Evaluating CREW: Assessing impact of research on policy

Cover photograph: Participants at a CREW workshop to identify capacity building projects

Contents

EXECUTIVE SUMMARY

The Evaluating Science Policy Practice Interfaces (ESPPI) project supports the Centre of Expertise for Waters (CREW), in its aim to better connect water research and water policy by building networks, increasing capacity, and making an impact. Identifying and assessing research impact is seen to be challenging, therefore we have undertaken a review of how research impact on policy is evaluated.

Key findings

- Understanding 'impact' is essential in order to achieve CREW's objective for improved environmental, social and economic outcomes for those involved in water management.
- Impact is more than dissemination and means making a difference. Impact can be about building capability or capacity to act; building knowledge or changing a way of behaving (conceptual impact); or making a concrete change (instrumental impact).
- Impact is more likely when research is co-constructed with research users and is designed with a specific context and use in mind. It requires on-going knowledge exchange and dedicated resources and skills to ensure that this occurs.
- Impact can be reduced if the research is not clearly communicated or lacks credibility.
- There are many challenges to assessing impact including time-lags, problems of attribution, uncertainty, and the resource intensive nature of a full evaluation.
- Impact assessment can forward track from research to the impact on policy or backward track from the change in policy to the research that precipitated this.
- There are many methods with different strengths and weaknesses. There are also some conceptual frameworks that combine methods, although none of these are directly appropriate for CREW.
- Findings from the review indicate that evaluating CREW should involve forward tracking, based on a robust conceptual framework, criteria for evaluation, and indicators of achievement agreed with CREW management and Scottish Government RESAS reporting leads. Once these are agreed we can identify data needed for the evaluation, and methods of data collection and analysis.

What is impact?

Very broadly, impact is defined as 'the end results of a programme for the people it was intended to serve' (Weiss, 1998). The literature identifies three main types of impact:

- **Building capability** at the individual, organisational or national level is an impact arising from the research process itself, i.e. the skills that are developed by those undertaking the research, and its exchange with research users (ESRC, 2009, OPM, 2005).
- **Conceptual impacts** refer to an intervention that increases understanding and creates a change in knowledge and direction of thinking, informing debates that lead to developments in policy and practice (OPM, 2005).
- **Instrumental impacts** influence the development of policy and practice, shape behaviour, and alter legislation. These impacts directly influence changes in policy, practice and behaviour (Mandell, 2001, Davies, 2005) and contribute to wider well-being via social impacts.

Challenges of measuring impact

Evaluation is widely agreed to involve assessment of outcomes, i.e. the impact made by the research as well as assessment of the processes involved in producing research findings. Impact evaluation is agreed to be the most difficult type. Some of these challenges relate to the nature of impact assessment; others are about methods for assessing impact. For example, there are difficulties in that not all impacts are direct, nor involve linear relationships between research findings and their impact. Apparent impact in the short term can be very different to the long term impacts. It is also particularly difficult to attribute impact directly to research findings when there are other factors which influence policy and practice.

Factors promoting impact

Studies e.g. ESRC (2009) and Young (2008) have found that the most important factors for generating impact are:

- Research is focussed on current policy problems with clear objectives;
- Good relationships and networks exist between researchers and the relevant research users;
- Users are involved throughout the research process (co-construction of knowledge rather than knowledge transfer);
- Engagement between researchers and users, and knowledge exchange strategies are planned in advance;
- Reputations of researchers are built from a strong portfolio of research;
- Good infrastructure and management support exist for researchers; and
- Knowledge brokers (intermediaries) are used to translate research findings (compelling 'stories' need to be synthesized from the research findings).

Evaluating impact

Two broad categories for assessing impact exist; tracking forward and tracking backward (OPM, 2005). Within these two categories, there are many approaches to measuring or assessing the impact of research, though none in itself will provide a comprehensive answer. It is widely agreed that the use of multiple methods at any one time offers the best results, with some capturing information on the diversity of impacts and others on the processes by which those impacts do, or have the potential to, occur (Kanninen, 2006). The literature notes that the purpose of an evaluation needs to be explicit before developing an evaluation design (Rogers, 2009), and that evaluation is carried out within a conceptual framework of how the research objectives will make the desired impacts.

Implications for ESPPI-CREW

We propose the Research Excellence Framework (REF) definition underpins assessment of impact in evaluating CREW - *an effect on, change or benefit to the economy, society, culture, public policy or services, health, the environment or quality of life, [that extends] beyond academia*. The evaluation methodology will be based on a theory of change and a conceptual framework, and will involve forward tracking to identify conceptual, capacity building and instrumental impacts. We propose to identify evaluation criteria (and indicators of achievement of these) to be discussed with CREW management and the Scottish Government RESAS reporting policy lead. Once these have been agreed, we will identify the data needed to assess achievement and the collection and analysis methods for each of the three main types of impact.

1.0   INTRODUCTION

Evaluating CREW's science policy and practice interfaces

This review was undertaken as part of the Evaluating Science Policy Practice Interfaces (ESPPI) project funded by CREW. ESPPI supports CREW in its aim to better connect water research and water policy by building networks, increasing capacity, and making an impact. Identifying and assessing research impact is seen to be challenging, therefore we have undertaken a review of how research impact on policy is evaluated.

ESPPI CREW aims to:

- Understand existing science: policy: practice interfaces;
- Measure and analyse how CREW's structure, members and activities contribute towards these interfaces; and
- Evaluate performance and suggest ways to improve links between research, policy and implementation.

Through these, ESPPI-CREW will enable CREW management to learn what helps and what hinders its aims in increasing:

- the networks between researchers, policy makers and practitioners in the field of water management (both the coverage and the quality of interactions);
- the skills and capacity of researchers to share knowledge appropriately and in response to policy/practitioner demand; and
- the impact of knowledge generated by CREW activities, such that it can lead to improved environmental, social and economic outcomes.

This review provides insights into how to evaluate the impact made by knowledge created by CREW activities and whether such impact leads to improved environmental, social and economic outcomes via evidence-based water management.

