



A common standard for the evaluation of public engagement with research

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Abstract

Despite growing interest in public engagement with research, there are many challenges to evaluating engagement. Evaluation findings are rarely shared or lead to demonstrable improvements in engagement practice. This has led to calls for a common 'evaluation standard' to provide tools and guidance for evaluating public engagement and driving good practice. This paper proposes just such a standard. A conceptual framework summarizes the three main ways in which evaluation can provide judgements about, and enhance the effectiveness of, public engagement with research. A methodological framework is then proposed to operationalize the conceptual framework. The standard is developed via a literature review, semi-structured interviews at Queen Mary University of London and an online survey. It is tested and refined *in situ* in a large public engagement event and applied *post hoc* to a range of public engagement impact case studies from the Research Excellence Framework. The goal is to standardize good practice in the evaluation of public engagement, rather than to use standard evaluation methods and indicators, given concerns from interviewees and the literature about the validity of using standard methods or indicators to cover such a wide range of engagement methods, designs, purposes and contexts. Adoption of the proposed standard by funders of public engagement activities could promote more widespread, high-quality evaluation, and facilitate longitudinal studies to draw our lessons for the funding and practice of public engagement across the higher education sector.

Keywords: responsible research and innovation; public participation; public understanding of science; co-production; monitoring and evaluation

Key messages

- A common 'evaluation standard' is proposed to provide tools and guidance for evaluating public engagement with research, to promote good practice and enable comparison between projects with different methods in different engagement contexts, and to monitor changes in the effectiveness of engagement across time and space.
- Tools have been developed (and classified by cost, time and expertise required) to evaluate the: (1) design of public engagement activities for a given purpose and context; (2) delivery and outputs of public engagement; and (3) long-term impacts of public engagement with research.
- Systematic application of the proposed standard may enable better evaluation of long-term impacts from public engagement under the Research Excellence Framework, for example showing how engagement contributes to learning, behaviour change and capacity building.

Introduction

Interest in public engagement with research has never been higher. The Higher Education Funding Council for England (HEFCE) defined public engagement with research as:

Specialists in higher education listening to, developing their understanding of, and interacting with non-specialists. The 'public' includes individuals and groups who do not currently have a formal relationship with an HEI [higher education institution] through teaching, research or knowledge transfer.

(HEFCE, 2006: 1)

It has been proposed that public engagement is a means of 'ensuring that science contributes to the common good' (Wilsdon and Willis, 2004: 1) and restoring public trust in science (Wynne, 2006). A major driver for this in the UK is the Research Excellence Framework (REF), which evaluates the social and economic benefits of excellent research in the UK. Similar systems are being considered in other countries that have significant public investment in research (for example, Australia and Germany are currently considering introducing impact into their national research evaluation exercises, Excellence for Research in Australia and Forschungsrating; Reed, 2016). The European Commission (2015) identifies public engagement as one of the six 'keys' for responsible research and innovation, and is considering ways of better evaluating the impact of its research in the successor to Horizon 2020.

However, there are many challenges to the evaluation of public engagement. As many public engagement activities are unplanned, there is often limited budget, staffing or evaluation expertise available. Even when the resources are available to evaluate public engagement, it may be difficult to motivate researchers to evaluate their engagement practice (Rowe and Frewer, 2005; Burchell, 2015). Often, this is due to resource constraints and a lack of structured techniques for identifying relevant publics and other end users (Emery *et al.*, 2015). Pathways from public engagement to impact can be complex, non-linear and indirect (ESRC, 2009; ESRC, 2011; Molas-Gallart *et al.*, 2000). In addition, issues of time lags and attribution plague the evaluation of impacts

arising from public engagement, given the complex range of factors that may delay or influence impacts (Morris *et al.*, 2011; Fazey *et al.*, 2013; Fazey *et al.*, 2014).

We define the evaluation of public engagement with research as a process that collects, analyses and reports data (via quantitative or qualitative means) on the effectiveness of public engagement programmes and activities in terms of their design (in relation to their context and purpose), delivery and immediate outputs, and the beneficial impacts that arise for participants and wider society, and subsequently improves the effectiveness of future engagement and/or enables timely, reliable and credible judgements to be made about the effectiveness of engagement (after Stufflebeam, 1968; Stufflebeam, 2001; Patton, 1987). There is a normative assumption within this definition that public engagement should produce benefits for the economy or society, and that evaluation should therefore assess the subjective worth or value of engagement to different publics and stakeholders (Hart *et al.*, 2009).

There are a large number of toolkits and resources available to guide the evaluation of engagement projects (NCCPE, 2017a). Useful work has also been done to develop indicators to allow institutions to evaluate and audit their engagement at a macro-level (Hart *et al.*, 2009; Neresini and Bucchi, 2011; Vargiu, 2014; European Commission, 2015). Despite this, there are claims that evaluation of public engagement tends to be done rather poorly (not just in higher education, but in most sectors) (Bultitude, 2014), and that evaluation findings are rarely shared widely or lead to demonstrable changes in engagement practice (Davies and Heath, 2013). As a result, there are now calls for the establishment of a common 'evaluation standard' to provide tools and guidance for evaluating public engagement in order to promote good practice and enable comparison between projects (Smithies, 2011; Neresini and Bucchi, 2011; Bultitude, 2014). This paper is a first step towards developing such a standard, which can subsequently be applied to compare the efficacy of different methodological approaches in different engagement contexts, and to monitor changes in the effectiveness of public engagement across time and space.

The aim of the paper is to propose a linked conceptual and methodological framework that can be used as a common evaluation standard for public engagement projects across a wide range of possible contexts and purposes. The conceptual framework summarizes the three main ways in which evaluation can provide judgements about, and enhance the effectiveness of, public engagement. A methodological framework is then proposed to operationalize the conceptual framework. The development of the standard is informed by literature review, an online survey and semi-structured interviews in Queen Mary University of London (QMUL), who commissioned the development of a 'public engagement evaluation toolkit' to inform their work, which could be used across the higher education sector. The standard is then tested and refined *in situ* in a large public engagement event hosted by QMUL and post hoc to a range of public engagement impact case studies from the 2014 Research Excellence Framework.

Background

As greater emphasis is placed on public engagement with research, it is increasingly important to be able to evaluate what works. An important starting point is to understand the reasons why both researchers and publics wish to engage with each other. It is not possible to evaluate 'what works' without first understanding what is being sought through public engagement.

