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THE INVISIBLE MADE VISIBLE: THE ROLE OF EVALUATION IN INFORMING PROCESSES OF KNOWLEDGE EXCHANGE

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Abstract

Governments hoping to succeed in the Knowledge Economy increasingly view university research as a critical resource to be utilised. For industry to thrive and for policy-making to be effective, knowledge transfer must evolve into genuine knowledge exchange among all actors in the 'triple helix' but the means of achieving this are non-obvious. Through a variety of targeted funding schemes, tacit knowledge of such processes is developing but impact assessments still focus on tangible outputs.

We have found that rigorous evaluations of non-academic impacts of publicly-funded research can capture insights and good practice. We take the view that such evaluations are formative, enabling continuous organisational learning about effective knowledge transfer by both research funding bodies and participants (academic and non-academic).

We draw on several diverse evaluations of innovative funding schemes in the UK which seek to promote change at the individual, institutional or cultural level. Findings from these evaluations highlight the importance of interactive processes and an emphasis on the role of 'knowledge intermediaries' that can enhance the likelihood that research findings will be utilised beyond academia. Learning from evaluation can thus accelerate and deepen the interactive relationships between researchers and research users that can contribute to the Knowledge Economy.

1. Introduction

1.1 Increasing demand for impacts as return on investment in research

Like all governments that invest in research, the UK government hopes to see "return on investment", not only in terms of academic excellence, but also in the form of economic benefits and other societal impacts including health, culture, education, justice and well-being (RCUK 2007). There is growing understanding that the full story of generation of such impacts cannot be told in simple tales of IP licensing. Indeed the phrase "economic impact" has been defined by the UK government to include impacts on society and quality of life (RCUK 2006).

Appreciation is also growing for the level of effort required. Clearly impacts do not arise automatically even from excellent research; no convenient tap has been found which can simply be turned "on" rather than "off". Analogous to long-standing debates about the inadequacies of the 'linear model of innovation' (e.g. Tait and Williams 1999), there is growing recognition that processes involved are neither unidirectional nor simple, as implied in the older phrase "knowledge (or technology) transfer". Rather, they are two-way (at least), complex and non-linear. So, increasingly, "knowledge exchange" (KE) is seen as a focus of concern among those hoping to see non-academic impacts from research (ESRC 2009).

Most reflections upon generation of innovation arising from research have focussed on the natural sciences, which fits into a relatively well-delineated web of relationships and pathways leading toward commercialisation. Effective facilitation of knowledge exchange from social sciences resulting in impacts on policy and professional practice presents particular challenges (Meagher et al 2008). Yet, if light can be shed on this apparently more problematic area, insights illuminated may be relevant to more typical knowledge exchange/ commercialisation processes involving the natural sciences as well.

We have conducted several evaluations of such non-academic impacts arising from publicly-funded research in the social sciences. In the process we have learned about the elusive, subtle, diffuse and long-term nature of impacts which, even where identifiable, can be virtually impossible to attribute to individual research projects. But these evaluation challenges can also be seen as opportunities – chances to deconstruct and improve understanding of those processes which can mean that research has a greater impact beyond academia. By identifying what characterises these knowledge exchange processes we can help researchers and research funders to adopt them more readily in the future in ways that complement (rather than conflict with) the generation of excellent research.

Within the broad arena of knowledge exchange, there are of course many interacting parameters, processes and roles that contribute to the generation of impacts on the economy and society from research. This paper focuses on two key aspects of the KE and offers five recommendations for policy-makers and others engaged in the process[1].

1.2 Challenges: culture change and accountability

For those seeking to bring about non-academic benefits from research, at least two key challenges exist:

the actual KE processes through which research generates return to society can be subtle and elusive
improvement of KE processes calls for attitudinal and behavioural changes at multiple levels

These challenges are not automatically addressed through typical research grants; even when asked to report on any non-academic impacts, most busy academics will cite dissemination activities such as a press release, a briefing paper or a talk at the end of a research project, on the assumption that such post hoc dissemination alone is sufficient for uptake.

