful information on the research impact’s broader characteristics. For example, the average time lag from the start of research to the end of impact was approximately ten years. However, research in Panels A and B took an average of three years longer than in Panels C and D. ICSs also provided many valuable examples of returns on investment (ROI) from research; overall, 2,146 ICSs (approximately 34%) mentioned currency or ROI within the impact section, although the varied expressions of it made it difficult to aggregate the results systematically and meaningfully.

Research benefited many different groups

We identified evidence of 59 different beneficiary types across the ICSs. The top five beneficiary groups identified comprised ‘governments’, ‘communities’, ‘policymakers’, ‘practitioners’ and ‘industry’. We also identified several specific beneficiary groups, including ‘nurses’ and ‘farmers’, highlighting the diversity of beneficiary groups within the ICSs.

Analysis revealed differing interdisciplinarity and collaboration levels across ICSs

As highlighted previously, research impacts draw on insights from multiple FoRs. However, we also compared across ICSs to understand the portfolio’s interdisciplinary or collaborative levels by analysing the underpinning research’s characteristics, revealing differences in the concentration of Interdisciplinary Research (IDR) between impact topics. Impact topics associated with societal challenges were more likely to have high IDR levels, whereas those within the ‘clinical medicine’ cluster were likelier to have lower IDR levels.

ICSs were underpinned by highly cited research

Most ICSs underpinning research performed better than the global average citation counts for the relevant FoR, with the highest citation counts associated with research from Panel A. Across all panels, the percentage of highly cited papers was significantly higher than the global average of 1%. Panel A was the highest at 9.7%.

There was significant consistency between REF 2021 and REF 2014

Analysis of the 2021 ICSs shows considerable consistency with the ICSs from REF 2014. Our findings are broadly similar to those in 2014, suggesting that a range of disciplines support impact along numerous unique pathways. UK HEIs’ global impact in 2021 was also consistent with that in 2014, evidencing a similarly rich and diverse impact portfolio.

Some differences from the 2014 analyses stemmed from the approach taken. For example, as expected, the topic model was different and should not be interpreted as reflecting a decline or increase in specific impact types. Consequently, a like-for-like detailed comparison between the two is not appropriate. However, the high-level picture remains consistent: impact is a complex, bespoke activity.

We also looked at how REF 2021 rule changes had affected the nature of ICSs. Generally, our results show that HEIs did not significantly utilise these rule changes. For example, very few HEIs took the opportunity to submit case studies focusing on impacts on students and teaching.
It is interesting to see the remarkable consistency between the findings from our analysis of the REF 2021 ICSs and the analysis of the REF 2014 ICSs. This consistency reinforces the strength of these conclusions, providing a unique insight into the complexity, diversity and importance of UK HEIs’ impact on society and the economy in the UK and beyond.

We also explored the contribution of ICSs underpinned by UKRI funding as a separate analysis for UKRI. UKRI funding significantly contributed to the research underpinning the REF ICSs; of 6,361 ICSs, 3,032 (46%) were underpinned by UKRI funding. These case studies helped address priority policies, including COVID-19, net zero and Place and benefited multiple beneficiary groups, including governments, communities and policymakers. Research funded by multiple UKRI councils was more likely to be interdisciplinary and collaborative, and case studies supported by multiple UKRI research councils’ funding reported a diverse range of impacts, including contributions to environmental sustainability, energy and applied technology.