A study of the views of scientists and publics about engagement in the context of stem cell research identified three types of public engagement: education, dialogue and participation in policymaking (Parry et al., 2012). The Department for Business, Innovation and Skills (BIS, 2010) reframed these in their ‘public engagement triangle’ as transmitting, receiving and collaborating. Although widely used, these typologies of engagement have limited theoretical basis. However, a new typology of engagement published by Reed et al. (2017), argues that types of engagement can in theory be distinguished by their mode and agency, leading to combinations of top-down and bottom-up approaches for informing, consulting and collaborating with publics in more or less co-productive ways (in line with NCCPE, 2017b):

- **Informing**, inspiring, and/or educating the public. Making research more accessible, for example:
 - dissemination: making research findings available and accessible to publics
 - inspiration and learning: where researchers share their research to inspire curiosity and learning
 - training and education: where research is used to help build capacity of individuals and groups in terms of knowledge, skills or other capacities
 - incentives: engagement with publics to incentivize public acceptance of research.
- **Consulting** and actively listening to the public’s views, concerns and insights, for example:
 - interaction: bringing researchers and research users together to learn from each other
 - consultation: using focus groups, advisory groups or other mechanisms to elicit insight and intelligence.
- **Collaborating** and working in partnership with the public to solve problems together, drawing on each other’s expertise, for example:
 - deliberation and dialogue: working ‘upstream’ of new research or policy to ensure that the direction of travel is informed by the public
 - doing research together: producing, synthesizing or interpreting research findings with publics, for example citizen science and collaborative research
 - facilitation: action research, where researchers enable the public to facilitate desired change
 - enhancing knowledge: where research findings are informed by multiple perspectives and so are more robust and relevant
 - informing policy and practice: involving the public to ensure their insights, expertise and aspirations influence the evidence base for policy and practice.

Each of these three broad reasons for engaging publics is valid, and may be appropriate depending on the context and purpose for which engagement is conducted. Contrary to normative arguments that collaborative approaches should always be preferred (see Arnstein’s (1969) ladder of participation), we adopt the approach taken by the NCCPE and Reed et al. (2017), which takes a non-judgemental stance on engagement, proposing that the type of engagement is matched to the context and purpose of engagement, embracing communicative approaches where these are suited to the context and purpose of engagement.

These different motivations for engaging with publics often lead to different types of impacts. Impacts occur when public engagement gives rise to tangible benefits for people (such as enhanced well-being or educational attainment), and are typically difficult to evidence. Research Councils UK defines research impact as ‘the

demonstrable contribution that excellent research makes to society and the economy' (HEFCE, 2016: n.p.). Public engagement may give rise to a range of impacts, including (after Hooper-Greenhill *et al.*, 2003; Davies *et al.*, 2005; Nutley *et al.*, 2007; Belfiore and Bennett, 2010; Morrin *et al.*, 2011; Meagher, 2013; Facer and Enright, 2016):

1. instrumental impacts (for example, financial revenues from widespread public adoption of a new technology or policy change resulting from public pressure)
2. capacity-building impacts (for example, new skills)
3. attitudinal impacts (for example, a change in public attitudes towards issues that have been researched)
4. conceptual impacts (for example, new understanding and awareness of issues related to research)
5. enduring connectivity impacts (for example, follow-on interactions and lasting relationships, such as future attendance at engagement events or opportunities for researchers and members of the policy community to work more closely with publics).

The ESRC (2009; 2011) emphasized the critical role of process design versus contexts in determining the impacts arising from public engagement. This was explored empirically by de Vente and colleagues (2016) and theoretically by Reed and others (2017), to identify design principles that could increase the likelihood that public engagement processes lead to impacts. These studies emphasize the importance of evaluating the design of public engagement processes. If design is evaluated a priori, or early in a public engagement project (that is, formative evaluation), it may be possible to adapt the design of engagement to better address contextual factors and increase the likelihood of impacts arising from the work.

Sciencewise (2015) took this a step further, differentiating between the design, context and delivery of public engagement as key determinants of impact. They argued that a well-designed process that is well suited to its context may still fail to achieve impacts if poorly delivered. As such, it is vital to evaluate the delivery of public engagements and the immediate outcomes that arise from effective delivery, in addition to evaluating the eventual impacts of engagement. In addition to evaluating the design of engagement, evaluating the pathway to impact in this way can further aid the adaptation of engagement processes to ensure they achieve impacts (Reed, 2016).

Building on this, it is possible to propose a series of principles to underpin the evaluation of public engagement (adapted from Pearce *et al.* (2007) and Sciencewise (2015)):

- Start early: evaluate engagement throughout the design and delivery of the project.
- Be clear: on purpose, scope, approach, levels of engagement in, and limits of, the evaluation.
- Use evaluation methodologies that are rigorous and fit for purpose.
- Seek understanding and learning, rather than apportioning blame or evaluating merely to satisfy funder requirements.
- Facilitate flows of knowledge, information and benefits between researchers and publics.
- Build trust: partnerships deepen and develop through extended reciprocity and improved access.
- Respect confidentiality: protecting the sensitivity of data collected, and avoiding personal or reputational harm.

- Avoid conflicts of interest: including privileged access to information not being used for future competitive advantage.
- Be proportionate: using sufficient resources to probe in sufficient depth to meet evaluation objectives.
- Be transparent: the evaluation should be explained to participants and stakeholders, and evaluation findings published.
- Be practical: evaluation data sought can be collected, assessed and reported within timescale and budget.
- Make it useful: evaluation findings should be reported in accessible language and in a form that is useful for learning and to provide evidence of impacts, what works, and lessons for the future.
- Be credible: use evaluation frameworks and methods that deliver intended outcomes.

In certain circumstances, in particular summative evaluations (that provide judgements of engagement and impact) for reporting to funders in large projects, it may also be important for the evaluation to be independent (from commissioners, funders, delivery team and participants). However, the focus of this paper is to create a standard that may be used by both researchers who wish to evaluate their own practice and independent evaluators.

A range of evaluation methodologies have been developed to enact these principles. Warburton (2008) and Sciencewise (2015) describe a methodological framework for evaluating public engagement that describes the purpose for which engagement is being used, the scope and design of the engagement process, the people who are engaged and the context in which engagement takes place. They suggest that there should be three stages in any evaluation of public engagement: baseline assessment, interim assessment of design and delivery, and final assessment of the overall project and its impact.

Logic models (such as logical framework analysis or 'logframes'; Gasper, 2000) and 'theory of change' (Quinn and Cameron, 1988) are more widely applied in international development settings, but they may also be used to evaluate public engagement. Each of these approaches requires a clear understanding of the desired or planned change, 'long-term outcomes' or goals that are sought from engagement. Both approaches then help teams to identify the steps that are needed to reach these goals (including the identification of specific inputs and activities), and help them to articulate and interrogate the assumptions that lie behind each of these steps in a change process. Each approach also specifies milestones and indicators that can be used to monitor progress towards impacts.