In recognition of the complexity and level of effort required for knowledge exchange that goes beyond dissemination, a variety of funding schemes have been developed in the UK with the aim of catalysing positive impacts upon industry and society, while also underpinning fundamental research. These schemes tend to promote interactions between researchers and non-academic stakeholders during a funded project or programme: in actuality, such schemes strive to bring about change at several levels – individual, institutional, cultural and relationships. Examples include industry support for PhD students (e.g. CASE studentships); engaging non-academic organisations in co-funded research projects (e.g. Knowledge Transfer Partnerships); and thematic programmes which require involvement of non-academics (e.g. the cross-council PACCIT programme).

[1] We draw on examples from the "hard case" of social science research; by exploring KE processes and roles in this area we hope to shed light on other fields of inquiry.

Whenever public funds are expended, some form of accountability is expected. While we may debate its exact nature, some measure of academic excellence has become the norm but definitions have not yet coalesced about appropriate metrics for assessing non-academic impacts of research (Molas-Gallart et al 2002). Particular evaluation challenges include variation across disciplines and sectors in the sorts of impacts generated while a core challenge lies in the intangible nature of many non-academic impacts: a policy-maker might incorporate an additional dimension into her/his thinking as a result of social science findings, but never directly acknowledge that work. Finally, the timescale over which impacts develop is likely to be much longer than the end-of-project window accessed by most evaluations.

1.3 Impact evaluation across projects as formative, "meta-evaluation"

Despite these challenges, appropriate evaluation can provide useful organisational learning about the dynamics, effective catalysis and implementation of knowledge exchange. Sensitive evaluation can contribute to enhanced understanding on the part of those promoting impact-generation (including policy-makers, funders and scheme managers) and those tasked with delivering impacts (both academics and non-academics).

An array of types of impacts is currently adopted (e.g. Nutley et al 2007) such as:

Instrumental use ("direct impact of research on policy and practice decisions")

Conceptual use ("where research changes ways of thinking, alerting policy makers and practitioners to an issue or playing a more general 'consciousness-raising role')

Capacity-building (this can refer to education, training or even development of collaborative abilities)

We have also suggested (Meagher 2008b) that there are also process-oriented impacts that can be identified in the shorter-term, such as:

positive changes in institutional cultures and individual attitudes toward knowledge exchange

enduring connectivity, when researchers and prospective users stay in contact even after a funded project ends.

Ultimately, of course, improved knowledge exchange processes mean a greater likelihood of economic and societal benefits. Inevitably, and reasonably, funders of research will want a "summative evaluation" in order to gain a sense of what happened at the end of the project, programme or scheme. Yet, when it goes beyond ticking the boxes of tangible accomplishments, deeper evaluation can also capture insights and lessons learned that can contribute to future efforts, for example in designing new schemes or in delivering new programmes. Although taking place at an endpoint, this can serve as "formative evaluation" in the sense of learning that may help to inform subsequent efforts.

Ideally, evaluation of impact generation from research can thus be both summative and formative. In this way, each scheme or programme evaluation can be seen as adding

cumulatively to organisational learning in the broadest sense, so that our understanding of knowledge exchange and impact generation improves over time.

As natural scientists sometimes draw together data from numerous, varied experiments (for example, assessments of endangerment of multiple species in an overview "meta-analysis" of biodiversity dynamics), so we suggest that insights, if not hard data, can be drawn together from multiple evaluations to illuminate knowledge exchange dynamics. Thus, we will highlight here key findings from several evaluations and draw inferences for the promotion and support of knowledge exchange processes.