It is widely recognised that impact is more likely to occur when research is co-constructed with research users and is designed with a specific context and use in mind. Knowledge needs to be produced via engagement of researchers and policy makers throughout the policy and research processes, and the outputs communicated in the right way, at the right time, to the right people to produce outcomes which may have an impact. Dissemination of research is not in itself sufficient to have impact.

Why evaluate impact?

CREW was established to better connect water research and policy. Evaluation of the centre's performance is important for accountability and also to learn from experience how to maximise CREW's potential to progress effective management of water resources.

More generally, evaluation of research impact is important to ensure evidence is informing policy development. Studies have shown that limited use is being made of available scientific evidence, leading to a lessened impact of research on policy (Percy-Smith, 2002; Percy-Smith, 2000; WHO, 2004). Research stemming solely from a science driven agenda often fails to make an impact on policy.

There is growing interest in measuring and assessing the impact of research on policy. The UK research councils, international organisations, large scale research funders, including the Scottish

Government, and more recently, scientists working in universities and research institutes are all increasingly concerned with establishing research impact (Boaz et al., 2009).

The motivations for this interest are numerous and varied but often depend on whether the organisation is a research funder or research provider. Motivations include accountability, improved performance, organisational promotion, and ensuring value for money. These may be heightened in the current economic climate of 'austerity', and because of increased competition for funding amongst research institutions (Rymer, 2011).

Review methods
The review sought to identify:
- Discursive articles on research impact;
- Approaches to and challenges in assessing research impact;
- Reflective articles on assessing the impact of research on policy;
- Descriptive accounts of approaches to assessing the impact of research on policy; and
- Specific approaches and challenges to assessing research impact on environmental policy.

Our search strategy was limited to web searches using key words, and citation tracking. Our focus was on practical approaches to assessing impact rather than theory based methods, so grey rather than academic literature was sourced. The search used citation tracking from source material. This involved following up references identified from documents reviewed in the initial stages of the search, and proved to be a useful approach to sourcing relevant material. Despite this we found very few empirical evaluations assessing research impact. We established that much of the work on impact evaluation is theoretical, and most commonly from areas of social policy, notably health care; few discussed approaches to evaluating impact and their relative limitations in the context of environmental policy.

2.0   WHAT IS IMPACT?

Defining impact
Literature from the international development field on evaluating the impact of research on policy (see for example, Carden, 2005; White, 2009) distinguishes research influence on policy (which is what researchers can promote) from research impact (which is the role of policy makers). Most of the literature on evaluating impact, however, defines impact without this distinction, seeing both researchers and policy makers as involved in ensuring research findings make an impact on policy (OPM, 2005; REF, 2011; Boaz et al., 2009).

In the literature it is widely agreed that identifying robust indicators of impact is difficult, and that dissemination of research (publishing research outputs and communicating research evidence to policy communities) does not constitute impact. Rather, it is the use or application of the research evidence that constitutes impact.

Impact is defined in the literature both broadly and in some detail. For Weiss (1998:8) impact is 'the end results of a programme for the people it was intended to serve'. For the ESRC (2011), impact refers to:

- research processes that aim to affect policy development;
- use of research evidence in policy development;
- wide use of research findings;

- results of affecting policy; and
- changed social practices.

Other definitions include additional elements of impact (Meagher, et al., 2008):

- knowledge production;
- research capacity building;
- policy or product development;
- sector benefits;
- wider societal benefits.

The ESRC impact definition includes research processes that aim to affect policy development. This acknowledges the many factors (other than research) impacting on policy, making sole attribution of impact to specific research evidence difficult, if not impossible. Because of this, and additional difficulties in directly linking research to its impact, some authors (see for example Meagher, et al., 2008**)** suggest that the best proxy for assessing impact is identifying the processes that lead to high quality exchanges of knowledge between scientists and research users.

The Research Excellence Framework (2012) identifies impact as a key element (alongside outputs and environment) of evaluating research excellence. Research Excellence Framework (2011) defines impact as:

> *"an effect on, change or benefit to the economy, society, culture, public policy or services, health, the environment or quality of life,* [that extends] *beyond academia"*.

Impact in this definition includes, but is not limited to:
- an effect on, change, or benefit to: the activity, attitude, awareness, behaviour, capacity, opportunity, performance, policy, practice, process or understanding of an audience, beneficiary, community, constituency, organisation or individuals in any geographic location whether locally, regionally, nationally or internationally; and
- the reduction or prevention of harm, risk, cost, or other negative effects.

We propose using this definition as the basis for evaluating CREW impact. It is sufficiently broad in its identification of the potential beneficiaries of research evidence relevant to the work of the centre. While CREW focuses on making an impact on policy and practice in the water arena, the REF definition also reflects the potential implications of CREW impact from the individual to the international level. REF has also outlined broad generic criteria (reach and significance of the stated impact/benefit) for assessing impact, and criteria include institutional support for and enabling of impact. Both of these are relevant for CREW.

Types of impact
The literature identifies three main types of impact:

- **Capacity building impacts** at the individual, organisational or national level are impacts arising from the research process itself, the skills that are developed by those undertaking the research, their availability to work on such projects, and exchange with research users (ESRC, 2009; OPM, 2005). Capacity building impacts can also include the transfer of people and skills across the researcher/user interface, e.g. through two-way secondments.
- **Conceptual impacts** refer to an intervention that increases understanding and creates a change in direction in knowledge and thinking, informing debates that lead to developments in policy and practice (OPM, 2005).

- **Instrumental impacts** influence the development of policy and practice, shape behaviour, and alter legislation. These impacts directly influence changes in policy, practice and behaviour and contribute to wider well-being via social impacts (Mandell, 2001; Davies, 2005; Meagher et al., 2008; Joubert, 2007; Nutley, 2009; RCUK, 2011; HM Treasury, 2011; SFC, 2011).

The literature also notes cultural benefits, which reflect a more subtle impact of a research project or wider research programme, whereby other researchers or research users demonstrate an increased willingness to engage in the research process (Armstrong, 2009).