Contribution analysis takes a logic model approach (Morton, 2015). It attempts to address issues of attribution in evaluation by assembling evidence to validate the logic model, including an examination of alternative explanations of impact. First, a pathway to impact is mapped, then assumptions and risks are identified for each stage of the pathway and impact indicators are identified. Using these indicators, evidence is collected for each part of the pathway and a 'contribution story' is written. In doing this, contribution analysis attempts to build a credible case about what difference is being made as a result of public engagement.

Similarly, outcome mapping (Earl *et al.*, 2001) considers how public engagement might directly influence the behaviour of individuals, groups and organizations, known as 'boundary partners', recognizing the many factors that are outside the control of the project. Outcome mapping therefore seeks to understand the contribution made by a project to impact, rather than claiming definitive attribution. Desired changes in

boundary partners are first identified, strategies for supporting change are developed and a monitoring system to track changes is used to evaluate engagement.

Realist evaluation (Pawson *et al.*, 2005) asks what works for whom in what circumstances and in what respects, and how, using a mixed methods approach, drawing on quantitative, qualitative, comparative and narrative evidence, as well as grey literature and the insights of programme staff. The 'adjudicator' then evaluates to what extent the data collected can be used to build or prove a theory of change or a pattern of outcomes.

The 'most significant change' technique (Davies and Dart, 2005) is a qualitative and participatory evaluation method that uses stories of change to assess the impact of public engagement. Rather than measuring indicators, stories are sought about specific changes that have occurred as a result of engagement, and these stories are then compared and analysed through multi-stakeholder discussion to decide which changes are most credible and important.

Finally, it is worth sounding a cautionary note that many of the theories, assumptions and methods discussed above align closely with the historic 'public understanding of science' movement. There is limited evidence that this movement increased public acceptance or trust in controversial research applications (such as genetically modified foods), but it has been credited with opening research activities up to public scrutiny.

Methods

A literature review, drawing upon peer-reviewed and grey literature, summarized in the previous section, led to the development of an initial evaluation framework. Arising from this review were several key principles:

- A reflective approach to evaluation that builds it into project planning and delivery is essential – it should not be left until the end.
- It is helpful to guide people through a set of prompts to encourage them to make explicit their assumptions about change – and to encourage them to revisit these.
- It helps to differentiate between inputs, outputs, outcomes and impacts as part of this.
- A 'logical framework' approach is particularly helpful in structuring the key questions/considerations people need to engage with to design and execute quality evaluation.

QMUL co-authors commissioned the research underpinning this article, and helped to identify likely users of a toolkit, who could help scope and shape its development. Semi-structured interviews were conducted by the lead author with five QMUL staff (who are not co-authors on this paper). A purposive sample was selective based on experience of public engagement, representing a range of disciplines and roles (professional services, events management, ethics, physics and geography) and levels of seniority (from PhD student to pro-vice-chancellor). Interview topics included: discussion of their role and experience of public participation, elements needed in a public engagement evaluation toolkit, and examples of good practice. Based on these examples, respondents were asked to identify generalizable good practice principles. Interviews with QMUL staff were supplemented with an online survey completed by ten further respondents from other UK universities, who self-identified themselves as potential users of the toolkit via social media. They were asked a range of questions

under each of the topics used in the semi-structured interviews, including: the most valuable resources they drew upon to inform their evaluation of public engagement, methods and approaches for evaluating public engagement, key challenges for evaluating public engagement (that the toolkit could address); they were also asked to identify indicators of successful public engagement.

A thematic analysis of semi-structured interviews and open survey questions was used to refine the conceptual framework and scope the specification of a public engagement evaluation toolkit. The structure of the toolkit was based on the conceptual framework, and its purpose and functionality was based on feedback from the semi-structured interviews.

The toolkit was then trialled at a major UK public engagement festival (the Festival of Communities, organized by QMUL from 21 May to 4 June 2016 in Tower Hamlets, London). Evaluation data collected at the festival ranged from qualitative survey responses and social media commentary to visitor counts and demographics, and was analysed using qualitative (thematic and content analysis) and quantitative (descriptive statistics) techniques.

To test its wider applicability, the framework was applied retrospectively to QMUL's Research Excellence Framework (REF) impact case studies from 2014, focusing on those that involved public engagement, and sourced from the HEFCE impact case study database. Application of the framework to these case studies aimed to explore how the use of the toolkit could both improve the design of the engagement processes, and better evidence if and how impacts had been achieved.

Feedback from QMUL festival organizers who trialled the toolkit, and insights from its application to REF case studies, was used to further refine the toolkit. The resulting toolkit was then reviewed by public engagement specialists and potential users from drama, physics and geography at QMUL, and further refined in response to their feedback.

A framework for evaluating public engagement

This section describes a linked conceptual and methodological framework for the evaluation of public engagement, as it was developed through this research. The conceptual framework summarizes the three main ways in which evaluation can provide judgements about, and enhance the effectiveness of, public engagement (see Figure 1):

1. Evaluate the design of public engagement activities for a given purpose and context: to what extent is/was the design of the public engagement process and activities appropriate for the context and purpose of engagement?
2. Evaluate the delivery and immediate outputs of public engagement: to what extent do/did the delivery of the public engagement process and activities represent good practice and lead to the intended outputs?
3. Evaluate the impacts of engagement: to what extent do/did engagement activities lead to planned (or other) benefits for target publics and researchers?

This is then operationalized via a methodological framework, based on a logic model approach (see Figure 2), as described below.