2. Learning from evaluation

2.1 Overview of contributing studies

Evaluations may vary in structure and purpose: they can be formal summative assessments; a formal mix of summative and formative approaches, less formal "reviews" or indeed on-going formative evaluations that keep pace with programmes as they unfold. Our evaluation 'toolkit' includes both quantitative methods (such as surveys and document analysis) and qualitative methods (such as semi-structured interviews, focus groups and development of detailed case studies). In this paper, we reflect on insights from five evaluations that we have conducted in the UK. These studies provide insights into processes and steps toward impacts while, at the same time, recognising the inevitable heterogeneity that exists among researchers, research problems and users (Meagher et al 2008). All five studies involved funding strategies oriented toward generating both academic and non-academic impacts by encouraging new modes of behaviour, interaction and communication. These evaluations (short summaries of which are given in Table 1) lead us to two key findings: the importance of understanding interactive processes and the importance of recognising and supporting key roles.

RDG: The Research Development Scheme of the (then) Scottish Higher Education Funding Council funded a diverse array of new centres intended to allow Scottish researchers to develop research excellence in emerging areas; often interdisciplinary and/or inter-institutional collaborations, these were encouraged to transfer knowledge (usually in natural sciences) as well as conduct excellent research. We conducted two evaluations of the scheme, covering 57 centres launched in 1997, 1998 and 1999. **www.sfc.ac.uk/information/info_circulars/sfc/2006/sfc3306/sfc_33_06.pdf**
RELU: The Rural Economy and Land Use Programme is an inherently interdisciplinary programme funded by several UK Research Councils and government departments to address societal problems through newly integrated approaches. We were asked (in 2006-2007) by the Programme to evaluate the effectiveness of its own internal seed-funding scheme in aiding the development of projects which combined disciplines and, often, academics and stakeholders. **www.relu.ac.uk/news/RELU%20FINAL%20REPORT%2012%2003%2007LMEAGHER.doc**
Psychology: We conducted both an evaluation of impacts from the Economic and Social Research Council's (ESRC) response-mode awards for psychology research (total of 134 ending in 1998, 2001, 2004) and a critical reflection on the various methodologies for capturing

impacts of such research. **www.esrcsocietytoday.ac.uk/ESRCInfoCentre/Support/Evaluation/publications**
Research Brokerage: The ESRC has funded a variety of individuals and activities to promote both communication and knowledge transfer related to its larger ventures. We conducted a review of this heterogeneous set, which included, for example, funded communications or KT personnel at a centre or programme, central communications staff, etc. **(Meagher 2008a)**
PACCIT: The People at the Centre of Computers and Information Technology programme was funded by EPSRC, ESRC and then-DTI, as well as non-academic partners, to facilitate cutting-edge research in a variety of projects that involved prospective users of their findings. We were asked to evaluate non-academic impacts of this programme; in so doing we not only analysed examples of impacts but we also looked at the processes and steps involved in generation of impacts over time (Meagher 2008b). To be posted on: **www.esrcsocietytoday.ac.uk/ESRCInfoCentre/Support/Evaluation/publications/index.aspx**

Table 1: Contributing studies of publicly-funded research and KE investments

2.2 Understanding processes: Knowledge flows and interactions

Throughout these evaluations, we have found that, in order to understand how impacts are or can be generated, it is important to have a contextual "big picture" view of how knowledge flows and circulates and feeds back during the process of knowledge exchange. The conceptual framework underpinning our Psychology evaluation (Meagher and Lyall 2007), for example, built on previous work (e.g. Davies et al 2005; Mollas-Gallart et al 2000) and highlighted the importance of network interaction and multiple flows of knowledge, focusing on the multi-lateral relationships between knowledge producers, knowledge brokers and knowledge users. This framework emphasised the heterogeneous nature of such knowledge flows – among research subjects, institutional contexts, potential stakeholders/users, knowledge intermediaries, and so on. Developing an understanding of how knowledge flows beyond and after a particular research project has ended is critical given the complexity and interwoven parameters involved between research and ultimate impacts and the challenges inherent in identifying intangible, long-term impacts and the further challenge in attributing causality.