Determining why impact is being evaluated and which impacts are to be considered, is the first step in designing an evaluation (Shaw and Bell, 2010). CREW aims to make conceptual, instrumental, and capacity building impacts, via increasing networks; research that is designed to meet specific policy needs for evidence; and increasing capacity in the James Hutton Institute and Scottish HEIs to undertake this work.

The literature notes that impact may be immediate, intermediate, or long term. In all cases, sufficient time needs to be allowed for impact to occur, yet not so long that signs of impact are lost (OPM, 2005). It is also recognised that impacts can be both positive and negative. An example of a negative impact is the influential research (Wakefield, 1998) on the link between the MMR vaccine and autism in young children. This research led to a reduction in the number of parents taking up MMR vaccination for their children and a consequent rise in incidence of measles, mumps and rubella in many different countries despite the research being flawed (Poland & Jacobson, 2011).

3.0   ACHIEVING RESEARCH IMPACT

In order to achieve research impact, it is necessary to understand the logic of why and how that impact is expected to be achieved. To help facilitate this, we have adopted a 'theory of change' (figure 1). The process involves creating a 'theory' or 'pathway' of the different steps and interventions needed to get to the end goal. In this case this is to explain how the CREW objectives fit together and can be evaluated, and demonstrate that in order for instrumental changes to occur, network generation and capacity building are also required.
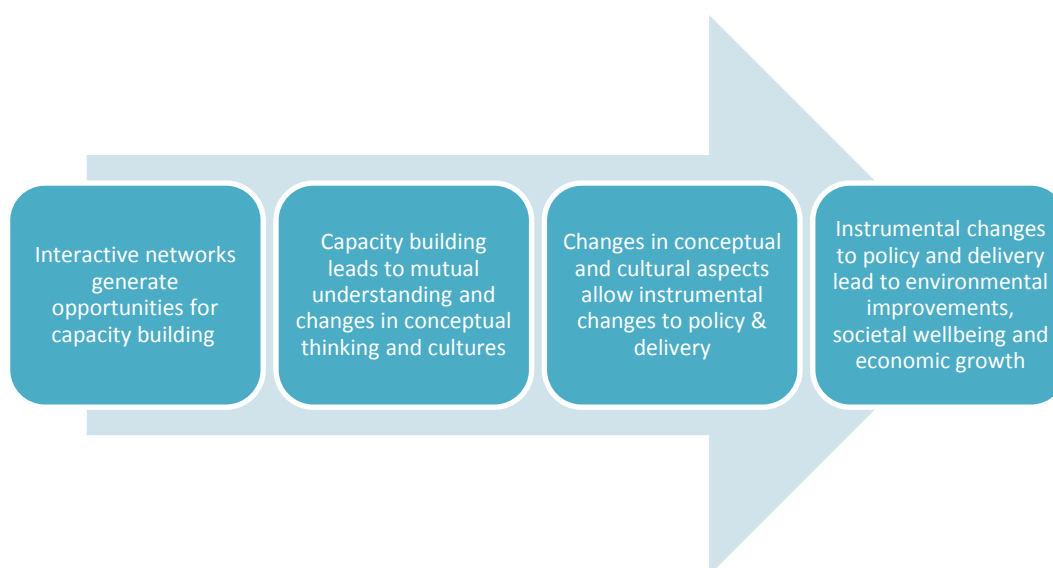

Figure 1 The Theory of Change process adopted in the evaluation of CREW

Barriers to achieving impact

Identifying the barriers to research uptake allow them to be minimised by the research provider. Various barriers to research use have been identified (Maclennan, 1999; Percy-Smith, 2002; Percy-Smith, 2005). The barriers are set out here using Lavis et al.'s (2003) taxonomy of knowledge transfer: context, messenger, message, process of communication/ transfer, and audience.

Context

The research must be relevant to its target audiences and their own aims. This is the case for research content, timing and geographic scope. If, for instance, content is not aligned with the user organisation's policy targets, or not presenting findings at the required scale, then use of research results, and thus impact, is likely to be lessened (Percy-Smith, 2002). The timing of research publication is of equal interest. The mismatch of science and policy timescales is well recognised. Research outputs timed to coincide with relevant activities by the policy user have a greater potential impact. Impact has also been found to be low when research findings do not support current directions in existing policies has also been found to affect its use (Percy-Smith, 2002).

Messenger

The motives for the research and the authoritativeness of the source moderate its use. Research commissioned by policy users is more likely to have an effect on policy (Percy-Smith, 2002). This may be linked to the increased potential impact of timely and relevant research; presuming that these characteristics of research are more likely to be embedded in user-specified research.

Message

Research has to be accessible. Most people working in policy will not have a scientific background. Outputs need to be in appropriate formats e.g. summaries, identification of key points, use of bullet points, recommendations, and action points. Clearly stated implications for policy and practice should be presented first and highlight the conclusions that can and cannot be drawn from the research (Percy-Smith, 2005; Maclennan, 1999). Research findings should be clear and written in plain English, and be jargon free (Fraser, 1999). Research that draws conclusions and policy implications using findings from a body of research rather than from one study is thought to have greater impact (Lavis, 2003).

Process of transfer/ communication

While dissemination alone is not an indicator of impact, how research findings are disseminated and communicated is an important factor in whether or not findings are understood and used (OPM, 2005; ESRC, 2009). Dissemination can be passive or active, with the former being untargeted, e.g. publishing outputs on a website, and the latter tailored to a specific audience or beneficiary. Active methods include face-to-face activities such as workshops. Active dissemination has been found to increase the likelihood of the research being used by the intended audience; the face-to-face approaches to dissemination help to raise awareness, allowing for dialogue and discussion, which in turn supports research use (Walter, 2003).

Audience

The receptiveness of the research audience is largely outwith the research provider's control and is associated with the culture of recipient organisations, including their approaches to research results.

This factor acknowledges that where impact does not occur this may be due to inactive or unwilling external parties (research users) (Percy-Smith, 2002).

