

## *WORKING PAPER*

# **Research Impact Evaluation, a Wider Context: Findings from a Research Impact Pilot.**

Rosa Scoble\*, Keith Dickson<sup>1</sup>, Justin Fisher<sup>2</sup>, and Stephen R Hanney<sup>3</sup>

<sup>1</sup>*Brunel Business School*, <sup>2</sup>*School of Social Sciences*, <sup>3</sup>*Health Economics Research Group (HERG)*,  
*Brunel University, Uxbridge, Middlesex UB8 3PH, UK*

*\*Corresponding author: rosa.scoble@brunel.ac.uk*

### **Abstract**

In the face of increasing pressure to demonstrate the socio-economic impact of funded research, whether it is funded directly by research councils or indirectly by governmental research block grants, institutions have to tackle the complexity of understanding, tracking, collecting, and analysing the impact of all their research activities.

This paper attempts to encapsulate the wider context of research impact by delineating a broad definition of what might be classified as impact. It also suggests a number of different dimensions that can help in the development of a systematic research impact assessment framework. The paper then proceeds to indicate how boundaries and criteria around the definition of impact and these dimensions can be used to refine the impact assessment framework in order to focus on the objectives of the assessor.

A pilot project, run at Brunel University, was used to test the validity of the approach and possible consequences. A tool specifically developed for the pilot, the Brunel Research Impact Device for Evaluation (BRIDE), is used for the analysis of research impact collected during the pilot. The paper reports on the findings of the analysis produced by BRIDE and confirms how a number of areas might be greatly affected by the boundaries set on definition and dimensions of research impact.

The pilot project shows that useful information on impacts can be generated and it also provides a way to identify areas of work from each unit of assessment for which it would be worth developing narrative case studies. The pilot project has illustrated that it is feasible to make progress in terms of assessing impact, but that there are many difficulties to be addressed before impact assessment can be incorporated into a system of assessing the impact from the university sector as a whole.

The paper concludes with an institutional perspective of the value of the approach and highlights possible applications. It also confirms the intention to expand the pilot and introduce new lines of investigation.

## **Background**

The socio-economic impact of research has become a central concern of the government agencies funding research. While there are many opposing views on the worth of assessing research on its ability to give a “return on investment”– the research community cannot ignore that the shift to a more accountable management of tax-payer’s contributions will, inevitably, result on more pressure on research funding accountability.

While some in the research community might resent what they regard as ‘interference’ from central government, it can be viewed as a positive sign that governments believe in the significance of research and, therefore, want to develop the best tools to help determine where best to invest.

The RAE was the first attempt to fund research quality and, therefore, invest in institutions where funding will sustain quality research. This has established norms and behaviours that are now pervasive in academic research arenas. The RAE has shifted research in the UK to a state where research quality, as defined according to traditional and fairly narrow academic criteria, has to be evidenced and be embedded in a community that will sustain and foster its development.

The RAE began in 1985/6 and, via several revisions, is now a well established means of assessing research quality. However, the socio-economic and political landscape has also changed during this period. While the funding councils are confident that quality is now recognised and rewarded wherever it occurs, a new imperative is now emerging. Quality in itself, it seems, does not meet the accountability needs of government’s funding of research.

Within this new environment institutions have to develop new research management tools, approaches and protocols that will allow them to adopt a broader definition of quality and track, capture, categorise, and evaluate the impact of their research. Such tools, approaches and protocols will aid them in building a comprehensive picture, through a number of evidence based profiles, of the impact of their body of research outside academia, on users and the wider-community.

## **Issues facing the assessment of research impact**

There are a range of inter-related factors to be considered when approaching the assessment of research impact. These include:

- Definition and categorisation of the impacts;
- Identifying ‘inputs’ in terms of the timescale and nature of the body of funding whose impact is being assessed;
- Identifying the ‘outputs’ that come from those inputs;
- Addressing the issue of attribution, ie demonstrating that the outputs do in some way lead to the impacts, or, as is more usually the case, contribute to them in some way.