Recommendation: We would recommend using some sort of flow model or conceptual framework to help in elaborating the different types of knowledge flows and network interactions involved in generating non-academic impacts from research.

Whenever we look for impacts we have found it necessary to focus on knowledge exchange, impact-generating processes. Such processes are often subtle yet it is possible to learn about and from them and to gain a general sense of how impacts develop over time, in order to identify likely steps on a pathway toward impacts.
It may therefore be helpful to think in terms of stages of development of impacts although, of course, this is an ideal: in reality, processes are messy and do not proceed neatly in a linear fashion through each of these stages. It is useful, however, to get an indicative sense of the degree of connectivity between researchers and potential

research users even after the research project concludes. During the PACCIT study, for example, we asked respondents to indicate which of the following stages they felt their work had reached at the time of survey:

Stage	Characterised by:
1	Dialogue/networking between academics/non-academics
2	Joint knowledge exchange activities e.g. workshops, training, reciprocal visits between academics/non-academics
3	Active ongoing collaboration e.g. follow-on research, new pilot projects
4	Utilisation of research ideas e.g. informing new policies or company research strategies
5	Utilisation of research findings e.g. impact on policy/practice, use in development of new products

In all of our evaluations we have seen indications of change in attitude or in culture as impacts of working with non-academics; sometimes too we have seen follow-on activity. With PACCIT, we were then able to drill down most rigorously into these changes. We found that it is both possible and useful to capture as impacts: Attitudinal/Institutional Change and Enduring Connectivity (between academics and non-academics). We also found that, a few years after the programme, these changes together represented some two thirds of the impacts that surveyed participants viewed as 'Achieved' and over half of the impacts that participants viewed as 'In Progress' (compared with Capacity building, Conceptual and Instrumental impacts).

These process-embodied impacts are important in and of themselves, and have the advantages of occurring in the short-term, within the window of typical evaluations, and of lending themselves to attributions of causality. (A researcher, for example, can reflect directly on whether or not s/he has become more positively inclined toward working with non-academics in the future.)

We would suggest further that these two near-term impacts can be forerunners of later, more conventionally assessed, impacts; they may be able to be used as "proxy indicators" of enhanced likelihood that such other impacts will eventually manifest.

Recommendation: When attempting to evaluate non-academic impacts from research, consider including 'Attitudinal and Institutional Change' and 'Enduring Connectivity' as both impacts and 'proxy indicators' of future impacts.

Recommendation: When attempting to facilitate the generation of impacts from research, encourage self-aware change in attitudes and institutional support and also provide incentives/support for activities that serve to connect academics and prospective users of research findings even after the formal end of a project, programme or scheme.

2.3 Understanding key roles: Acknowledging the importance of 'knowledge intermediaries'

In every evaluation we have conducted, we have sought lessons learned by participants and have uncovered a significant body of tacit knowledge as to what works and what does not. One of the key points of learning has been the critical role of 'knowledge

intermediaries'. Funding bodies themselves can act as knowledge intermediaries, as can individual researchers (occasionally), university units, dedicated staff hired by a research centre, advisory board members or indeed a wide range of individuals who inhabit a professional space between academics and non-academics. As an example of the capacity of evaluation to illuminate critical roles and parameters of processes leading toward impacts, we will focus briefly here on this role. Variously named and defined, Knowledge Intermediaries, Research Brokers or Boundary Spanners act at the interface between researchers and non-academics who might utilise research understanding, facilitating productive communication, dialogue, interactions and/or relationship-building. However termed, these individuals, units or organisations can play a crucial role far beyond technical management of intellectual property contracts, by bringing together academics and non-academics, helping them to find a common language, assisting them in distilling problems in ways that are meaningful to all involved, and facilitating a variety of interactive events and dialogue that, when sustained, enhance the likelihood that research findings will be utilised.

When studied collectively across those evaluations that we have conducted, we see that a considerable experience and tacit knowledge exists about the role of Knowledge Intermediaries. Yet this knowledge is latent and the role is not necessarily fully recognised by either funders or researchers – or indeed often by the knowledge intermediaries themselves.