Factors promoting impact

Studies e.g. ESRC (2009) and Young (2008) found that the most important factors for generating impact are:

- Research is focussed on current policy problems, and has clear objectives;
- Good relationships and networks exist between researchers and the relevant research users;
- Users are involved throughout the research process (co-construction of knowledge rather than knowledge transfer);
- Engagement between researchers and users, and knowledge exchange strategies are planned in advance;
- Reputations of researchers (as recognised by research users) are built from a strong portfolio of research;
- Good infrastructure and management support is in place for researchers;
- Knowledge brokers (intermediaries) are used to translate research findings (compelling 'stories' need to be synthesized from the research findings).

These indicators could be used by CREW evaluators to assess how far CREW research has the potential required for achieving impact.

4.0   CHALLENGES OF ASSESSING IMPACT

Evaluation is widely agreed to involve assessment of outcomes, i.e. the impact made by the research, as well as assessment of the processes involved in producing research findings. Process evaluation involves assessment of the implementation of knowledge exchange (KE), and is widely viewed as the most straightforward, so long as appropriate aims and objectives are identified for the KE interaction, and the evaluation is of performance against these. Measuring the impact of research is more challenging. Some of the challenges noted below cover the nature of impact assessment; others relate to the methods for assessing impact.

Nature of impact assessment

The relationship between the research, its transfer or exchange, and social, environmental and economic outcomes is complex (Rymer, 2011; Kanninen, 2006). Not all impacts are direct, nor involve linear relationships between research findings and their impact. Apparent impact in the short term can be very different to the long term impacts; full impact may not be realised until some other external event occurs, or the original work is endorsed/supported by other research.

Difficulties with time-lags are widely acknowledged (ESRC, 2011; DTZ, 2010; Kanninen, 2006). The time interval between research publication and when its benefits become apparent can be substantial, unpredictable, and may differ depending on the type of research or its disciplinary basis. As the time interval increases, the difficulties in attributing impact to particular research outputs also increases (Boaz et al., 2008).

The literature notes that research by its nature is often speculative, and any impact still only latent. In this case potential impacts could be attributed, identifying the intended user or beneficiary and its anticipated potential impact (ESRC, 2011; Davies, 2005; DTZ, 2010). However, the literature recognizes that even the best outcome could have no impact because of external influences.

Assessing impact involves establishing what would have been the policy outcome without the input of the research (the counterfactual) (DTZ, 2010). It also requires the establishment of a baseline/benchmark, and identification of other factors (contextual, co-incidental) that may influence observed change. Establishing the counterfactual can be challenging. For CREW, this means asking whether the policy change would have happened anyway without this intervention, and whether a different intervention would have been equally good, or better, at achieving the same aims and objectives.

The issue of perspective is also acknowledged in the literature. Impact from research may not be recognised as beneficial to all audiences (Rymer, 2011; Kuruvilla, 2006). For example, industry may view research impact as negative if it means accommodating increased regulation, while conservationists may view the same research as positive if it helps reduce environmental degradation.

Methodological issues
Despite the multitude of measures available to assess impact, none (either singly or used in combination) can lead to a definitive conclusion. Any interpretation of an evaluation has to take into account the inherent uncertainties involved (Rymer, 2011; Kanninen, 2006). Deciding which methods best suit the research questions and available resources can have an effect on the impact evaluation (Shaw, 2010).

Using long term policy outcomes to define research impact raises issues of attribution (Boaz et al., 2008; Kanninen, 2006). It is difficult, perhaps impossible, to separate out the effects of a particular knowledge exchange initiative or research output given the influence of wider social, political, economic, institutional and cultural factors acting on policy. The key challenge is to attribute impacts to a particular piece of research or to attribute aspects of a change (since it is unlikely to be a sole attribution) to a specific intervention. This attribution is likely to decrease over time and as policy is affected by many factors (Boaz et al., 2009).

These challenges mean that in evaluating impact there needs to be clarity about who defines 'impact' - the researcher, the user or both? The literature indicates that research users need to give a clear steer on what constitutes impacts from research, the relative prioritisation of those impacts, and on-going engagement on how impact can be best achieved. For ESPPI-CREW, a key question is what is the desired impact of CREW work?

Specific issues for assessing impact on environmental policy
Much of the work reviewed here is in areas of social policy, particularly health care; however, specific issues for assessing research impact on environmental policy were also sought. Some authors e.g. Boaz et al. (2008) consider that the impact of research on policy can be measured with a universal toolbox of methods across disciplines and policy domains including environmental policy. The literature, however, identifies a number of specific factors to consider in this area:

- The inter- and trans-disciplinary approach of environmental research and policy needs to be taken into account (Kivimaa, 2007; Shaw, 2010);
- In some circumstances, policy impact may only occur if environmental research is acted upon immediately. In this case, it may be pertinent to assess the actual impact of research rather than its potential (Shaw and Bell, 2010);
- Environmental science is subject to uncertainty and caveats. Evaluations may want to consider how these uncertainties have affected the potential impact of the research.

Therefore, any evaluation of impact for CREW will have to recognise that results are contingent, partial, and uncertain, based on the opinions and judgements of those involved in CREW. Our evaluation methodology will have to take account of subjectivities, direct and indirect impacts, positive and negative impacts, and deal with time-lags. Given that CREW has only been operating since April 2011, the problems of long-term attribution may be less relevant for our parallel evaluation.

5.0   EVALUATING IMPACT

Approaches
The literature refers to two broad approaches to assessing impact; tracking forward and tracking backward (OPM, 2005).

- **Tracking forward approaches** involve taking specific research activity as a start and identifying the impacts which have arisen from those activities by ascertaining their use, in our case by policy and practice.
- **Tracking backward approaches** take specific policy initiatives or policy change as the starting points and seek to identify the contributions specific research has made to that change.

Both tracking forwards and backwards can be used to assess conceptual, instrumental, and capacity building impacts; however, forward tracking is more straightforward for assessing instrumental impacts because of their reliance on linear relationships between research and outcomes (OPM, 2005). The key difficulty in forward tracking approaches is to determine a time frame to conduct the evaluation, and how to recognise impact (OPM, 2005).

Back-tracking approaches support assessment of conceptual and capacity building impacts by identifying more complex policy-research relationships and impacts (Davies et al., 2005). Back tracking approaches still encounter difficulties in determining time frames for evaluation, and do not resolve the problems in distinguishing change due to research from change arising through other external factors (OPM, 2005).