Figure 1: Three ways to evaluate public engagement

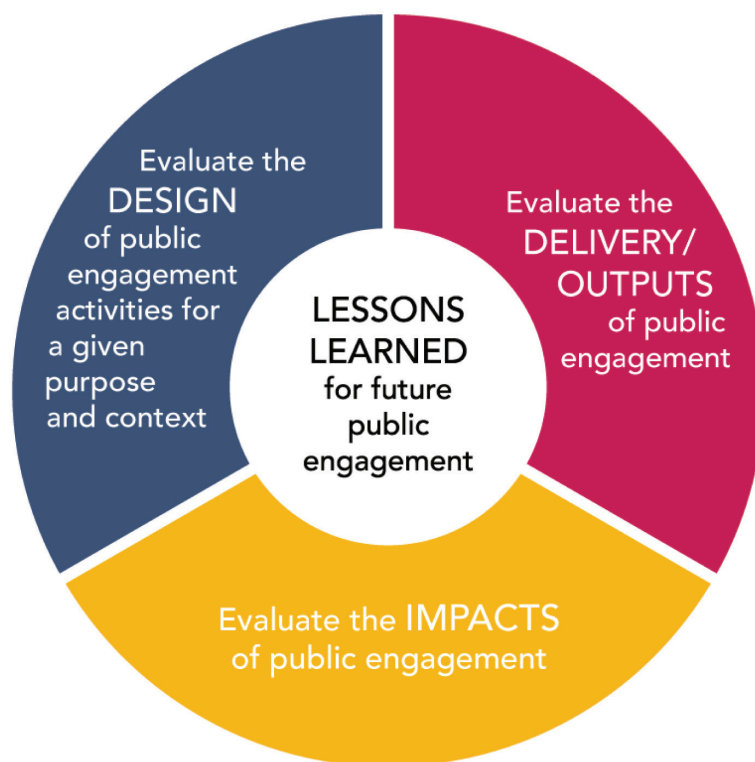


Figure 2: Public engagement evaluation planning template

Design	Have you evaluated the design of your public engagement?		
	Does the design follow good practice, underpinned by sound ethics?	Have you systematically identified relevant publics (and stakeholders)?	
		Do you understand the expectations and specific benefits each group is likely to derive from engagement?	
		Have you identified and made contingencies for any risks & assumptions?	
		Have you tested your activities and sought feedback from relevant publics?	
	How well do you know the context you are working in, and have you adapted the design of your activities to this context?	Do your proposed engagement activities match the interests and needs of your target publics and their social and cultural context?	
		Is there experience of engagement and existing trust between members of the research community and publics?	
Do you have sufficient resources and support for engagement in this particular context e.g. professional facilitation, event planning etc.?			
Delivery outputs	What immediate outputs do you want to deliver from engagement?	How will you know you delivered these outputs? <i>Identify indicators to show whether your delivery of public engagement activities is providing the immediate outcomes you want</i>	What tool will you use to track your progress? <i>Identify evaluation tools that will enable you to track the indicators you have identified</i>
	What benefits or "impacts" do you want to achieve from engagement?	How will you know you achieved these impacts? <i>Identify indicators to show whether your public engagement is leading to "benefits" or impacts</i>	What tool will you use to track your progress? <i>Identify evaluation tools that will enable you to track the indicators you have identified</i>
Impact			

Evaluate the design of public engagement activities

Many of the most common mistakes in public engagement can easily be avoided if formative evaluation of the design is done at an early stage. It is important to evaluate the design of planned public engagement against good practice principles, and check if activities are appropriate to the context and likely to meet intended goals.

As shown in the case study that follows in the next section, using the evaluation planning template in Figure 2, it is possible to evaluate the design of planned public engagement:

1. Does the design follow good practice, underpinned by sound ethics and avoid known issues that commonly lead to failure?
2. Is the design appropriate and relevant for the context in which it is taking place, including the needs, priorities and expectations of those who take part?

Are any of these factors likely to present challenges for the planned approach to public engagement? If the evaluation of design is done prior to engagement, it may be possible to improve the design before delivering the project.

Evaluate the delivery and immediate outputs of public engagement

Public engagement is often assessed in terms of the number and range of people taking part. However, it is just as important to know about the quality of the engagement: good delivery of public engagement results in all sorts of positive outputs, and poor-quality engagement can achieve little, and in some cases make things worse.

Using the evaluation planning template in Figure 2, it is possible to identify specific outputs that researchers and/or publics would expect to see as a result of engagement (for example, new learning and awareness, or changes in behaviour). Then indicators can be identified that would show progress towards these outputs. It is useful to systematically identify outputs, and associated indicators and tools linked to each planned engagement activity.

In contrast to most logic models, the proposed standard moves from design to delivery and outputs, and then impacts (missing outcomes). This was done in response to feedback from users unfamiliar with evaluation methods, who found it difficult to understand the difference between outputs, outcomes and impacts. As a result, we do not provide an academic discussion of the differences between these terms here, to avoid further confusion given the conceptual overlaps that exist between them. Instead, we provide explanatory examples of outputs in the case study below, and accept that this term can be used loosely in practice, without compromising the rigour of the evaluation.

Evaluate the impacts of engagement

The third way that we are proposing to evaluate public engagement is to focus on the impacts of engagement. If the goal is to report benefits arising from public engagement, it will be necessary to consider the sorts of impacts that might be expected as a result of the engagement. Depending on how indirect and long term these impacts are, it will typically be necessary to include evaluation activities sometime after the original project is completed (where resources permit). These activities can build on any initial evaluation to capture longer-term impacts. Although many researchers tend to look primarily for instrumental impacts, the previous section of this paper has shown other types of impacts that may arise from public engagement with research.

Once impact goals have been identified, it is possible to use the evaluation planning template in Figure 2 to assign indicators to track progress towards each of these impacts, using relevant tools.

Collect, analyse and report evaluation data

With an evaluation plan in place, it is now possible to start collecting and analysing data for each of the selected indicators, using the tools chosen from a menu in the toolkit. There are almost always opportunities to learn from the experience of doing public engagement, and an effective evaluation will provide lessons that can enhance future practice. Larger, longer-term projects can consider how they can improve their practice using the evaluation planning template in Figure 2. This uses a traffic light system to colour code each indicator to show if it is 'on track' (green), 'improving' (amber) or 'not on track' (red). The tool has space to record reasons for these assessments, and what can be done to improve the public engagement approach, or address unexpected challenges. To enable this, the traffic light system is adapted from a project management tool, and combined with the three logic model components (evaluate the design, evaluate the delivery and immediate outcomes, and evaluate the impacts of engagement) covered in Figure 2.

Results

Figure 3 shows the structure and contents of the toolkit that was developed. Figure 4 shows the menu of tools, an example tool and the key to interpret symbols used in the tool.