At the Health Economics Research Group (HERG) Brunel University these issues have been considered in relation to programmes or bodies of health research funding through the development of the Payback Framework (Buxton and Hanney, 1996; Buxton et al., 2004). Some attempts have been made to broaden the scope of application of this framework, for example to the research funded by the ESRC (Wooding et al., 2007), and to primary health

care research in Australia as part of an exercise to prepare for the planned research assessment exercise in Australia (Kalucy et al., 2007)

The Payback stream of research has informed the analysis in this paper, but the paper adopts a broader approach, and considers issues related to assessing impact across a university. The first difficulty in assessing and evaluating research impact is the definition of impact. In the most generic sense impact can be defined as: influence, effect, bearing, etc. However, to develop a systemic approach for the evaluation of research impact there is a need to clearly define what constitutes academic research impact or/and what are its boundaries.

In the broadest sense and with no distinction between academic and socio-economic impact, one can envisage impact occurring differently at different levels. Impact can originate from:

- Research – that can take the form of different types of outputs including reports, patents, journal articles, artefacts, creative performances, etc.;
- Researcher – by acting as an expert advisor and, therefore, having an impact through influence informed by knowledge accumulated from research activities;
- Research community – by training and knowledge transfer activities that build capacity and capabilities.

The **origin of the impact** can therefore become one of the first criteria for defining one of the boundaries of what might, in an evaluation framework, be considered as research impact. However, even if the strictest criteria on the origin of the impact were imposed, there are further considerations to be taken into account when defining boundaries.

If one took a ‘strict’ view of research impact as originating from research itself this would exclude considering impact originating from a researcher acting as an advisor based on their accumulated research activities or from a research community.

When considering research itself as the only origin of impact a number of other criteria have to be explored that might affect the setting of the boundaries of academic research impact. It might be thought important to consider the issue of **Intentionality**, i.e. was the research conducted with a specific aim of achieving a wider impact. However, using ‘intentionality’ as a criterion for inclusion in the assessment exercise would, inevitably, exclude discoveries that had a substantial impact on nations and the well-being of populations but which had not been set out as the aim of the research.

If ‘intentionality’ is not one of the criteria, then the ‘degrees of separation’ become an important element especially regarding basic/theoretical research and socio-economic impact. This links into the key issue of attribution, i.e. showing that the specific research outputs led to impacts. **Degrees of separation** can be expressed as how many times the research had to be integrated in further/other research before impact occurred, research that has a direct impact will have one degree of separation. Therefore, for example, a newly developed mathematical model published solely for the academic community could be adopted and incorporated in an engineering research project that has impact on a large sector of the UK manufacturing industry. The research that developed the mathematical model would have two degrees of separation from the impact.

Therefore, the number of degrees of separation between the original research and impact might have a significant effect on the quantity of research in the basic/theoretical sciences that fall within the boundaries of the impact evaluation framework.

## **Impact Assessment Matrix**

Independently from the definition of the boundaries of research impact there is a need to develop an approach that allows for the systematic assessment of impact. As illustrated in the discussion above, impact can take different forms and can affect different communities.

In its most abstract form impact is often a measure of change, though some research can play an important role in confirming current practices and policies. Even if we use the broadest definition of impact (where capability building for example through PhD training is an acceptable form of research impact) and examine the impact of training PhD students that then join the non-academic workforce, we have to assume that the skills they acquired will make them ‘change’ the way they make decisions and solve problems.

However, if we want to measure in a way that allows for the systematic comparison across different types of impact, forms of impact and communities, a generic and flexible framework has to be established. Independently of who the research has benefited or how it has occurred, impact manifests itself on various dimensions including: the **depth** or degree of the change it generated and the **spread** of the change across a single or multiple communities.