ESRC (2011) suggest that using a combination of approaches may help to improve understanding of research impact on policy, and to offer a better account of the relationship between them. This is advocated by some academic researchers (Leksmono, 2006; Kostoff, 1995; Hooton, 2006).

Methods
Within these two approaches, many methods for measuring or assessing the impact of research are cited, though it is recognised that none in themselves will provide a comprehensive answer. Boaz et al. (2009) list commonly used methods:

- Qualitative methods: semi-structured interviews, documentary analysis, field visits and observations;
- Quantitative methods: surveys, bibliometrics and patent/new technology tracking;
- Panels and peer review;
- Workshops and focus groups;
- Process tracking: historical tracing, positive utilisation narratives, tracing post-research activity and impact logs;
- Literature review;
- Network mapping and analysis.

Different methods serve different purposes; methods chosen should best reflect the purpose of the assessment and the situation (taking into account the scale of the evaluation, time and other available resources), though this is recognised not to be a straight forward task (Boaz et al., 2009). The nature of the impacts being sought also need consideration (Rogers, 2009), for example whether they are short- or long-term, transformational (those that once achieved are unlikely to be reversed), or fragile (for instance relationships and networks).

It is agreed that the use of multiple methods in impact assessment offer the best results, with some capturing information on the diversity of impacts and others on the processes by which those impacts do, or have the potential to, occur (Kanninen, 2006). No one method gives a complete, unambiguous result but each has its own strengths and weaknesses, and are appealing in different situations.

Forward tracking approach examples
There is a plethora of literature describing the individual approaches and their merits in particular situations. Some examples of approaches are given here with a short description of each.

Wooding's Payback Methodology (Wooding, 2005)
This approach relies on information from documents and bibliometric analysis alongside research user interviews to produce qualitative data on the impact of the research. Data are displayed using a descriptive approach similar to a radar chart and an accompanying narrative. The payback approach allows different types of impact to be identified.

Bibliometrics
Commonly used forms of bibliometrics such as citation analysis can help assess the impact of research by quantifying the number of citations for a specific research output (academic publications) but focusses on quantity of outputs rather than outcomes (Kanninen, 2006). This is less relevant for CREW as outputs are not aimed at academic publication.

Case study analysis
Case study analysis takes a few aspects of a project or programme and conducts in-depth studies of them. The approach seeks to explore and describe why and how impacts have occurred.

Workshops and focus groups
Workshops with key research users can be used to identify likely impacts from research. Workshops can be used either as part of a forward or backward tracking approach.

Backward tracking approach examples
Surveys
Surveys of potential research users can provide a comprehensive dataset of perceived impact across multiple projects unlike other methods such as individual case studies (Kanninen, 2006). Furthermore they can provide comparative data for comparison across time.

Stakeholder surveys can be used to gather views from research users to assess the importance of the research outputs, their accessibility, and provide examples of their use. Surveys can help to identify barriers to use, which assists researchers to subsequently overcome them to achieve impact.

Commercialisation surveys collect quantitative data on patents, licensing income, etc. These may be of relevance to CREW's work with Scottish Water and other industry partners.

Peer/panel review

Expert review panels of people with relevant experience in a policy area can be used to assess the difference specific research has made (Kanninen, 2006).

Documentary analysis

Impact assessment via documentary analyses involves scrutinizing policy documents or other sources, such as parliamentary or key organisation reports and minutes, for citations of specific research outputs (OPM, 2005).

Semi-structured interviews

Interviews (either face-to-face or telephone) of both researchers and research users can be used to track impact forwards or backwards (Boaz et al., 2009). This flexible approach allows for a diverse range of issues to be uncovered and interviews can be followed up at a later date to identify change over time. Interview studies are time intensive.

A number of other approaches are discussed in the literature but there are few examples of them being used in practice to conduct a research impact evaluation (figure 2).
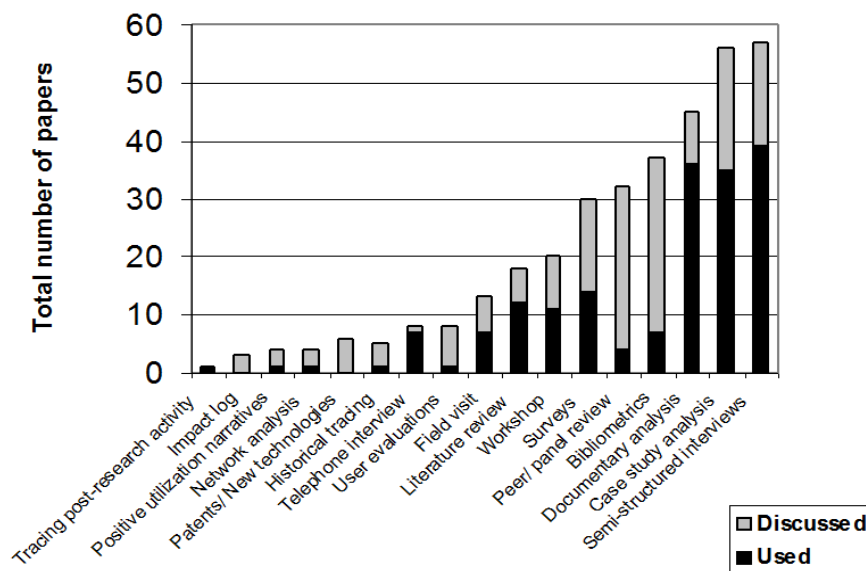
Figure 2 Evaluation approaches and the number of references to the concept and their use (Boaz et al., 2009)

Evaluation examples

The following boxes set out two examples of evaluation, firstly within the Research Excellence Framework (REF) and secondly at a project level, the Rural Economy and Land Use (RELU) project.