Figure 3: Structure and content of the public engagement evaluation toolkit

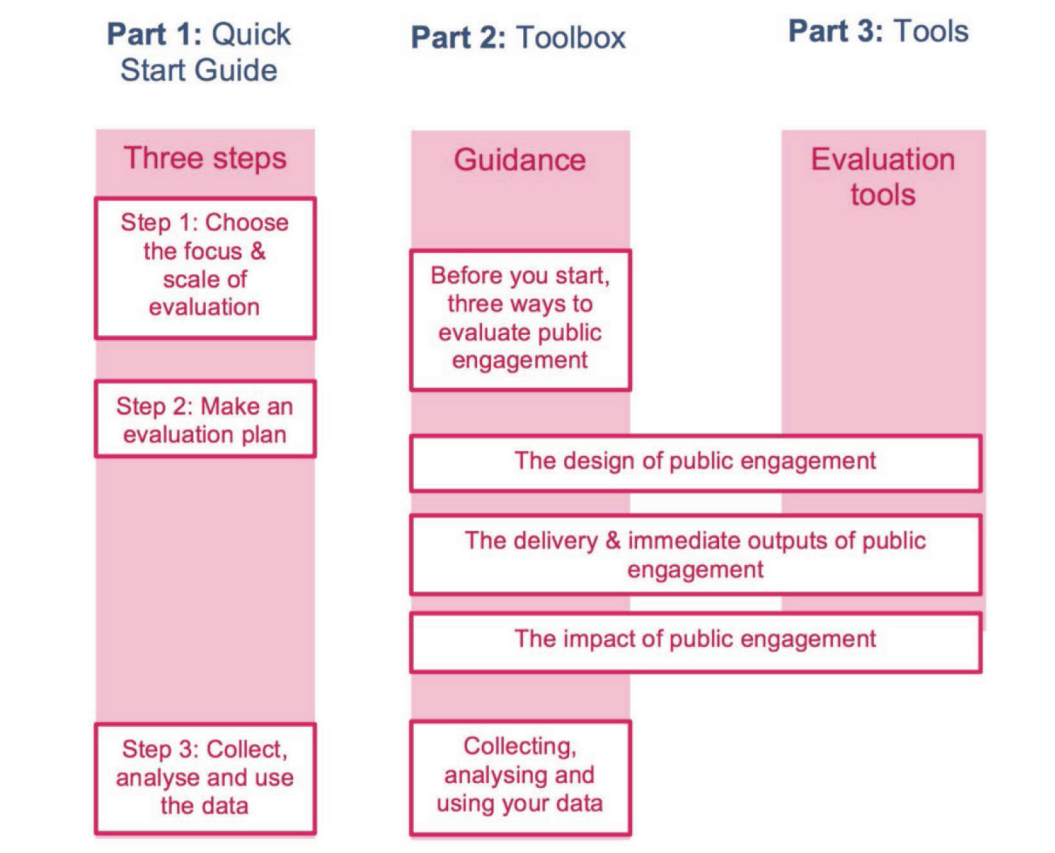
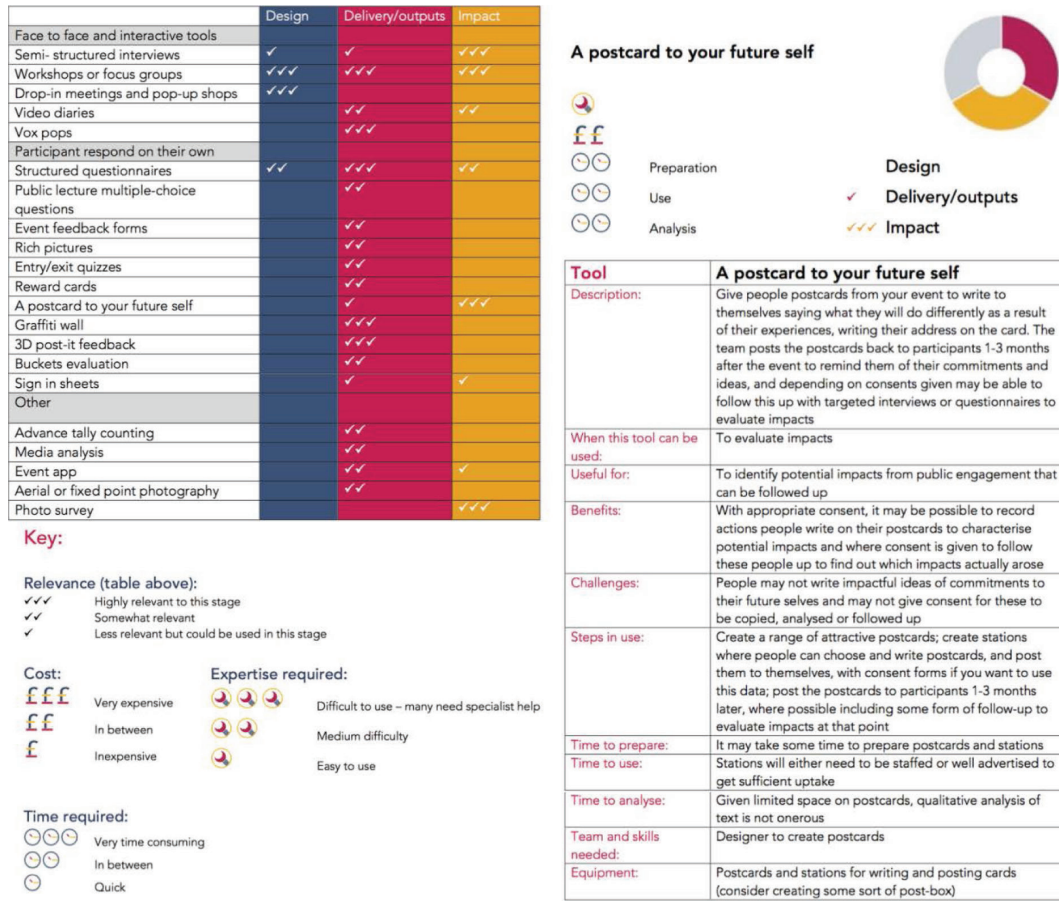


Figure 4: Menu of tools, an example tool and the key to interpret symbols used in the tool



Interview findings

Thematic analysis of data from interviews with QMUL staff showed that those interviewed perceived formative feedback from evaluation to be more important than summative feedback, although it was recognized that both would be necessary in the toolkit that would be developed for them. The perceived importance of formative feedback was in recognition of its value in enhancing engagement practice during the engagement process. An emphasis was placed on kinaesthetic evaluation techniques, for example involving participants placing counters in buckets, sticking shapes on walls or Post-it notes on 3D shapes to evaluate public engagement activities. Consistent with concerns raised by the Wellcome Trust (Burchell, 2015), there was a desire for evaluation techniques that could be used simply and quickly by researchers: ‘pick up and play’, as one interviewee put it. With this in mind, it was suggested by one interviewee that it should be possible for non-academic support staff to be able to use the evaluation toolkit on behalf of researchers. While there was support for a common evaluation standard that could enable comparison between projects, interviewees also emphasized the need to be able to select goals, indicators and tools for a wide variety of purposes and contexts: ‘tools not rules’, as one interviewee put it. For this reason, the evaluation planning template in Figure 2 was made as open and flexible as possible, so that users can identify unique goals for projects, with appropriate indicators tailored to measure progress towards those goals. The toolkit does, however, provide suggestions of methodological tools that can be used to collect data for a range of indicators, and

so monitor progress towards goals. Interviewees wanted to see a mixture of tools that could provide quantitative and qualitative data. The toolkit is designed to make it easy to select relevant tools, using an index of tools and/or a graphical key at the start of each tool. Both the index and graphical key show users which part of the engagement process the tool is most suited to (for example, evaluating the design of engagement versus evaluating impact), and the time, expertise and resources likely to be required in its use.