The use of the term ‘community’ is significant because, at this stage, no boundaries have been set on where impact must occur to be included in the evaluation framework. Therefore, the term ‘community’ can broadly identify all types of beneficiaries such as: academia, users, ethnic groups, nations, policy makers, advisory bodies, etc.

The conceptual framework of a matrix based system for the assessment of impact allows for the inclusion of a number of dimensions that can be tailored to different needs. Once the basic structure of depth and spread has been established, other dimensions can be added and weighted according to a view of the intended results of the assessment exercise.

The granularity of the depth and spread is important to the extent that the evaluation framework wants to distinguish between levels of impact. As a way of generating potentially useful information for the institution and identifying areas of work for which narrative case studies should be developed, a four-scale depth and spread appears to be sufficient to distinguish between levels of impact but also be manageable<sup>1</sup>. Therefore, for example, depth could be defined as: surface, shallow, deep and profound; while spread could be defined as: limited, enclosed, pervasive and global.

The concept of impact behaving differently in different contexts is fundamental to develop a system that has the sensitivity to adapt and capture all the benefits of research. While the depth and spread act as a way to capture/evaluate the extent of the impact, impact ‘**categories**’ are an essential dimension to create cohesive groups of impact with similar properties.

Classification of impact into categories is a well researched and established concept. The categories can be adapted according to the discipline being analysed. However, they are mostly divided into two types: academic impact and impact on non-academic communities. There are currently five established categories<sup>2</sup>. In the academic arena: knowledge creation, and impact on future research including capacity building and career development. In the non-academic arena: impact on the policies of public and corporate bodies and on product development, impact on industrial practice and wider social economic impact. Capacity

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<sup>1</sup> See Appendix A – Impact Depth and Spread Matrix

<sup>2</sup> See Appendix B – Impact Categories

building and career development could also have impact on non-academic communities by training and skilling of the non-academic workforce.

The three dimensions described above allow the capture of all types of impact independently of how they occurred and which community they benefited. Each category can have tailored descriptors of the levels of depth and spread that are meaningful for the impact mode and specific community. Moreover, categories descriptors can also be tailored to the specific discipline.

There are a number of other dimensions that could be considered, such as: individual contribution to the impact generated, attribution, additionality, etc. While these have not been investigated in any detail at the present time, it could be envisaged that these might act as weightings in the final assessment of the impact generated.

The modularity and flexibility of this approach results in an evaluation framework that can be adapted to the needs of the evaluator. Boundaries can be set around the origin of the impact, intentionality, and degrees of separation, but also on which categories of impact to consider. While the depth and spread matrix can be tailored to deal with different disciplines while maintaining assessment compatibility between disciplines.

## **Pilot**

A pilot study is currently running at Brunel to: investigate the consequences of changing the boundaries of an evaluation framework, and to assess the viability of the matrix based evaluation approach described above. The pilot study is also discipline based so that its applicability can be tested across a number of disciplines.

In order to meet its objectives, the pilot was run initially with no boundaries to try and capture all impact, irrespective of origin or type. Analysis of the outcomes highlight clusters of impact and, therefore, which subsets would be eliminated once different boundaries are introduced. However, due to the set-up of the pilot, impact that has two or more degrees of separation was difficult to identify.

For the purpose of the pilot, analysis of impact was based on Brunel's submissions to RAE2008. The RA5a was used as the main source of information, however, these were complemented by the knowledge of the lead academic for each submission. The process, to identify and evaluate impact, was to: identify impact in the RA5a, complement it with other information and knowledge from the lead academic, assign it to impact categories, and evaluate it based on the specific category's depth and spread. Each impact is recorded in the appropriate category and against its depth and spread. For each research area analysed the output consist of a matrix for each category completed with the number of impacts for each level of depth and spread<sup>3</sup>.