Research Excellence Framework (REF) 2014

REF 2014 has introduced an explicit element to assess research impact. Narrative case studies are submitted by Higher Education Institutions and can include *'social, economic or cultural impact beyond academia'*. REF does not account for future or potential benefits, only those that have occurred. REF does not consider dissemination as a form of impact. Panels comprising academics and research users assess the impact of research using criteria for each case study submitted (Gordge, 2011). Impact criteria include the reach of the research and significance of impacts on the economy, society and culture, as well as the institution's approach to enabling research impact (Dickinson, 2012)

Rural Economy and Land Use (RELU)

RELU is a large (£26.5m) research programme studying rural areas from 2004-2013. The ESRC commissioned an evaluation to identify impacts from the research undertaken, and determine the extent to which the project had met its policy and practice impact objectives. The evaluation uses ESRC's Conceptual Framework (ESRC, 2011) alongside the authors' own knowledge conceptual model (Meagher, 2008). Impact assessment was assessed by documentary analysis of a range of reports, publications and website information; stakeholder surveys; and interviews and case studies to ascertain to what degree the programme achieved conceptual, instrumental, and capacity building impacts.

Conceptual Frameworks

The literature commonly notes that the purpose of an evaluation needs to be explicit before developing an evaluation design (Rogers, 2009). Preliminary questions are: who are the users of the results? What is the intended use- to demonstrate value for money to the funder or to inform internal change? What will be considered as an impact?

Boaz et al. (2008:4) identify eight questions that need to be considered when designing an impact evaluation, in light of the time, skills and resources available:

- What is your conceptual framework?
- What are the outcomes of interest?
- What methods will best explore the outcomes of interest?
- How do you address attribution?
- What is the direction of travel for the evaluation?
- Is this a mixed method approach providing scope for evaluation?
- Will the methods selected capture context and complexity?
- When might be the best time to conduct the evaluation?

The literature includes a number of conceptual frameworks/models that have been developed specifically for evaluating research impact, for example the Health Economics Research Group (HERG) payback model, RAPID outcome assessment, the Research Impact Framework (RIF) and SKEP.

HERG – The Health Economics Research Group Payback model has been used by a range of organisations to assess impact. It is a comprehensive framework which requires extensive resources to complete.

RAPID Outcome Assessment – The RAPID Outcome Assessment (ROA) is a learning methodology to assess and map the contribution of a project's actions on a particular change in policy or the policy environment. It has 3 main stages: preparation (document review and a series of informal conversations); stakeholder workshop (key policy change processes are identified) and follow up (researchers to refine the stories of change, identifying key policy actors, events and their contribution to change).

RIF – The Research Impact Framework is a simple 'DIY' approach for researchers to assess research related impacts, policy impacts, service impacts (in this case health) and wider societal impacts. This framework generates one page impact narratives.

SKEP Guide to Impact Evaluation

The SKEP Network funded project 'Understanding the impact of environmental research on policy' (Shaw, 2010) has developed a conceptual framework specifically for evaulating the impact of research on environmental policy. The practical guide gives step-by-step information on developing an evaluation study from planning through reporting, whilst allowing flexibility to adapt the approach to the individual situation and resource availability. The framework is based around five existing models including HERG and RIF, but guides the user to the one that most closely suits their needs. Two ready to use methods are also provided for those with less time available to develop a tailored approach.

We propose that ESPPI- CREW adopts a methodology based on the SKEP guide flow chart (Figure 3) for its own purposes. The guide will be useful in helping consolidate our existing evaluation methods and practice. It also provides an existing conceptual framework for our needs. The guide does not provide detail about data collection and data analysis, but allows evaluators to select appropriate methods. The review of possible methods above will inform the ESPPI-CREW selection.