In situ case study application

Interview findings were combined with insights from the literature review to create a draft public engagement evaluation toolkit, which was trialled at a major public engagement event, the QMUL Festival of Communities, in Tower Hamlets, London. As part of this, a range of tools were trialled from the toolkit, from each of the three major sections: evaluating the design of engagement, its delivery and immediate outputs, and its impact. This was a collaboration between QMUL and local community organizations aimed at enabling cohesion between different local communities and fostering long-term relationships between these communities and the university:

- **Evaluate the design of public engagement activities:** Before running its first Festival of Communities in 2016, QMUL evaluated the design of the event using a focus group with community leaders and academics. Participants discussed the goals of the festival, target publics, risks and assumptions associated with planned activities, and whether or not these activities were likely to achieve the goals of the festival for each of the target publics. Community leaders provided valuable feedback about contextual factors that may limit the success of the festival, such as language barriers and objections to noise from surrounding communities. Where plans were already in place to adapt the design of the festival to this context, these were communicated to participants (for example, coordinating the location and timing of noisy activities with the local mosque) and, where necessary, the design of activities was adapted (for example, recruiting student volunteers with relevant language skills to assist stallholders).
- **Evaluate the delivery and immediate outputs of public engagement:** In QMUL's Festival of Communities, two evaluation tools were used to assess progress towards the immediate goal of having engaged a wide range of publics (many for the first time). These tools were designed to collect data that could indicate the balance of participants from different communities, ages, genders and backgrounds, and the proportion who were engaging with research for the first time. Face-to-face surveys were carried out by student volunteers with a random sample of participants during family 'fun days', and questionnaires were administered at a selection of other festival events. During fun days, participants received reward cards and could collect stickers (different colours for different activities) for doing something new, with completed cards being entered in a prize draw.
- **Evaluate the impacts of engagement:** The impact goals of the QMUL Festival of Communities included an increased acceptance of different cultures within local communities, and to generate long-term relationships between the university and local communities. Indicators of success for these impacts included evidence of more positive attitudes towards different cultures and the university from among community members, and increased engagement with QMUL (for example, via future events) after the festival. The tools that were used

to measure progress towards these goals via these indicators were the collation of comments on social and other media linked to the festival, and a follow-up survey (pertaining to this and other impacts) with those who signed up for email updates at the festival and those commenting on the festival via social media. Attendance at future events will also be monitored, with questions in future evaluation forms asking about previous engagement with QMUL, including specific reference to the festival.

- **Collect, analyse and report evaluation data:** Data collection at the QMUL Festival of Communities was done by an evaluation team supported by student volunteers for fun days, and by QMUL event organizers throughout the rest of the festival. Across the festival, sampling was used to collect data efficiently while representing the widest possible range of public engagement activities. For example, five stalls were selected at the fun day to represent the main types of activities on offer, and visitor counts were conducted in 15-minute periods spread out across the day, including visual assessments of diversity criteria (for example, gender and broad age categories). Examples of data analysis from the QMUL Festival of Communities include content analysis of social media comments linked to the festival, and quantitative (descriptive statistics) and qualitative (thematic analysis) analysis of data from questionnaires. Evaluation findings are being used to communicate outputs and impacts from the festival to stakeholders and to shape future festival designs. Formative feedback from the evaluation has been supplemented via interviews with members of the organizing team, and used to formulate specific recommendations for improvements that can be made for future events.

Post-hoc application to other case studies

Finally, the revised toolkit was tested post hoc on a wider range of public engagement programmes and activities, described in the QMUL REF impact case studies. The purpose of this step was to test the wider applicability of the evaluation standard, and test its applicability as a post-hoc tool, not to provide guidance on how to evaluate public engagement in REF. Of the 77 case studies submitted, 43 referenced keywords associated with public engagement (as detailed in NCCPE, 2016).

Analysis of these 'public engagement'-relevant case studies provided insights into the types of impact claimed through public engagement, which predominantly focused on enriching public discourse and understanding – often through media appearances. While there were several case studies where public engagement played the key role in achieving impact, many included public engagement alongside substantial policy engagement and/or engagement with practitioners. The public was primarily referred to as 'one group', with few attempts to define their target publics. The evidence provided for impact included detailed lists of the number of outlets, with the size of audience also featuring in many of the case studies. Evidence was also provided through expert testimonial, and in a few cases through audience feedback. This is reflected in the analysis of the REF case studies completed by the NCCPE (2016) that illustrated the role of public engagement in creating impacts relevant to the REF.

The case studies are specifically framed around the criteria for the UK's Research Excellence Framework (significance and reach of impacts arising from excellent research, which were used as criteria in 2014 and will be used again in 2021), and do not typically provide details about how they evaluated engagement. However, we

can make some assumptions about the evaluation approach based on the evidence provided in the case study. Retrospectively applying the toolkit principles to these case studies suggests that evaluation could be strengthened to develop more effective approaches to public engagement, including more clearly defined aims and a better understanding of audiences/participants. In addition, the toolkit would enable more convincing evidence of impact to be assessed, by creating baseline data to assess progress over time, by better understanding the nature of those participating in the engagement activities, and by providing approaches to enable researchers to explore the nature of any change on those engaged.

The analysis of the case studies, albeit limited by the nature of the REF case studies, suggests that the toolkit can provide a useful framework for evaluating public engagement, improving engagement practice and evidencing impact (including for the REF).

Discussion

In its initial form, those who used the draft toolkit *in situ* found the resulting evaluation plan too detailed and difficult to follow. In response to this feedback, backed up by calls from interviewees, all the sections of the evaluation plan that could be completed by users were removed except for the template in Figure 2, and a cut-down version of this table was provided in an initial 'quick-start guide', providing users with quick access to basic evaluation planning over two pages.

This feedback, evidence from interviews and literature, and the analysis of the REF case studies suggests that the quality of engagement practice and the rigour of impact assessment could be greatly enhanced by investing in evaluation training and capacity building.

Additionally, the review of the REF case studies identifies some particular challenges arising from the types of engagement currently being practised in higher education, reinforcing the findings of the NCCPE's review of the whole REF case study sample (NCCPE, 2016). There is a need to evidence more effectively how engagement through the media actually inspires learning, behaviour change or capacity building. Most case studies assume that appearing in the media is an impact in itself, and therefore do not gather further evaluative data showing how ideas from the research influenced public discourse. Conceptual impacts were the most common type of impacts claimed in public engagement-related case studies in REF 2014. However, in future, consideration could be given to the broader range of impact types that may be achieved through public engagement.

The process of developing a public engagement evaluation standard has reinforced a number of messages that have arisen repeatedly in the literature:

- Clarity about the purpose(s) of your planned evaluation is essential (for example, to inform more effective design or execution of engagement activities, to find out what happened as a consequence). The REF case studies illustrated a need for a more effective approach to evaluation for engagement activities, which would improve the effectiveness of the activities, and evidence what change has happened as a result.
- It helps to think 'systemically': projects always exist within a wider context. Being clear about that context and how your project contributes to a wider system is important in making robust judgements about its effectiveness.
- Usually you are making a 'contribution', rather than achieving the impact through your intervention alone. Several of the REF case studies analysed evidenced

impact where the direct link between the research and the impact was not clear. In several of these case studies, it would be interesting to see a wider context for the impact claimed, with a recognition that this may be a contribution to the desired change, rather than the only factor in achieving the impact.