In the RDG evaluation, for example, we often heard centre directors speak about the importance of liaison staff, who facilitated connections among individuals, institutions, disciplines and sectors. In the Psychology Impacts study, we uncovered a surprising heterogeneity among Knowledge Intermediaries. Some of these we had anticipated (e.g. those in the media or in the psychologists' professional body) but we also demonstrated the existence of a wide diversity of individuals, often independently employed, who acted as "go-betweens" distilling research information for use by particular non-academic bodies, such as groups of international CEOs, members of a criminal justice panel, teachers of the deaf, or police educators. Such well-informed, highly motivated individuals who can translate research findings in targeted ways may be an under-utilised knowledge exchange resource. In the PACCIT evaluation, we again found that individuals played important Knowledge Intermediary roles. PACCIT award-holders identified many such facilitation roles including help in ongoing networking (with other academics, disciplines, and/or non-academics) and help in providing credibility (with home institution, non-academics, and/or funders).

In our review of various ESRC Research Brokerage mechanisms we found that non-academic impacts from ESRC-funded research were more likely when genuine connectivity existed between researchers and stakeholders with some degree of proximity throughout the research. This required time, effort and resources to build long-term user/researcher relationships. Likely indicators of success include investment 'at the coalface' which allowed for flexibility and individuality and recognition of research brokerage as a specialised role, as well as specialist training (such as media training) and pro-actively facilitating the sharing of good practice among other knowledge intermediaries.

Recommendation: Structure, mine and use evaluations to shed light on critical components of knowledge exchange, to encourage enhancement of processes involved and thus to increase ultimate impacts generated from research

Recommendation: Recognise the essence of the Knowledge Intermediary role and the many shapes it can take, provide incentives for involvement of Knowledge Intermediaries, make explicit and share widely tacit understanding of how best to use Knowledge Intermediaries.

3. Conclusions

Through their research funding bodies, governments hope to encourage the generation of economic and societal impacts from excellent research. But there is a need to acknowledge that some worthwhile impacts may be less amenable to measurement and only achieved in the long-term – at which point it will probably be impossible to identify a direct link to an individual research project.

In the face of this accountability conundrum, we have found that rigorous, qualitative and quantitative evaluations of non-academic impacts of research can be conducted in such a way as to address both immediate questions and longer-term challenges. We have found that process-embodied impacts and interactions can serve as indicators of likely impacts-in-progress. By capturing these shorter-term indicators it is possible to signal future impacts more generally categorised as instrumental, conceptual or capacity-building. Thus two "summative" evaluation objectives are addressed.

Insightful evaluation can deepen understanding of knowledge exchange processes and can be used to capture and share good practice and advice or recommendations from both academic and non-academic participants in innovative funding schemes. Through evaluation, it is possible to identify the nature of knowledge flows, the types of effective processes and the key roles involved when research does lead toward impacts on the economy and society. The role of the Knowledge Intermediary is one example of a critical component common to many successful knowledge exchange situations.

We take the long view that each experimental funding scheme can represent a stage in development of understanding. In an important sense, such evaluations can be viewed as "formative", in that they inform policymakers/funders' design of future schemes and academic and non-academic participants' implementation of knowledge exchange. Contributions of continuous organisational learning about paradigms of effective knowledge exchange can thus be made to a dynamic evolving system of innovation in which the generation from research of impacts on the economy and society can be accelerated or enhanced.

In conclusion, we recommend that policy-makers, research funders and those responsible for schemes promoting knowledge exchange, learn through appropriate evaluations that make explicit an emerging body of tacit understanding of key knowledge flows, processes and roles. Learning from evaluation can accelerate and deepen the interactive relationships between academics and industry or other non-academics that can contribute to the Knowledge Economy. We also recommend that implementers – academic and non-academic participants in knowledge exchange – are enabled to share and benefit from this learning.

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