The guide does not reflect on how the process of impact evaluation can actually affect impact itself. This is an emerging aspect of impact evaluation (Evely et al., 2012). Our evalation will also be informed by the view that co-construction of evaluation outputs, through providing an arena and/or a boundary object for reflection and discussion, can contribute to, or enhance, conceptual and cultural impacts.
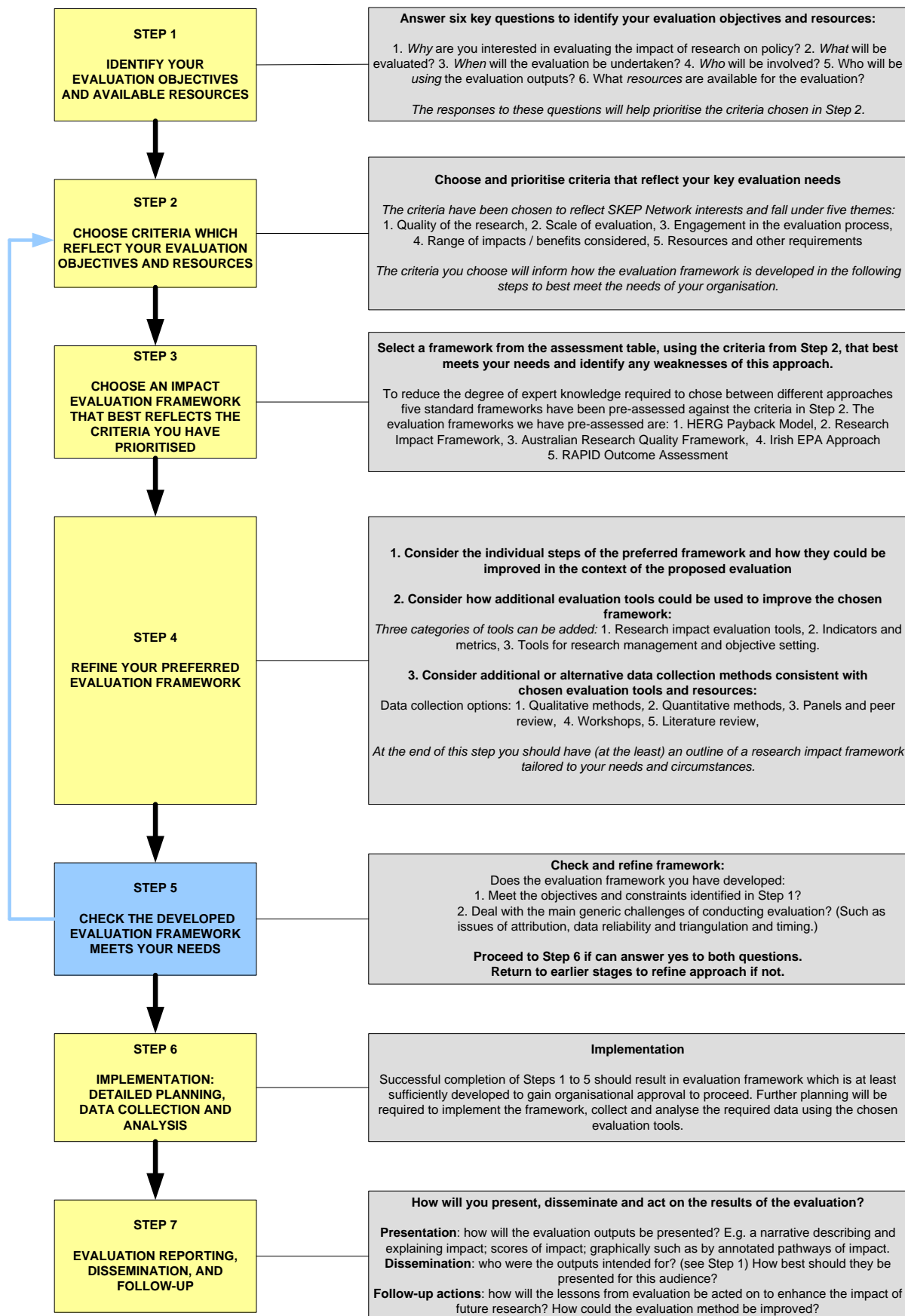
STEP 1 **IDENTIFY YOUR EVALUATION OBJECTIVES AND AVAILABLE RESOURCES**	**Answer six key questions to identify your evaluation objectives and resources:** 1. *Why* are you interested in evaluating the impact of research on policy? 2. *What* will be evaluated? 3. *When* will the evaluation be undertaken? 4. *Who* will be involved? 5. Who will be *using* the evaluation outputs? 6. What *resources* are available for the evaluation? *The responses to these questions will help prioritise the criteria chosen in Step 2.*
STEP 2 **CHOOSE CRITERIA WHICH REFLECT YOUR EVALUATION OBJECTIVES AND RESOURCES**	**Choose and prioritise criteria that reflect your key evaluation needs** *The criteria have been chosen to reflect SKEP Network interests and fall under five themes:* 1. Quality of the research, 2. Scale of evaluation, 3. Engagement in the evaluation process, 4. Range of impacts / benefits considered, 5. Resources and other requirements *The criteria you choose will inform how the evaluation framework is developed in the following steps to best meet the needs of your organisation.*
STEP 3 **CHOOSE AN IMPACT EVALUATION FRAMEWORK THAT BEST REFLECTS THE CRITERIA YOU HAVE PRIORITISED**	**Select a framework from the assessment table, using the criteria from Step 2, that best meets your needs and identify any weaknesses of this approach.** To reduce the degree of expert knowledge required to chose between different approaches five standard frameworks have been pre-assessed against the criteria in Step 2. The evaluation frameworks we have pre-assessed are: 1. HERG Payback Model, 2. Research Impact Framework, 3. Australian Research Quality Framework, 4. Irish EPA Approach 5. RAPID Outcome Assessment
STEP 4 **REFINE YOUR PREFERRED EVALUATION FRAMEWORK**	**1. Consider the individual steps of the preferred framework and how they could be improved in the context of the proposed evaluation** **2. Consider how additional evaluation tools could be used to improve the chosen framework:** *Three categories of tools can be added:* 1. Research impact evaluation tools, 2. Indicators and metrics, 3. Tools for research management and objective setting. **3. Consider additional or alternative data collection methods consistent with chosen evaluation tools and resources:** Data collection options: 1. Qualitative methods, 2. Quantitative methods, 3. Panels and peer review, 4. Workshops, 5. Literature review, *At the end of this step you should have (at the least) an outline of a research impact framework tailored to your needs and circumstances.*
STEP 5 **CHECK THE DEVELOPED EVALUATION FRAMEWORK MEETS YOUR NEEDS**	**Check and refine framework:** Does the evaluation framework you have developed: 1. Meet the objectives and constraints identified in Step 1? 2. Deal with the main generic challenges of conducting evaluation? (Such as issues of attribution, data reliability and triangulation and timing.) **Proceed to Step 6 if can answer yes to both questions. Return to earlier stages to refine approach if not.**
STEP 6 **IMPLEMENTATION: DETAILED PLANNING, DATA COLLECTION AND ANALYSIS**	**Implementation** Successful completion of Steps 1 to 5 should result in evaluation framework which is at least sufficiently developed to gain organisational approval to proceed. Further planning will be required to implement the framework, collect and analyse the required data using the chosen evaluation tools.
STEP 7 **EVALUATION REPORTING, DISSEMINATION, AND FOLLOW-UP**	**How will you present, disseminate and act on the results of the evaluation?** **Presentation**: how will the evaluation outputs be presented? E.g. a narrative describing and explaining impact; scores of impact; graphically such as by annotated pathways of impact. **Dissemination**: who were the outputs intended for? (see Step 1) How best should they be presented for this audience? **Follow-up actions**: how will the lessons from evaluation be acted on to enhance the impact of future research? How could the evaluation method be improved?

Figure 3 How to evaluate the impact of environmental research on policy- summary (Shaw & Bell, 2010)

6.0   CONCLUDING DISCUSSION

CREW aims to better connect water research and policy, which needs effective knowledge exchange among these communities. ESPPI-CREW focuses on the science, policy and practice interfaces for knowledge exchange, aiming to assess the effectiveness of these interfaces in CREW for progressing CREW's aims of building networks, increasing capacity, and ensuring knowledge from CREW activities makes an impact.

Both building networks and increasing capacity are identified in the literature as elements of research impact on policy and practice. As well as selecting a conceptual framework to underpin our evaluation, we also need to be clear about how CREW envisages these impacts arising from its work. The review of evaluating knowledge exchange (Evely et al., 2012) carried out in year 1 of the ESPPI-CREW project indicates that theories of change are useful for this, and we propose to use a theory of change model alongside the conceptual framework to guide our work.