- Evaluating public engagement is particularly challenging because its impacts are often subtle (on understanding, attitudes or values); these are hard to measure and they change over time, and it is often challenging to isolate the contribution made by the activity being evaluated. Very few of the REF case studies made any attempt to evidence long-term impacts arising from public engagement.
- Different disciplinary and practice areas have rather different philosophical, epistemological and practical frameworks guiding their practice (often implicitly). These need to be acknowledged – while some fundamental principles cut across all disciplines, it is important to develop different approaches and ways of describing evaluation that are ‘tuned in’ to people’s professional contexts and mindsets. The review of the REF case studies revealed significant differences in how researchers in the different panels chose to describe and rationalize their engagement activities, with those in the sciences usually seeking to raise public awareness of their research through the media, and those in the arts and humanities more often working in partnership to weave their public engagement activity into a more integrated approach to influencing cultural policy and practice.

Conclusion

This paper has developed a set of common standards for the evaluation of public engagement with research, consisting of three ways of evaluating engagement linked to a logic model. The goal is to provide a framework that explains what should be considered when evaluating public engagement with research, rather than to use standard evaluation methods and indicators, given concerns from users and the literature about the validity of using standard methods or indicators to cover such a wide range of engagement methods, designs, purposes and contexts. The adoption of such a standard by funders of public engagement activities could promote more widespread evaluation of public engagement. In this way, it may be possible to create an evaluation data repository that could facilitate longitudinal studies and enable lessons to be drawn for the funding and practice of public engagement across the sector.

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References

- Arnstein, S.R. (1969) 'A ladder of citizen participation'. *Journal of the American Institute of Planners*, 35 (4), 216–24.
- Belfiore, E. and Bennett, O. (2010) 'Beyond the "toolkit approach": Arts impact evaluation research and the realities of cultural policy-making'. *Journal for Cultural Research*, 14 (2), 121–42.
- BIS (Department for Business, Innovation and Skills) (2010) *The Public Engagement Triangle* (Science for All – Public Engagement Conversational Tool Version 6). Online. <http://webarchive.nationalarchives.gov.uk/20121205091100/http://scienceandsociety.bis.gov.uk/all/files/2010/10/pe-conversational-tool-final-251010.pdf> (accessed 4 October 2017).
- Bultitude, K. (2014) 'Science festivals: Do they succeed in reaching beyond the "already engaged"?' *Journal of Science Communication*, 13 (4). Online. https://jcom.sissa.it/sites/default/files/documents/JCOM_1304_2014_C01.pdf (accessed 2 November 2017).
- Burchell, K. (2015) *Factors Affecting Public Engagement by Researchers*. London: Policy Studies Institute. Online. <https://wellcome.ac.uk/sites/default/files/wtp060036.pdf> (accessed 2 November 2017).
- Davies, H., Nutley, S. and 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, London, 12–13 May 2005.
- Davies, M. and Heath, C. (2013) *Evaluating Evaluation: Increasing the impact of summative evaluation in museums and galleries*. London: King's College London. Online. http://visitors.org.uk/wp-content/uploads/2004/01/EvaluatingEvaluation_November2013.pdf (accessed 4 October 2017).
- Davies, R. and Dart, J. (2005) *The "Most Significant Change" (MSC) Technique: A guide to its use*. London: CARE International. Online. www.kepa.fi/tiedostot/most-significant-change-guide.pdf (accessed 4 October 2017).
- De Vente, J., Reed, M.S., Stringer, L.C., Valente, S. and Newig, J. (2016) 'How does the context and design of participatory decision making processes affect their outcomes? Evidence from sustainable land management in global drylands'. *Ecology and Society*, 21 (2). Online. www.ecologyandsociety.org/vol21/iss2/art24/ (accessed 2 November 2017).
- Earl, S., Carden, F. and Smutylo, T. (2001) *Outcome Mapping: Building learning and reflection into development programs*. Ottawa: International Development Research Centre.
- Emery, S.B., Mulder, H.A.J. and Frewer, L.J. (2015) 'Maximizing the policy impacts of public engagement: A European study'. *Science, Technology, and Human Values*, 40 (3), 421–44.
- ESRC (Economic and Social Research Council) (2009) *Taking Stock: A summary of ESRC's work to evaluate the impact of research on policy and practice*. Swindon: Economic and Social Research Council. Online. www.esrc.ac.uk/files/research/evaluation-and-impact/taking-stock-a-summary-of-esrc-s-work-to-evaluate-the-impact-of-research-on-policy-and-practice (accessed 4 October 2017).
- ESRC (Economic and Social Research Council) (2011) *Branching Out: New directions in impact evaluation from the ESRC's Evaluation Committee*. Swindon: Economic and Social Research Council. Online. www.esrc.ac.uk/files/research/evaluation-and-impact/branching-out-new-directions-in-impact-evaluation-from-the-esrc-s-evaluation-committee/ (accessed 4 October 2017).
- European Commission (2015) *Indicators for Promoting and Monitoring Responsible Research and Innovation: Report from the Expert Group on Policy Indicators for Responsible Research and Innovation*. Brussels: European Commission.
- Facer, K. and Enright, B. (2016) *Creating Living Knowledge: The Connected Communities Programme, community–university relationships and the participatory turn in the production of knowledge*. Bristol: AHRC Connected Communities Programme.
- Fazey, I., Bunse, L., Msika, J., Pinke, M., Preedy, K., Evely, A.C., Lambert, E., Hastings, E., Morris, S. and Reed M.S. (2014) 'Evaluating knowledge exchange in interdisciplinary and multi-stakeholder research'. *Global Environmental Change*, 25, 204–20.
- Fazey, I., Evely, A.C., Reed, M.S., Stringer, L.C., Kruijssen, J., White, P.C.L., Newsham, A., Jin, L., Cortazzi, M., Phillipson, J., Blackstock, K., Entwistle, N., Sheate, W., Armstrong, F., Blackmore, C., Fazey, J., Ingram, J., Gregson, J., Lowe, P., Morton, S. and Trevitt, C. (2013) 'Knowledge exchange: A review and research agenda for environmental management'. *Environmental Conservation*, 40 (1), 19–36.
- Gasper, D. (2000) 'Evaluating the "logical framework approach" towards learning-oriented development evaluation'. *Public Administration and Development*, 20 (1), 17–28.