To aid the classification and evaluation of impact, the Brunel Research Impact Device for Evaluation (BRIDE) has been developed. BRIDE allows for the capture, storage, codification, and analysis of impact. BRIDE also presents an initial evaluation of impact in a depth and spread matrix<sup>4</sup> and analysis of the contribution from each category<sup>5</sup>. The key examples can then be analysed more appropriately in case study narratives.

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<sup>3</sup> See Appendix C – Example of Matrix for 'Impact on Policy' Category

<sup>4</sup> See Appendix D – Matrix for the Analysis of Overall Impact

At this stage of the pilot no evidence of the impact was collected. Neither was the assessment of the depth and spread challenged. The aim of the pilot is to verify the validity of the approach and, therefore, collection of evidence was not essential at this stage.

## **Findings**

The pilot study has now completed an analysis of three Units of Assessment as they were submitted in RAE2008. These were: Business and Management, Politics and International Studies, and Applied Mathematics. It is envisaged to progress the pilot study into three further disciplines in the humanities, engineering and the arts.

The key findings were:

1. Except for academic impact, the type and volume of non-academic impact varies substantially for different disciplines.

While Politics research has most of its impact on the ‘policy’ category, Business and Management mainly affects the ‘practice’ (interpreted as the user’s community) category. Applied Mathematics appears to have little impact on the non-academic communities, however, where it has it is limited to impact on ‘practice’.

Wider social and economic impact arises for both Business and Management and Politics, but not for Applied Mathematics.

2. Boundaries around the origin of the research impact might affect some disciplines substantially.

Boundaries around the impact originated from a researcher’s advisor/expert role can have a large effect in disciplines such as Politics where academics frequently contribute to policy debates in a number of spheres. For example, based on their expertise researchers are often asked to act as expert witnesses or sit on government committees. These activities directly influence national policies. The pilot study revealed that there is quite a large impact cluster around these activities that, if outside the evaluation framework boundaries, will substantially reduce its volume.

While ‘impacts on future research’ appears to lie well within academic impact, the pilot study revealed that there are a number of these activities that affect non-academic communities. Some of the activities that originate from a research group are aimed at training and transferring knowledge to non-academic communities. This has been observed in all the UoAs investigated in the pilot study, for example, PhD programmes solely aimed at students that will join the non-academic workforce, and training programmes specifically designed for both national and international politicians.

3. The matrix evaluation approach based on depth and spread allows for a clear identification of high impact activities and mitigates against some of the fuzziness around the boundaries.

Since the pilot study was run with no boundaries around the definition of impact, it was observed that impact, such as training and knowledge transfer, could be included but assessed at a level of depth and spread that reduced their effect on the overall assessment.

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<sup>5</sup> See Appendix E – Category Contribution to Impact Analysis

BRIDE provided, for each UoA, a rich map of impact. Because of the flexibility of defining the levels of depth and spread, all categories of impact are considered independently and, therefore, there is no need to find a 'one-size-fits-all' solution. However, the analysis of the contribution of each impact category performed by BRIDE supports the understanding of the strengths of the impact submitted. While the aggregation of the single categories' matrices into one overall assessment of impact presents a strong evaluative tool.

4. The pilot study shows that it is more feasible to make some progress in assessing the impact from research than many people have previously thought. However, there are much greater difficulties in converting and integrating such a system into a comprehensive approach that a funding body could use to assess university research. It is likely that the matrix will identify areas of work for which a narrative account of impacts could be developed. Such narratives would again incorporate the notions of depth and could have various potential roles in any research assessment exercise:
  - The narratives could describe the impact from a particular study, an article from which is being nominated by a researcher as one of the examples of their work they wish to be considered in the research assessment exercise;
  - The narratives could be self-contained accounts of the impact from particular studies or streams of research irrespective of whether a publication from that stream had been nominated as one of their publications to be included in the exercise;
  - The narratives could provide a broader account of the wider impacts from the research related to the Unit of Assessment;
  - The matrix approach could then be used by the REF panel as a guide to help in the assessment of the impact narratives.