We plan to follow good practice in discussing and agreeing evaluation criteria and indicators of achievement with CREW management and the Scottish Government RESAS reporting lead before finalising the methods for evaluating CREW impact.

7.0   REFERENCES

ARMSTRONG, F. 2009. Knowledge exchange and impact. ESRC.

BOAZ, A., FITZPATRICK, S. SHAW, B. 2009. Assessing the impact of research on policy: a literature review. Science and Public Policy, 36, 255-270.

BOAZ, A., FITZPATRICK, S. SHAW, B. 2008. Assessing the impact of research on policy: A review of the literature for a project on bridging research and policy through outcome evaluation King's College London.

CARDEN, F. 2005. Making the most of research: The influence of IDRC supported research on policy processes, Paper for the International conference 'African Economic Research Institutions and Policy Development: Opportunities and Challenges', Dakar.

DAVIES, H. NUTLEY., S. WALTER, I. 2005. Assessing the impact of social science research: conceptual, methodological and practical issues. Background discussion paper for the ESRC symposium on Assessing Non-Academic Impact of Research.

DICKINSON, A. 2012. REF 2014: Panel criteria and working methods. Research Excellence Framework 2014.

DTZ 2010. The Impact of RERAD's Investment in Science: Final Report. Scottish Government.

ESRC 2009. Taking stock: A summary of ESRC's work to evaluate the impact of research on policy and practice.

ESRC 2011. Branching out: New directions in impact evaluation from the ESRC's Evaluation Committee.

EVELY, A., LAMBERT, E., REED, M., FAZEY, I. (2012) Evaluating knowledge exchange: a review, CREW report

FRASER, S. 1999. The value of 'best practice' can be determned by its applicability to others. A discussion paper. Buckingham Partnership.

GORDGE, R. 2011. Decisions on assessing research impact.

HOOTON, N., D LEE-SMITH, G NASINYAMA AND D ROMNEY 2006. Learning Lessons from the Kampala Urban Agriculture Policy Process, Process and Partnership for Pro-Poor Policy Change Project report. International Livestock Research Institute, and London: Overseas Development Institute.

KANNINEN, S. L., T. 2006. Methods for evaluating the impact of basic research funding: An analysis of recent International evaluation activity. Academy of Finland.

KIVIMAA, P., MELA, H, AND FURMAN, E 2007. Approaches and practices in mid-term and ex-post evaluation of environmental research programmes. Scientific Knowledge for Environmental Protection (SKEP) Work Package 3.

KOSTOFF, R. N. 1995. Federal research impact assessment: axioms, approaches, applications. Scientometrics, 34, 163-206.

KURUVILLA, S. MAYS., N. PLEASANT, A. WALT, G. 2006. Describing the impact of health research: a Research Impact Framework. BMC Health Services Research, 6, 134.

LAVIS, J., D. ROBERTSON, J. M. WOODSIDE, C. B. MCLEOD, J. ABELSON AND THE KNOWLEDGE TRANSFER STUDY GROUP 2003. How Can Research Organizations More Effectively Transfer Research Knowledge to Decision Makers? The Milbank Quarterly, 81, 221-248.

LEKSMONO, C., J YOUNG, N HOOTON, H MURIUKI AND D ROMNEY 2006. Informal traders lock horns with the formal milk industry: the role of research in pro-poor dairy policy shift in Kenya, Working Paper 266. London: Overseas Development Institute.

MACLENNAN, D. M., A. 1999. Evidence, what evidence? The foundations for housing policy. Public money and management.

MANDELL, M., GREENBERG, D. & LINKS, D 2001. The politics of evidence: The use of knowledge from social experiments in US policymaking.

MEAGHER, L. M., LYALL, C. AND NUTLEY, S. 2008. Flows of knowledge, expertise and influence: a method for assessing policy and practice impacts from social science research. Research Evaluation, 17, 163-173.

OPM 2005. The impact of research on policy-making and practice: current status and ways forward. Report fro the Audit Commission.

PERCY-SMITH, J. D., A. 2005. Local authority research effectiveness: a discussion paper. Paper prepared for the Local Government Association and Local Authorities Research and Intelligence Association.

PERCY-SMITH, J. S., I. DOWSON, L. 2000. Enhancing the research capcity of Local Government. London: Local Government Association and LARIA.

PERCY-SMITH, J. S., I. DOWSON, L. LADI, S. 2002. Promoting change through research: the impact of research on local government. Joseph Rowntree Foundation.

POLAND ,GA, JACOBSON RM, (13 January 2011). "The Age-Old Struggle against the Antivaccinationists". N Engl J Med 364 (2): 97–9. doi:10.1056/NEJMp1010594

ROGERS, P. 2009. Matching impact evaluation design to the nature of the intervention and the purpose of the evaluation. Journal of Development Effectiveness, 1, 24-33.

RYMER, D. L. 2011. Measuring the impact of research-the context for metric development. Group of Eight, Australia, http://www.go8.edu.au/

SHAW, B. A. BELL, S. 2010. How to evaluate the impact of environmental research on policy: Final Report. skep network.

WAKEFIELD A, Murch S, Anthony A et al. (1998). "Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children". Lancet 351 (9103): 637–41.. Retrieved 2007-09-05. (Retracted, see PMID 20137807)

WALTER, I. NUTLEY, S. DAVIES, H. 2003. Research impact: A cross sector review. Literature review. ESRC.

WEISS, C.H. 1982 "Knowledge Utilization in Decision Making: Reflections on the terms of the discussion". Research in Sociology of Education and Socialization Vol 3: 17-41

WHITE, H. 2009. Some reflections on current debates in impact evaluation International initiative for impact evaluation.

WOODING, S., HANNEY, S., BUXTON, M., & GRANT, J. 2005. Payback arising from research funding: evaluation of the Arthritis Research Campaign. Rheumatology, 44, 1145-1156.

WORLD HEALTH ORGANISATION. 2004. World report on knowledge for better health: strengthening health systems, Geneva.

YOUNG, J. 2008. Working with complexity-Impact of research on policy and practice