- Hart, A., Northmore, S. and Gerhardt, C. (2009) *Auditing, Benchmarking and Evaluating Public Engagement*. Bristol: National Co-ordinating Centre for Public Engagement.
- HEFCE (Higher Education Funding Council for England) (2006) *Beacons for Public Engagement: Invitation to apply for funds*. Bristol: Higher Education Funding Council for England. Online. http://webarchive.nationalarchives.gov.uk/20100202100434/http://www.hefce.ac.uk/pubs/hefce/2006/06_49/06_49.pdf (accessed 4 October 2017).
- HEFCE (Higher Education Funding Council for England) (2016) 'REF impact: Policy guide'. Online. www.hefce.ac.uk/rsrch/REFimpact/ (accessed 4 October 2017).
- Hooper-Greenhill, E., Dodd, J., Moussouri, T., Jones, C., Pickford, C., Herman, C., Morrison, M., Vincent, J. and Toon, R. (2003) *Measuring the Outcomes and Impact of Learning in Museums, Archives and Libraries*. Leicester: Research Centre for Museums and Galleries. Online. <https://www2.le.ac.uk/departments/museumstudies/rcmg/projects/lirp-1-2/LIRP%20end%20of%20project%20paper.pdf/view> (accessed 4 October 2017).
- Meagher, L.R. (2013) *Research Impact on Practice: Case study analysis*. Swindon: Economic and Social Research Council. Online. www.esrc.ac.uk/files/research/evaluation-and-impact/research-impact-on-practice (accessed 4 October 2017).
- Molas-Gallart, J., Tang, P. and Morrow, S. (2000) 'Assessing the non-academic impact of grant-funded socio-economic research: Results from a pilot study'. *Research Evaluation*, 9 (3), 171–82.
- Morrin, M., Johnson, S., Heron, L. and Roberts, E. (2011) *Conceptual Impact of ESRC Research: Case study of UK child poverty policy*. Swindon: Economic and Social Research Council.
- Morris, Z.S., Wooding, S. and Grant, J. (2011) 'The answer is 17 years, what is the question: Understanding time lags in translational research'. *Journal of the Royal Society of Medicine*, 104 (12), 510–20.
- Morton, S. (2015) 'Progressing research impact assessment: A "contributions" approach'. *Research Evaluation* 24 (4), 405–19.
- NCCPE (National Co-ordinating Centre for Public Engagement) (2016) *Reviewing the REF impact case studies and templates: The role of public engagement with research*.
- NCCPE (National Co-ordinating Centre for Public Engagement) (2017a) 'Evaluating public engagement'. Online. www.publicengagement.ac.uk/plan-it/evaluating-public-engagement (accessed 4 October 2017).
- NCCPE (National Co-ordinating Centre for Public Engagement) (2017b) 'Why engage? Deciding the purpose of your engagement'. Online. www.publicengagement.ac.uk/plan-it/why-engage (accessed 4 October 2017).
- Neresini, F. and Bucchi, M. (2011) 'Which indicators for the new public engagement activities? An exploratory study of European research institutions'. *Public Understanding of Science*, 20 (1), 64–79.
- Nutley, S.M., Walter, I. and Davies, H.T.O. (2007) *Using Evidence: How research can inform public services*. Bristol: Policy Press.
- Parry, S., Faulkner, W., Cunningham-Burley, S. and Marks, N.J. (2012) 'Heterogeneous agendas around public engagement in stem cell research: The case for maintaining plasticity'. *Science and Technology Studies*, 25 (2), 61–80.
- Patton, M.Q. (1987) *Qualitative Evaluation Methods*. Newbury Park, CA: SAGE Publications.
- Pawson, R., Greenhalgh, T., Harvey, G. and Walshe, K. (2005) 'Realist review: A new method of systematic review designed for complex policy interventions'. *Journal of Health Services Research and Policy*, 10 (Supplement 1), 21–34.
- Pearce, J., Pearson, M. and Cameron, S. (2007) *The Ivory Tower and Beyond: Bradford University at the heart of its communities: Bradford University's REAP approach to measuring its community engagement*. Bradford: University of Bradford.
- Quinn, R.E. and Cameron, K.S. (eds) (1988) *Paradox and Transformation: Toward a theory of change in organization and management*. Cambridge, MA: Ballinger Publishing Company.
- Reed, M.S. (2016) *The Research Impact Handbook*. Huntly: Fast Track Impact.
- Reed, M.S., Vella, S., Sidoli del Ceno, J., Neumann, R.K., de Vente, J., Challies, E., Frewer, L. and van Delden, H. (2017) 'A theory of participation: What makes stakeholder and public participation in environmental management work?' *Restoration Ecology*.
- Rowe, G. and Frewer, L.J. (2005) 'A typology of public engagement mechanisms'. *Science, Technology, and Human Values*, 30 (2), 251–90.
- Rowe, G., Horlick-Jones, T., Walls, J. and Pidgeon, N. (2005) 'Difficulties in evaluating public engagement initiatives: Reflections on an evaluation of the UK "GM Nation?" public debate about transgenic crops'. *Public Understanding of Science*, 14 (4), 331–52.

- Sciencewise (2015) *Evaluating Sciencewise Public Dialogue Projects (SWP07)*. Harwell: Sciencewise Expert Resource Centre. Online. www.sciencewise-erc.org.uk/cms/assets/Uploads/Evaluation-docs/SWP07-Evaluating-projects-22April15.pdf (accessed 4 October 2017).
- Smithies, R. (2011) *A Review of Research and Literature on Museums and Libraries*. London: Arts Council England. Online. <http://webarchive.nationalarchives.gov.uk/20160204121949/http://www.artscouncil.org.uk/advice-and-guidance/browse-advice-and-guidance/museums-and-libraries-research-review> (accessed 4 October 2017).
- Stufflebeam, D.L. (1968) *Evaluation as Enlightenment for Decision-Making*. Columbus: Ohio State University Evaluation Center.
- Stufflebeam, D.L. (2001) *Evaluation Models* (New Directions for Evaluation 89). San Francisco: Jossey-Bass.
- Vargiu, A. (2014) 'Indicators for the evaluation of public engagement of higher education institutions'. *Journal of the Knowledge Economy*, 5 (3), 562–84.
- Warburton, D. (2008) *Deliberative Public Engagement: Nine principles*. London: National Consumer Council. Online. www.involve.org.uk/wp-content/uploads/2011/03/Deliberative-public-engagement-nine-principles.pdf (accessed 4 October 2017).
- Wilsdon, J. and Willis, R. (2004) *See-through Science: Why public engagement needs to move upstream*. London: Demos.
- Wynne, B. (2006) 'Public engagement as a means of restoring public trust in science: Hitting the notes, but missing the music?' *Community Genetics*, 9 (3), 211–20.