## **Conclusions**

The pilot study, currently running at Brunel, to investigate the impact of the institution's research activity has demonstrated that it is feasible to assess impacts, but impact has a number of dimensions. These dimensions have to be understood in order to set boundaries and criteria that will have the desired outcome from a research impact evaluative framework.

From an institutional perspective, analysis and assessment of research impact can serve multiple purposes. Therefore, it is essential to have a broad and flexible tool for research impact evaluation that can be easily manipulated. The pilot demonstrates that the manipulation should act on: origin of research impact, categories of impact and levels of depth and spread. Inclusion and exclusion of these dimensions will focus the analysis of impact on the desired objectives. Information about institutional research impact could be, for example, on the type of community that benefits most from Brunel's research (users, academia, policy makers, wider community), the spread it has (national, regional, international), the depth it has (transformational, revolutionary, long-term) and where the impact originated (targeted research project, training, expert advice).

The pilot study will continue by analysing other disciplines. The plan is to extend it to start collecting impact as it occurs in all areas and review the type of evidence that is available. Collection of evidence will also inform the best way to present different types of impact, such through: narrative, case studies, indicators (citations and usage indices), exemplars, and any other appropriate types of supporting evidence.

## **Acknowledgements**

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**Appendix A – Impact Depth and Spread Matrix**

		Spread			
		Limited	Enclosed	Pervasive	Global
D e p t h	Profound				
	Deep				
	Shallow				
	Surface				

## Appendix B – Impact Categories

<b>Adapted Payback Framework<sup>6</sup></b>			
<b>Classification</b>	<b>Categories</b>	<b>Definition</b>	<b>Evidence to gather</b>
<b>Impact within research sector (academic impact)</b>	Knowledge	Explicit and codified knowledge  Papers, books and book chapters can be used as a proxy	<i>Personal records of all publications, conference presentations, appearances, and other research outputs.</i>  <i>Citations and other evidence of use</i>
	Impacts on future research	Generation of new research questions; development of new methods and/or datasets; capacity building; career development	<i>Follow on research by self or others</i>  <i>Scholarships and higher degrees awarded</i>  <i>Promotions and subsequent employment of research staff</i>
<b>Impact outside sector (non-academic impact)</b>	Impacts on policy	Effects of research on policy at many levels, for example: national policy; the policy of professional bodies; the policies of departments of organisations  Includes effects on the ability, and propensity, of policy makers to use research	<i>Citation in policy documents</i>  <i>Testimony of policy makers, managers or decision makers</i>  <i>Policy documents and reports</i>  <i>Research reports</i>  <i>Patents</i>  <i>Evidence of implementation or influence</i>
	Impacts on practice	Effects on individual behaviour, which may or may not be in line with the policies of the organisation, or group to which the individual belongs	<i>Evaluation and research reports</i>
	Wider social and economic impacts	Social or economic effects that change society, including impacts on public opinion. Media coverage can be used as proxy for impact on public opinion.	

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<sup>6</sup> RAND Europe and HERG – impact of the ESRC's Future of Work Programme – Technical report 2007 (with variations in *italic* from Primary Health Care – Research Impact Project – February 2007 – sponsored by: Australian Dept. of Health and Ageing)

Appendix C – Example of Matrix for ‘Impact on Policy’ Category

**Impact on Policy**

		Spread			
		Limited	Enclosed	Pervasive	Global
D e p t h	Profound	6			2
	Deep		3	5	
	Shallow	9	8		
	Surface				7

**Appendix D – Matrix for the Analysis of Overall Impact**

		Spread				
		Limited	Enclosed	Pervasive	Global	
D e p t h	Profound	7	1	3	5	16
	Deep	2	6	2	3	13
	Shallow	2	7	4	7	20
	Surface	4	4	1	4	13
		16	18	10	19	62

**Appendix E – Category Contribution to Impact Analysis**

